

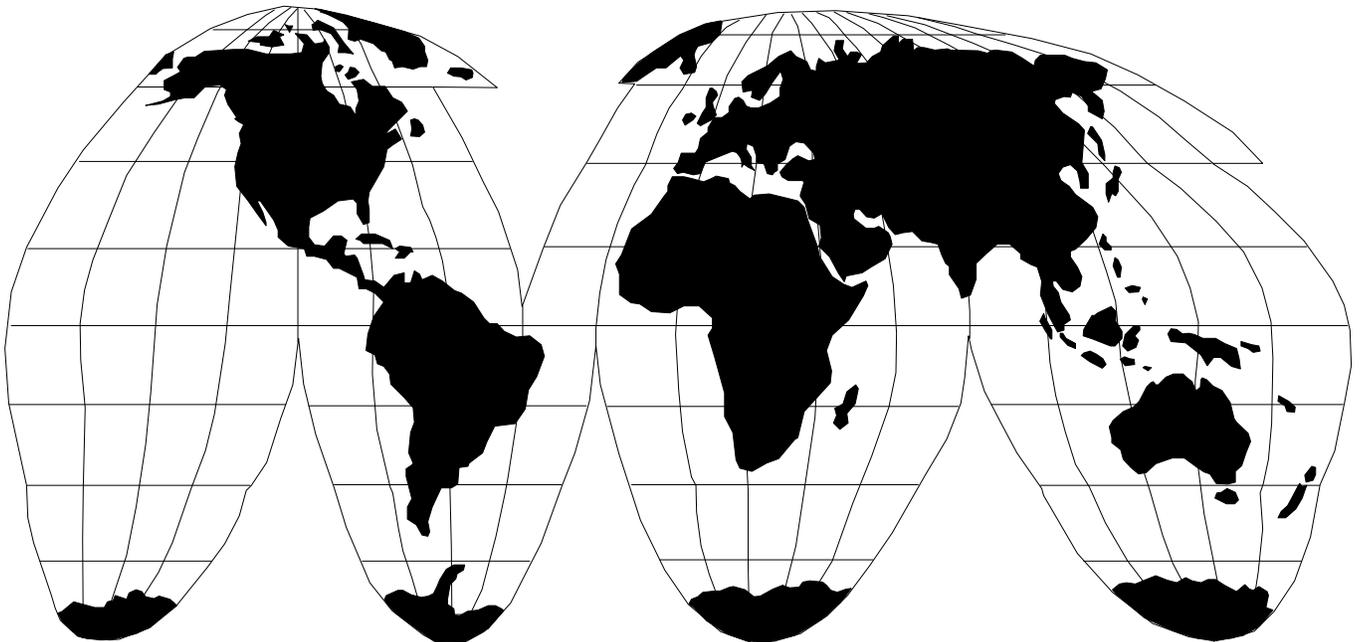
# Conditions of Competition in U.S. Forest Products Trade

Report on Investigation No. 332-400 under section  
332(g) of the Tariff Act of 1930

Publication 3246

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**U.S. International Trade Commission**



Washington, DC 20436

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# ABSTRACT

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On November 9, 1998, at the request of the Committee on Finance, United States Senate, the U.S. International Trade Commission instituted investigation No. 332-400, *Conditions of Competition in U.S. Forest Products Trade*, under section 332(g) of the Tariff Act of 1930, for the purpose of providing a report on how recent trends in foreign markets, such as the financial crisis in Asia, depreciation of currencies relative to the dollar, increased production, and declining consumption, have impacted the competitiveness of the U.S. forest products industry. As requested by the Committee, the Commission's report on the investigation includes the following information:

- An overview of the global market for forest products, including consumption, production, capacity, and trade trends;
- A description of the U.S. forest products industry and the major foreign forest products industries in Asia, Europe, and Latin America, including recent changes in production, capacity, marketing practices, and market shares;
- Trade patterns that affect U.S. forest products trade, including tariff and non-tariff barriers, fluctuations in exchange rates, and foreign competition;
- Foreign government policies affecting U.S. forest products trade, including financial and other domestic support programs, access to raw materials, regulatory enforcement, forestry practices that may distort domestic and/or international markets, and support from international institutions; and
- A comparison of the strengths and weaknesses of the major U.S. and foreign producers in areas such as raw materials, capital availability, technological capabilities, extent of plant and equipment modernization, present and future capacity, and government support.

The United States is the world's leading producer and consumer of forest products. Strong economic growth over 1994-98 has boosted production in the forest products industry. In quantity terms, lumber production grew by 1 percent, structural panel production increased by 5 percent, and paper and board production rose by 4 percent over this period. The strong economy contributed to rising imports of forest products, which increased by 33 percent over 1994-98. Exports of forest products have also grown, registering a 5-percent rise in value terms during 1994-98. While paper exports surged 35 percent over this period, there have been significant declines in exports of wood and wood products (-19 percent) and pulp and wastepaper (-9 percent). Moreover, while exports to NAFTA partners rose substantially (30 percent), there was a 29-percent fall in exports to Asia over this period, with the financial turmoil in Asia exacerbating the decline. U.S. exports of all forest products to Japan, in particular, have dropped significantly in the last two years.

Major producers of forest products in Europe include Sweden, Finland, Germany, France, and Russia. While most European production is consumed in Europe, almost \$14 billion

was exported in 1997. Major export markets for European forest products include the United States and Japan.

Brazil and Chile are the major producers of forest products in Latin America, and Mexico is an important market for forest products. In 1997, Latin America's contribution to global production of lumber and wood panels amounted to 8 percent and 5 percent, respectively. The pulp and paper industries of the region have increased their share of world production since 1994, but regional production accounts for a small share of the world total.

In Asia, the major wood producers are China, Japan, Indonesia, and Malaysia, while paper production is dominated by Japan, China, Korea, Indonesia, and Taiwan. Indonesia and Malaysia are net exporters of forest products; Japan, China, Korea, and Taiwan are net importers. The Asian economic crisis that began in mid-1997 reduced demand for forest products in most Asian countries during 1998.

Tariffs on raw materials, such as logs, chips, and pulp, are free or low in most countries, but increase on value-added products. Paper tariffs are generally lower than those on wood and wood products. Non-tariff barriers, such as regulatory restrictions, certification programs, and government intervention, have increased in importance as tariff levels have fallen.

Public notice of the investigation, reproduced in appendix A, was posted in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and published in the *Federal Register* (63 FR 64101) of November 18, 1998. A public hearing on the investigation was held on May 26, 1999, in Washington, DC.<sup>1</sup> Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under statutory authority covering the same or similar subject matter.

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<sup>1</sup> A list of witnesses who testified at the hearing is included in appendix B.

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# Abbreviations and Acronyms

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ADB	Asian Development Bank
AF&PA	American Forest & Paper Association
CAP	Common Agricultural Policy (Europe)
CBD	United Nations Convention on Biological Diversity
CSD	United Nations Commission on Sustainable Development
CITES	Convention on International Trade in Endangered Species of Wildlife and Flora
EAGGF	European Agricultural Guidance and Guarantee Fund
EMS	Environmental Management System
EU	European Union
EX-IM	Export-Import Bank of the United States
FAO	United Nations, Food and Agriculture Organization
FAS	United States Department of Agriculture, Foreign Agricultural Service
FS	United States Department of Agriculture, Forest Service
FSC	Forest Stewardship Council
HA	Hectares
HTS	Harmonized Tariff System
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IFF	Intergovernmental Forum on Forests
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IPF	Intergovernmental Panel on Forests
IPPC	International Plant Protection Convention
ISO	International Organization for Standardization
ITTA	International Tropical Timber Agreement
ITTC	International Tropical Timber Council
ITTO	International Tropical Timber Organization
IWGF	Intergovernmental Working Group on Forests
JEXIM	Export-Import Bank of Japan
M <sup>3</sup>	Cubic meters
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MT	Metric tons
NAFTA	North American Free Trade Agreement
NAPPO	North American Plant Protection Organization
NGO	Non Government Organization
NTCC	National Timber Certification Council
NTM	Non Tariff Measures
PEFC	Pan-European Forest Certification
SFI	Sustainable Forest Initiative
UNCED	United Nations Conference on Environment and Development
UNECE	United Nations Economic Commission for Europe
USDA, FAS	United States Department of Agriculture, Foreign Agricultural Service
USDA, FS	United States Department of Agriculture, Forest Service
USDOC, ITA	United States Department of Commerce, International Trade Administration

## Abbreviations and Acronyms—*Continued*

USTR	United States Trade Representative
VAT	Value added Tax
WCFSD	World Commission on Forests and Sustainable Development
WTO	World Trade Organization
WWF	World Wildlife Fund

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# EXECUTIVE SUMMARY

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## Introduction

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On October 19, 1998, the U.S. International Trade Commission (Commission) received a letter from the Senate Committee on Finance, requesting that the Commission “. . . investigate the conditions of competition in forest products trade . . . and provide a report setting forth the results of that investigation.” The Committee request cited the forest products industry’s concern “that the recent financial crisis in Asia and developments in Europe and Latin America . . . are having an important effect on U.S. forest product exports and on market conditions in the United States.” On November 9, 1998, the Commission instituted investigation No. 332-400, *Conditions of Competition in U.S. Forest Products Trade*, under section 332(g) of the Tariff Act of 1930. As requested by the Finance Committee, the study covers products included in chapters 44 (wood and wood products), 47 (pulp and wastepaper), and 48 (paper and paper products) of the Harmonized Tariff Schedule of the United States (HTS). The principal findings of this investigation are presented below.

## Global Overview

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- The world’s major producers and consumers of forest products are in North America, Asia, and Europe. Forest products industries in these areas have access to an abundant supply of raw material and large consumer markets.
- The North American market, comprising Canada and the United States, is the world’s leading producer and consumer of forest products. Most of North America’s consumption is supplied from within. The largest market, the United States, is largely supplied by domestic production and imports from Canada.
- Japan and China are the largest producers and consumers of forest products in Asia. Malaysia and Indonesia have utilized their significant forest resources by developing sizeable export-oriented forest products industries. The Asian economic crisis has reduced demand for forest products in most countries within the region.
- Most of Europe’s raw material needs are supplied by European production. Sweden and Finland are the principal suppliers, but Russian supplies are significant and production could increase significantly if its manufacturing sectors could secure capital to invest in equipment and infrastructure.
- Latin America ranks first among world regions in the area of forestland, but fourth or lower in production, trade, and consumption. Most of the natural forest in Latin America consists of tropical hardwoods.
- Oceania and Africa are small-volume producers and consumers of forest products. In Oceania, New Zealand is the only country widely engaged in export trade, and

Australia is the principal consumer and importer. In Africa, only South Africa is notable as a producer and exporter of forest products.

- In 1998, discussions by Asia Pacific Economic Cooperation member governments to reach an agreement on accelerated tariff and non-tariff barriers reductions on a variety of products concluded without results. Failure to reach agreements on forest and fisheries products was the primary reason cited.

## **United States**

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- In 1997, the United States accounted for approximately 27 percent of total world industrial wood production; one-third of world pulp production; and 29 percent of global paper and paperboard production. The United States annually consumes about one-third of world pulp production and about 30 percent of the world's paper and paperboard production. The average U.S. per capita consumption of paper and paperboard in 1997 was 329 kilograms, more than 4 times the world average.
- The United States has less forestland than Canada, Russia, and Brazil; however, several factors have enabled the United States to lead the world in the harvest and processing of forest products. U.S. resources are large and benefit from productive soils and a climate favorable to forest growth. The large U.S. market for forest products has encouraged investments in management and capital that have made the U.S. forests among the most productive in the world.
- The U.S. forest products industry is generally near timber resources, in part, due to the high cost of transportation and relatively low value of the raw material. Important U.S. production regions include the Pacific Northwest and the Southeast (primarily softwoods) and the Northeast and Midwest (mainly hardwoods). Producing mills are found throughout forested regions of the United States, although most of the production is in the West and the South.
- U.S. forestlands are most commonly owned by private individuals and industry, unlike many other major forest product producing countries in which the forests are mainly controlled by the government. In the United States, Government ownership accounts for 27 percent of the forestland. Government lands are concentrated in the Western States and have a significant influence on raw material supplies in this region of the United States.
- U.S. shipments of wood and wood products totaled \$100 billion in 1998, and increased about 1 percent over 1994-98. U.S. paper shipments are estimated at \$169 billion in 1998, up about 22 percent from 1994.
- Demand for most forest products is directly related to economic activity, and in recent years the United States has experienced a period of economic growth and low interest rates. Consequently, there has been an increased business demand for paper and paper products, as well as increased residential and industrial construction demand for lumber and wood products.

- During 1994-98, U.S. lumber production grew by 1 percent, wood panel production increased by 1 percent, and paper and paperboard production rose by 6 percent.
- During 1994-98, the value of U.S. forest product exports increased by 5 percent to \$19.5 billion. Canada, Japan, and Mexico were the principal export markets, accounting for 52 percent of U.S. exports in 1998. The value of exports peaked in 1995, at \$23.3 billion, and then generally declined to the 1998 level.
- Exports to NAFTA partners, Canada and Mexico, increased 30 percent over the period, offsetting declining exports to other markets (especially Asian markets). In 1998, paper and paper products accounted for nearly 53 percent of total U.S. forest product exports, followed by wood and wood products (30 percent) and pulp and wastepaper (about 18 percent). The value of 1998 exports was equivalent to about 7 percent of U.S. shipments, compared to a level of 8 percent in 1994. During 1994-98, wood and wood product exports declined by 19 percent; wood pulp and wastepaper exports were down by 9 percent; however, paper and paper product exports were up by 35 percent.
- Exports of forest products to Asia declined by 29 percent during the period and the value of U.S. forest product exports to many Asian markets declined significantly in 1998. The economic turmoil in Asia that began in mid-1997 appears to have accelerated the decline.
- U.S. forest product exports to Japan have been falling since 1995, and reached a 10-year low in 1998; they were down by 35 percent during 1994-98. U.S. exports of forest products to Japan fell sharply (down by 27 percent) in 1998 when compared with 1997. Japan was the largest market for U.S. forest product exports until 1997, when it fell to second behind Canada.
- U.S. imports of forest products totaled \$28.6 billion in 1998, and were up by 33 percent over 1994-98. Canada, by far the most significant supplier, accounted for over 70 percent of 1998 imports (primarily softwood lumber). The next largest suppliers, Mexico, China, Brazil, and Finland, each supplied about 3 percent of U.S. imports. Principal import items in 1998 were lumber (23 percent), printing and writing paper (14 percent), and newsprint (13 percent). Strong U.S. demand during 1994-98 contributed to an increase in imports: wood and wood products imports were up by 32 percent; paper and paper products increased by 35 percent; and wood pulp and wastepaper were up by 6 percent. Imports supplied about 10 percent of U.S. consumption in 1998, the same as in 1994.

## **Latin America**

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- In spite of recent strong growth, Latin America is not a major world producer or exporter of forest products. In 1997, the region produced about 9 percent of global industrial wood and about 5 percent of world production of pulp and paper. Similarly, total exports of the region's forest products amounted to \$5.7 billion in 1997, which accounted for just 4 percent of world exports.

- Brazil's forest products processing industry is composed of a large number of very small operations, although some large-scale and highly efficient pulp operations have been established. It is estimated that about 600,000 Brazilians depend on the sector for direct employment, while another 3.5 million depend indirectly on the industry. Brazilian exports of forest products, which reached \$3.2 billion in 1997, were fairly volatile during 1994-98 due to changes in domestic and overseas demand.
- Development of the Chilean forest products sector has occurred mainly through expansion of privately owned forestry plantations. Development of industrial plantations has been encouraged through a government assistance program that covers up to 75 percent of the cost of tree planting and maintenance. A few large companies manufacture the majority of Chile's forest products. In 1997, Chilean exports of forest products reached \$1.7 billion, up by 16 percent from 1994.
- Mexico's forest resources are relatively small and are less than 10 percent of U.S. forest resources. Mexico's forest product imports amounted to \$3.5 billion in 1997, of which 90 percent was supplied by the United States. Overall imports grew 11 percent between 1994 and 1997, in spite of a decline in 1995 following the peso devaluation. Mexico is not a major exporter of wood and wood products, although exports of lumber and value-added wood products (such as moldings) increased during 1994-97.

## Europe

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- Europe is a major producer and consumer of forest products. In 1998, the region accounted for about 25 percent of world industrial wood production, 24 percent of world pulp production, and 30 percent of world paper and paperboard production. Annually, Europe consumes over a quarter of world production of pulp, paper, and paperboard. The average European per capita consumption of paper and paperboard in 1998 was 102.4 kilograms, about twice the world average.
- Although most European production is consumed in Europe, significant amounts are traded. In 1997, European exports of forest products amounted to almost \$14 billion and imports were valued at almost \$13.2 billion. Significant export markets included the United States and Japan. Other important markets included Hong Kong, Turkey, and Australia. Major export items included paper and paper products (68 percent by value) and wood and wood products.
- Trade and industry sources in Europe have indicated that in 1998-99 increased quantities of forest products, especially pulp, certain papers, and hardwood plywood, have been entering Europe from Indonesia and Malaysia. These trade and industry sources generally attributed the increase in imports to the Asian financial crisis and the resulting decline in Asian demand, as product that would normally have been sold in Asia (especially Japan) was instead sent to Europe.
- The European Union (EU)--particularly Sweden, Finland, Germany, and France--and the Russian Federation (Russia) are the most important European forest product economies (in terms of production). Although Russian production of forest products

has declined significantly since the late 1980's (present levels are about 25 percent of peak levels), it is still currently a significant producer of forest products.

- In 1992, EU forests became subject to the Common Agricultural Policy. An important regulation affecting the forest products industry is EU regulation 2080/92, which promotes the conversion of agricultural land into forests in order to reduce the output of surplus agricultural products and provides assistance for this purpose.
- The certification of forests as being managed for “sustainable use” has been, and continues to be, an important issue in Europe. Demand for certified forest products is generally from buyers’ groups, who wish to offer certified forest products to their customers. Industry sources report that buyers are not offering premiums for certified products, nor are they charging higher prices to their customers; rather, they sell certified products to increase or protect market share and establish a positive corporate image. The first shipments of certified sawnwood in Europe were in 1997; although shipments are still relatively modest, they have been increasing. Certification systems include the Forest Stewardship Council (FSC), the International Organization for Standardization (ISO), and the Pan-European Forest Certification (PEFC) system.
- Long-term demand forecasts for all forest products in Europe indicate continuing growth over the next 10 years. Demand is expected to increase by about 2 percent per year over the period. Demand for printing and writing paper is expected to show the strongest growth at an average annual rate of 2.4 percent. Demand for newsprint is expected to grow at 1.9 percent and lumber is forecast to grow at an average annual rate of 1.1 percent.

## Asia

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- Asia is a significant producer and consumer of forest products. In 1997, Asia’s share of world production was 18 percent for industrial wood, 24 percent for lumber and wood panels, 21 percent for pulp, and 29 percent for paper and paperboard. In 1997, Asia’s share of world consumption was 22 percent for industrial wood, 27 percent for lumber and wood panels, 26 percent for pulp, and 32 percent for paper and paperboard. China, Japan, Malaysia, and Indonesia are the region’s major wood products producers, while Japan, China, Korea, Indonesia, and Taiwan dominate in paper and paperboard production.
- Asia’s share of world production and consumption of industrial wood, lumber, and wood panels was stable during 1994-97. Asia’s production and consumption of pulp and paper and paperboard grew at a faster rate than that in North America and Europe during 1994-97; Asia’s share of world production and consumption of these products consequently increased during this period.

- Indonesia and Malaysia are net exporters of forest products; Japan, China, Korea, and Taiwan are net importers. Indonesia is a large exporter of plywood, pulp, and paper, and Malaysia is a large exporter of logs, lumber, and plywood. Japan is a major importer of forest products, importing raw materials (logs and wood chips) and processed products (lumber, plywood, and pulp). China has increased its imports in recent years to satisfy growing domestic demand for forest products.
- The Asian economic crisis that began in mid-1997 reduced demand for forest products in most Asian countries during 1998. Forest products producers in the region struggled in an environment of falling output and prices.
- Government involvement in the forest products industry in Asia varies considerably by country, ranging from assistance with planting costs and tax concessions to the use of trade and investment policy to influence the allocation of forest product resources. In some countries, the Government has played an important role in the development of downstream wood processing industries to capture domestically more of the value-added manufacturing.

## **Tariff and Non-Tariff Barriers**

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- Tariffs on imports of raw materials (logs, wood chips, and pulp) are free or low in most countries, but increase on value-added products. Tariffs on wood and wood products are generally higher than those for paper and paper products. Tariffs on wood panels are among the highest, ranging from 5 to 20 percent.
- As forest product tariffs have been reduced, non-tariff barriers have become more prevalent. Types of non-tariff barriers identified include regulatory restrictions (building codes and product standards), certification programs (nongovernment product standards), government intervention (forestland ownership and industry assistance programs), and export restrictions (taxes, quotas, bans).

## **Exchange Rates**

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- Indonesia and Malaysia are two forest product producer nations that experienced sharp currency devaluations relative to the U.S. dollar after mid-1997. These real devaluations of Indonesian and Malaysian currencies relative to the U.S. dollar may have diverted world import demand from U.S. forest products toward Indonesian and Malaysian products, insofar as the devaluation's effects on imported input prices did not cut into production levels.
- In real terms, the Japanese yen and the Korean won have both weakened considerably against the U.S. dollar in recent years. The real Japanese exchange rate increased by 66 percent during June 1995-August 1998. Korea's real exchange rate increased by 73 percent over the 2-year period ending January 1998. During these periods of depreciation, both Japanese and Korean purchasers of forest products, barring other concurrent macroeconomic problems, may have had incentives to switch to non-U.S.

forest product suppliers with currencies against which the yen and won did not depreciate as markedly as against the U.S. dollar.

## **Environmental Issues**

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- The linkages between trade in forest products and the environment are complex, and there are divergent views on this relationship. One view is that international trade in forest products has little or no effect on the environment and therefore trade should not be inhibited by measures to address environmental problems. A second perspective is that the pressure of expanding markets leads to excessive consumption and increased cutting, and thus damages forests.
- Industry representatives suggest that trade liberalization may actually be beneficial for the environment since it increases the economic efficiency of resource utilization. They are concerned that policy responses being developed to combat deforestation (primarily in tropical areas) and degradation of forest quality will increase production costs and have trade impacts, ranging from import bans on particular products to regulatory and business practices that restrict trade or mislead consumers as to the relative environmental impact of forest products. Industry interests are concerned that the adoption of certain of the approaches to sustainable forest management under consideration will threaten their competitive position in domestic and foreign markets.
- The environmental community generally alleges negative impacts of current forest management practices and trade patterns in two areas. First, excessive harvesting or poor management of forest resources has local effects such as increased erosion and water pollution and disruption of communities, and potentially global effects on biological diversity and climate change. Second, the processing, transport, and consumption of forest products each produce additional negative effects such as excessive waste disposal and the introduction of insects and diseases. These two types of impacts have elicited calls from the environmental community for improvements in forest management practices and limits on future trade liberalization with respect to wood and paper products until these impacts can be addressed.
- Forest sustainability and forest product certification are two related issues currently receiving elevated attention from the forest products industry and environmental groups. Forest sustainability relates to the implementation of management systems that ensure that all values derived from the forests are protected and preserved for future use. Forest certification programs are intended to ensure that forest products are produced from resources that are responsibly managed. Problems associated with certification include agreement on what constitutes sound management and manufacturing practices and the costs of monitoring.

# CHAPTER 1

## INTRODUCTION

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### Background

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On October 19, 1998, the U.S. International Trade Commission (Commission) received a request from the Senate Committee on Finance requesting that the Commission “. . . investigate the conditions of competition in forest products trade . . . and provide a report setting forth the results of that investigation” (see request letter in appendix A). The Committee’s request cited the U.S. forest products industry’s development of export markets in Asia and elsewhere, and industry’s concerns that the recent financial crisis in Asia and developments in Europe and Latin America were having an important effect on U.S. forest product exports and on market conditions in the United States. Failure to reach an agreement on accelerated tariff and non-tariff barriers reductions in the Asia Pacific Economic Cooperation (APEC) Early Voluntary Sectoral Liberalization forum during 1997 and 1998 also heightened industry concerns.<sup>1</sup>

### Purpose

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This report provides (1) an overview of the global market for forest products; (2) a description of the U.S. forest products industry and the major foreign forest products industries in Asia, Europe, and Latin America, including recent changes in production, capacity, marketing practices, and market shares; (3) a description of trade patterns and conditions affecting U.S. forest products trade, including tariff and non-tariff barriers, fluctuations in exchange rates, and competition from exporting countries; (4) a description of foreign government policies affecting U.S. forest products trade, including factors such as financial and other domestic support programs, access to raw materials, regulatory enforcement, forestry practices that may distort domestic and/or international markets for forest products, as well as support from entities such as international financial institutions; and (5) a comparison of the strengths and weaknesses of major U.S., Asian, European, and Latin American producers in such areas as raw materials, capital availability, technological capabilities, extent of plant and equipment modernization, present capacity and future planned capacity expansion, and government support.

The Commission instituted investigation No. 332-400, *Conditions of Competition in Forest Products Trade*, under section 332(g) of the Tariff Act of 1930 on November 9, 1998. A public hearing in connection with this investigation was held on May 26, 1999, in Washington, DC.<sup>2</sup> Notice of the investigation and hearing was given by posting copies of the notice at the Office of the Secretary, U.S. International Trade Commission, and by

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<sup>1</sup> Discussions with staff of the American Forest and Paper Association (AF&PA), Jan.-Feb. 1999.

<sup>2</sup> Appendix B contains a witness list for the public hearing.

publishing the notice in the *Federal Register* of November 18, 1998 (63 F.R. 64101).<sup>3</sup>

## Scope

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At the direction of the Finance Committee, the study covers products included in chapters 44 (wood and wood products), 47 (pulp and wastepaper), and 48 (paper and paper products) of the Harmonized Tariff Schedule of the United States (HTS). The products in these HTS chapters comprise many unrelated manufactured products which, though often produced by the same firm, are usually treated as separate industries by the producers and industry analysts. This separation is based mainly on product markets (end uses) and competing products. Many of the larger manufacturers of the forest products included in this report are vertically and horizontally integrated, and usually regard wood producing and paper producing units as separate entities. The principal trade association of the industry, the American Forest and Paper Association (AF&PA), was until 1989 two separate organizations: the National Forest Products Association representing wood product manufacturers located in Washington, DC, and the American Paper Institute located in New York City. Members of the AF&PA include many regional associations representing the various producers of the commodities described below.

Forest products include wood and paper manufactured from softwood and hardwood species of trees. The term softwood is used to designate the wood of coniferous tree species (gymnosperms). The distinction is botanical and not based on the hardness of the wood, although coniferous species are generally softer and lighter in weight than hardwoods. The term hardwood refers to the wood of broad-leaved tree species (angiosperms). Hardwoods are usually deciduous, dropping their leaves in winter. Though generally harder than softwoods, some hardwoods are among the softest species (balsa). A further distinction is made for hardwoods by dividing them into tropical and temperate species. A few tropical species are traded in large quantities, such as teak, mahogany, and Philippine mahogany. Temperate hardwoods are found mostly in the Northern Hemisphere, although some are in the southernmost regions of Africa, South America, and Oceania. There are thousands of hardwood and softwood species, many with properties that make them especially useful for specific applications.

The principal forest products covered by chapters 44, 47, and 48 of the HTS as examined in this report are described below.

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<sup>3</sup> A copy of the notice of the Commission's investigation and hearing is included in appendix A.

## ***Wood***

Wood is defined as any woody material removed from the forest. This comprises residual wood and industrial wood as defined below.

### ***Residual Wood***

Any woody material from trees, other than logs or pulpwood, that is removed from the forest is categorized as “residual wood;” this includes firewood, sawdust and other wood waste, and similar unprocessed wood.

### ***Industrial Wood***

Industrial wood is that used to produce pulp, lumber, wood panels, and all other manufactured wood and paper products. This includes logs and pulpwood, poles, piling and posts, wood chips, and other shavings and particles. It excludes firewood gathered from forests and woodlands.

Logs can be cut in the forest to lengths suitable for intended uses, or tree-length logs can be transported to the mill where they are cut crosswise into suitable lengths for manufacture into lumber (logs, usually 8 feet or longer), veneer (straight sections, usually from the base of the log), pulpwood (logs too small to be used for lumber or veneer), and poles, etc. (logs with specified taper and cut to specified lengths).

### ***Lumber***

As defined in the HTS, lumber is a log sawn or chipped lengthwise or sliced or peeled, of a thickness exceeding 6mm (see “veneer” below). A log crudely sawn or chipped on two sides to facilitate stacking for shipment is classified as lumber, as is a one-inch board sawn on four sides and smoothly planed or sanded.

### ***Wood Panels***

Sheets of wood with a large surface relative to their thickness are referred to as “wood panels.” In the United States, a standard panel is 4 feet by 8 feet. Thicknesses range from near-paper-thin veneer to 2 inches. The 5 major types of panels are (1) veneer, (2) plywood, (3) oriented strandboard and waferboard, (4) particleboard, and (5) fiberboard. Veneer is a sheet of wood sawn or sliced, less than 6mm in thickness. The majority of veneer that is produced is consumed in the manufacture of plywood in the same factory. Plywood panels are made by gluing veneer in layers, usually with each sheet at a right angle to the next. Oriented strandboard (OSB) and waferboard (see definition below) are now being substituted for plywood. Some production statistics include plywood and OSB in a single category - structural panels. Waferboard and its

improved offspring OSB are manufactured from slivers or thin chips of wood glued together and formed into panels by pressing. OSB is an improvement over waferboard in that the slivers are laid at alternating angles adding strength. OSB competes directly with plywood in building applications; waferboard is substituted in uses where strength is less of a factor. Particleboard is made from very small shavings and fine particles of wood (about the size of sawdust) glued under pressure. Particleboard is used principally as shelving and for hidden components in furniture and cabinets. There are various types of fiberboard, including hardboard, medium-density fiberboard, and insulation board. These products are distinguished by density and application.

### ***Millwork and Builders' Joinery***

Millwork includes lumber that has been further manufactured into products such as decorative moldings, flooring, and siding. Builders' joinery is wood articles intended for use in building construction. Builders' joinery includes built-up building components constructed of wood materials such as windows and doors and their frames, structural building members (roof trusses), assembled wall panels, and precut stair components.

### ***Articles of Wood***

Articles of wood include many intermediate and final products for industry and consumers, including packaging and shipping containers, tools, household utensils, picture frames, jewelry boxes, clothes hangers, statuettes, and ornaments.

### ***Wood Pulp***

Wood pulp derived from logs, wood chips, and residues is the principal raw material used in the production of paper and paperboard. Certain types of wood pulp are also used for making rayon, plastics, and other nonpaper products. The principal types of wood pulp, identified by the basic production process employed, are mechanical wood pulp (groundwood), chemical wood pulp, and various combinations of mechanical and chemical pulp. Chemical wood pulps are produced by cooking chipped wood in a digester with chemical solutions to a point where the fibers can be easily separated. The three principal types of wood pulp identified by chemical process are sulfate, sulfite, and dissolving and special alpha. Sulfate is by far the largest type, accounting for over 95 percent of U.S. production.

### ***Wastepaper***

Wastepaper consists of newspapers, other printed matter, paperboard, cartons, bags, etc. that are recovered and reused in the production of wood pulp. Two measures of the use of wastepaper are the utilization rate and the recovery rate. The utilization rate is a calculation of wastepaper consumed by the industry divided by total paper and paperboard production. The recovery rate is the amount of wastepaper used as a percent

of total fiber use.

## *Paper and Paper Products*

As used here, paper includes the basic stock for the manufacture of industrial and consumer products, usually reported as paper and paperboard. Paperboards are heavier grades of paper. Paper and paperboards are produced as large sheets in rolls or stacks, and subsequently converted to products in the manufacturer's mill or sold to other paper product manufacturers (converters). Paper products are also referred to as "converted paper."

## *Conversion Factors*

The standard units of measure used in the report are metric. When measurements common to the U.S. forest products industry needed to be converted to metric units the following were used.

One acre = 2.471 hectares

Short ton = .90718 metric ton

Thousand board feet (logs) = 4.53 cubic meters.

Thousand board feet (lumber) = 2.358 cubic meters.

Thousand square feet (wood panels) 3/8 inch thick = .885 cubic meter

## **Approach**

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The study examines world trade in forest products, the conditions that affect such trade, and recent events that may have altered trade and competitive conditions. Its intent is to identify major world markets for forest products and explain how the demand in these markets is satisfied by domestic production and imports. It also identifies the major exporting countries and examines the conditions in which they compete with U.S. producers and exporters in domestic and foreign markets. The time frame covered by the report is 1994-98.

The information in this report is from the Commission's public hearing, written submissions, domestic and foreign fieldwork, and interviews with producers, purchasers, importers, exporters, academicians, and associations. Additional information was obtained from U.S. Department of Agriculture (USDA) and U.S. Department of State telegrams, annual commodity reports of the USDA Foreign Agriculture Service (FAS), U.S. Department of Commerce, International Trade Administration (USDOC, ITA), research and reports of various U.S. academic institutions, and previous Commission studies. Fieldwork took place in Japan, Belgium, Sweden, Switzerland, the United Kingdom, and in the States of Washington and Virginia.

## Organization of Study

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Chapter 2 provides an overview of the world's forest products producing regions and the important trade flows in forest products. Chapter 3 describes the U.S. forest products industry and important conditions that affect the industry. Similarly, Chapters 4, 5, and 6 describe the forest products industries of Latin America,<sup>4</sup> Asia, and Europe, respectively. Chapter 7 describes U.S. trade in forest products, lists tariff and non-tariff barriers applied to forest products, and examines the exchange rate fluctuations that occurred during the period under study. Chapter 8 incorporates the information presented in the previous chapters into a matrix ranking the producing and exporting countries according to their competitive strengths. Statistical tables are presented in the appendices.

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<sup>4</sup> Latin America includes Mexico and all the countries of Central America, the Caribbean, and South America.

# CHAPTER 2

## GLOBAL MARKET OVERVIEW

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Forests cover about 27 percent (approximately 3.5 billion hectares) of the world's land surface.<sup>1</sup> The availability of forest resources is an important determinant in the development of a forest products industry, its markets, and demand. Only a few countries lack any forests, but for many, the area, volume, and quality of the forest are insufficient to meet domestic needs. Fewer countries have forest resources greatly in excess of domestic needs. The Food and Agriculture Organization of the United Nations (FAO) periodically attempts to estimate world forest area and assess its condition. The most recent FAO estimate based on data compiled from individual country data is shown in the tabulation below by region.

<b>Forest area by region, 1995</b>	
	<i>Million hectares</i>
North America . . . . .	457
Latin America . . . . .	950
Europe . . . . .	146
Russia <sup>1</sup> . . . . .	816
Asia . . . . .	474
Oceania . . . . .	91
Africa . . . . .	520
<b>World total</b> . . . . .	<b>3,454</b>

<sup>1</sup> Includes all the area of the former USSR.

Source: State of the World's Forests, FAO, (Rome 1997).

The forest is dynamic, changing due to natural events (fires, insect and disease infestations), logging, and land clearing. Global inventories are at best rough estimates, given the vast area and inaccessibility of forestland in countries such as Brazil, Canada, and Russia. In the United States, the U.S. Department of Agriculture's Forest Service is required to assess the condition of the forest and rangeland every 10 years.<sup>2</sup> The latest assessment was completed for 1992 and includes data regarding the acreage of forestland and volume of timber thereon. All large scale forestland inventories of this type are done by sampling. However, not all countries conduct scientific assessments of forestland and many are subject to wide variances.

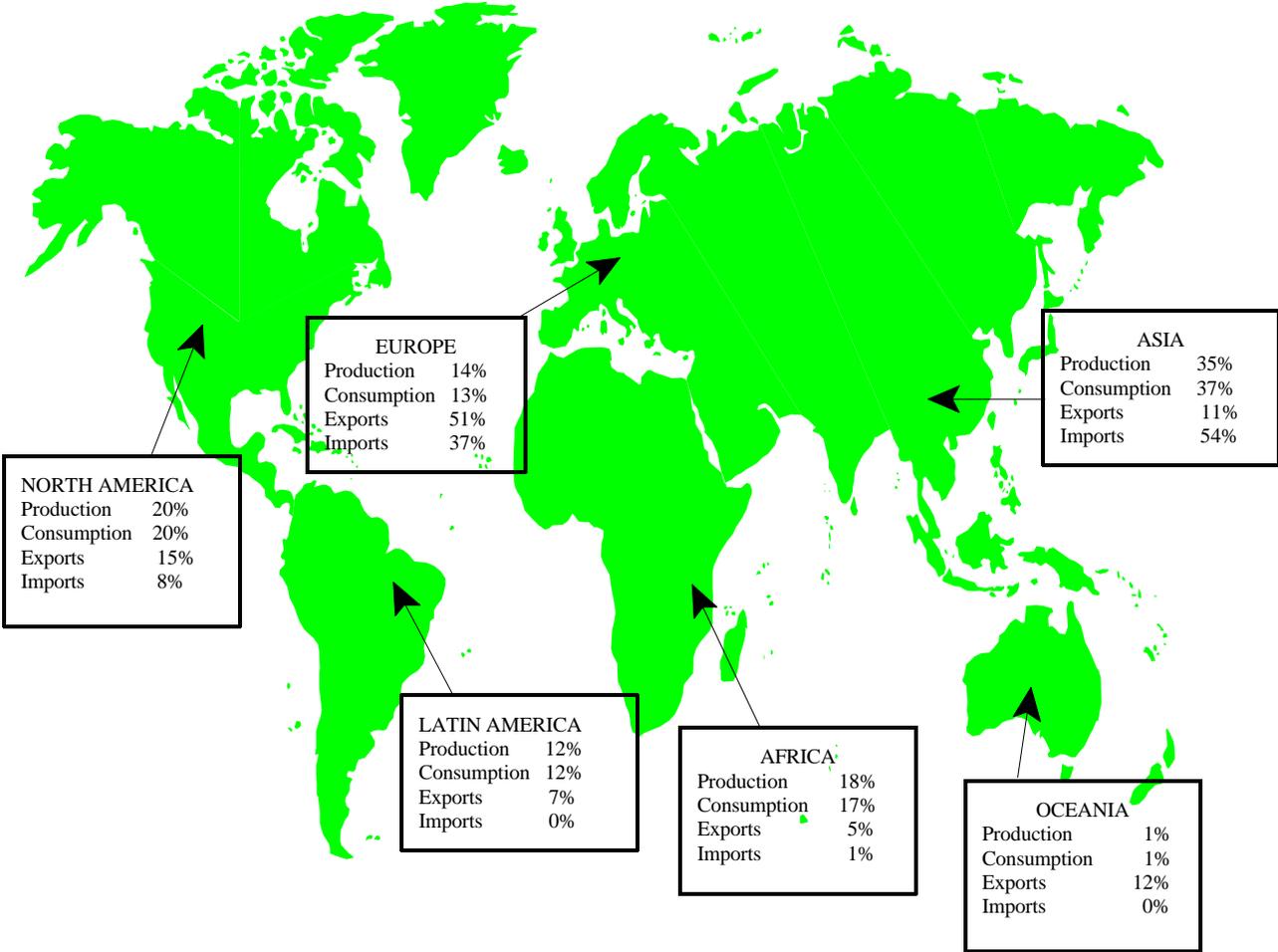
Figures 2-1, 2-2, and 2-3 illustrate the major regions of the world in terms of trade, production, and consumption for wood, lumber and wood panels, and pulp, paper, and

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<sup>1</sup> *State of the World's Forests, 1997*, Food and Agriculture Organization of the United Nations, (Rome, 1997), p. 10.

<sup>2</sup> The Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), P.L. 93-378, 88 Stat. 475.

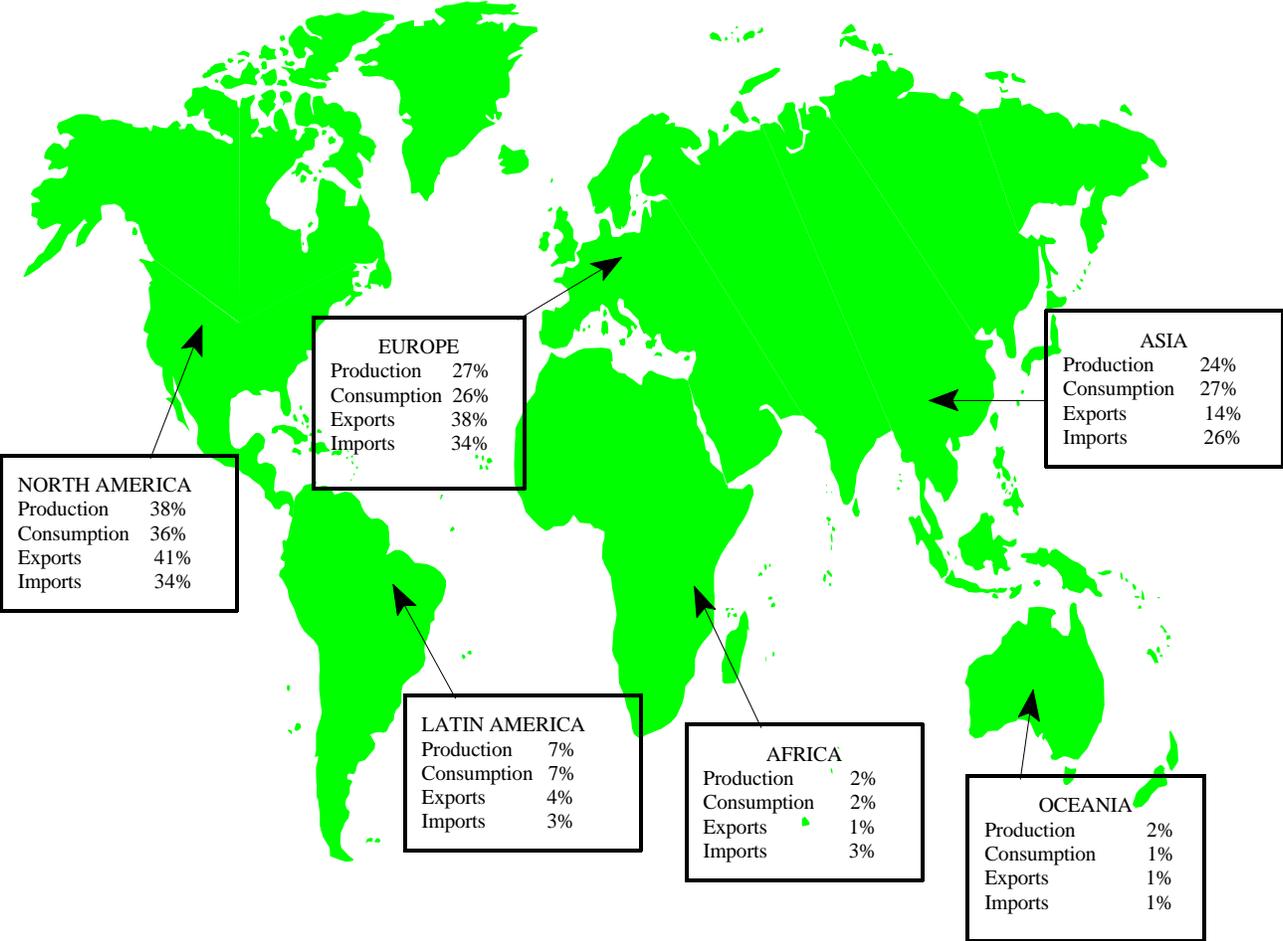
**Figure 2-1**  
**Wood: World shares of production, consumption, and trade, 1997**



Note.—Includes intraregional trade.

Source: Food and Agriculture Organization of the United Nations.

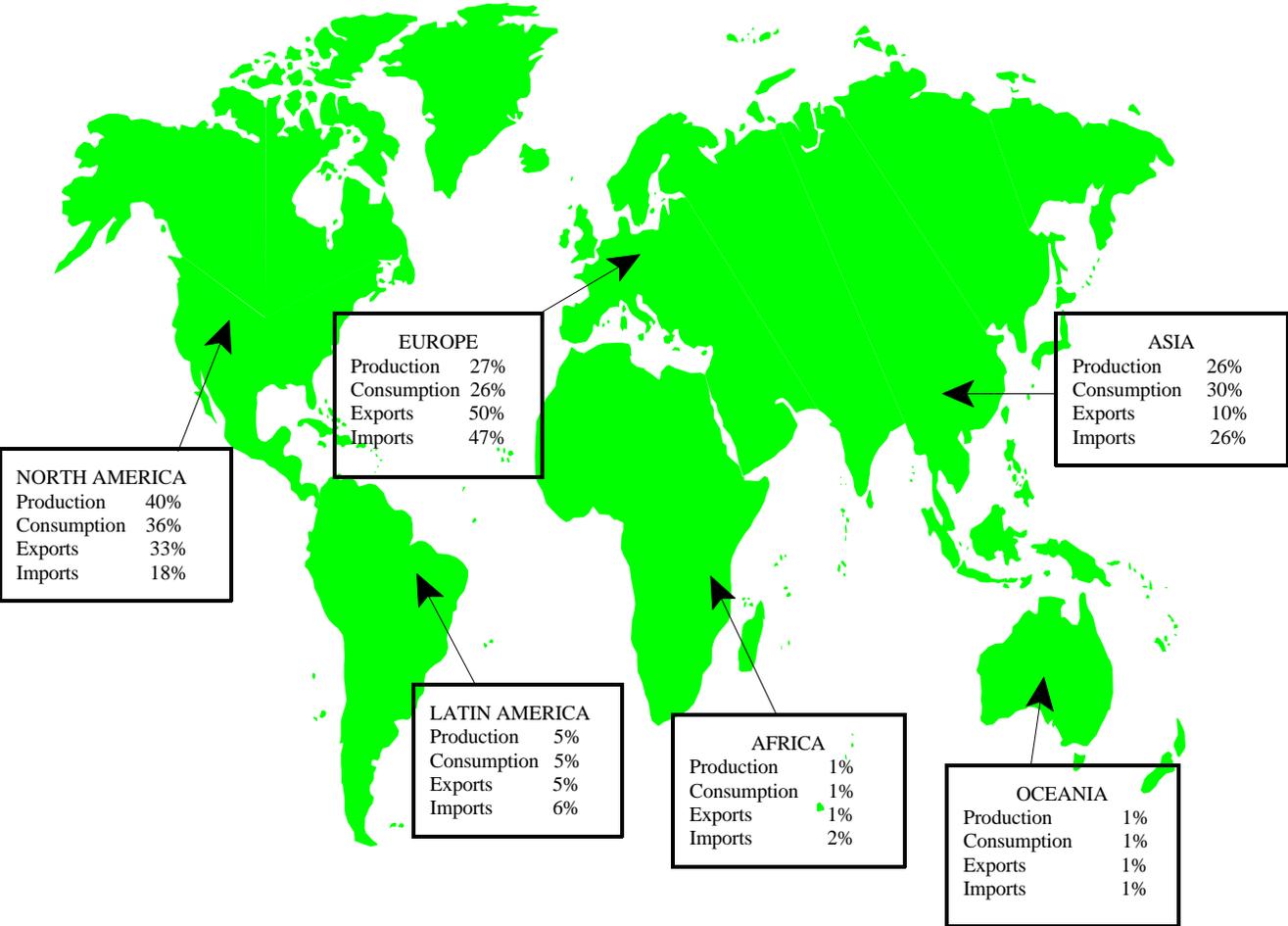
**Figure 2-2**  
**Lumber and panel products: World shares of production, consumption, and trade, 1997**



Note.—Includes intraregional trade.

Source: Food and Agriculture Organization of the United Nations.

**Figure 2-3**  
**Pulp, paper, and paperboard: World shares of production, consumption, and trade, 1997**



Note.—Includes intraregional trade.

Source: Pulp & Paper International, *International Fact & Price Book 1999*.

paperboard in 1997. North America, Europe, and Asia are the top three regions for forest product imports, exports, production, and consumption (appendix table C-1). North America is the world's leading producer and consumer of lumber, wood panels, pulp, paper and paperboard, and a wide variety of value-added products. The most important forest products producers (based on harvest of industrial wood) include the United States, Canada, Russia, China, Brazil, and Sweden. Japan imports large volumes of raw materials such as logs, wood pulp, and wood chips for processing, and ranks high among the world's producers of wood and paper products. Finland, France, Germany, Indonesia, and Malaysia also rank among the top producers of industrial wood.

North America, Europe, and Oceania have the highest per capita consumption levels of forest products (table C-2). Although Canada has a high per capita consumption rate for forest products, most of Canada's production is driven by demand in the huge U.S. market. Although Asia is the world's second-largest consumer of forest products, it has a very low per capita consumption rate, and expectations are that small increases in Asian per capita consumption would lead to significant increases in production and trade.

Oceania ranks third in exports as a percent of production for lumber and wood panels primarily because New Zealand, the principal producer in the area, exports over one-half of its lumber and panel production. Import penetration of the lumber and wood panels market in Africa (38 percent) is higher than any other world region (table C-3). Import penetration of the African market for pulp, paper, and paperboard is also relatively high (35 percent).

World capacity for certain paper production was estimated by the Canadian Pulp and Paper Association (CPPA) to be 238 million metric tons in 1998.<sup>3</sup> U.S. mills accounted for 24 percent of that capacity, followed by Japan (11 percent), Canada (9 percent), Finland (8 percent), and Germany (6 percent). The CPPA projects world capacity to increase by 7 percent (17 million metric tons) by 2001. For the United States and Japan, projections are for capacity increases of 2 and 3 percent, respectively. For Canada, Finland, and Germany, capacity is expected to grow 7 to 12 percent, and for the rest of the world, 11 percent. Historically, world capacity has increased at an annual rate of about 2 percent.

World trade in forest products totaled an estimated \$176 billion in 1997, with North America accounting for nearly 20 percent of the total (\$34 billion).<sup>4</sup> The value of world trade trended upward irregularly from 1994 to 1997. Measured by quantity, world exports of forest products increased each year from 1994 through 1997.<sup>5</sup> Lumber and panel product exports increased from 146 million cubic meters (m<sup>3</sup>) in 1994 to 163 million m<sup>3</sup> in 1997 (12 percent). Pulp and paper exports increased from 104 million metric tons in 1994 to 123 million metric tons in 1997 (up 18 percent).

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<sup>3</sup> Newsprint, printing and writing paper, coated and uncoated mechanical papers, and coated and uncoated wood-free paper.

<sup>4</sup> Compiled from the FAO forest products database found at Internet address <http://www.fao.org>, retrieved on Jan. 8, 1999.

<sup>5</sup> Ibid.

## *North America*

FAO reports that the United States and Canada account for about 13 percent of the world's forestland (457 million ha) and a significantly large volume of temperate hardwood and softwood growing stock. Estimates by Canada and the United States put the area of forestland higher than FAO. This is most likely the result of differing definitions, particularly in the case of Canada. The USDA Forest Service estimated the area of forestland in the United States in 1992 to be 298 million ha, of which 198 million ha were classified productive and available for harvest. Canada estimated that it had 418 million ha of forestland in 1995, of which 217.6 million were considered productive and available.<sup>6</sup> Less than 1 percent of Canada's commercial acreage is harvested annually. Of Canada's commercial forests, 63 percent is classified as softwoods, 15 percent hardwood, and 22 percent mixed species. Canada does not have a complete inventory of timber volume, but relies on Provincial estimates of allowable cut to regulate cutting. The estimated allowable cut in 1995 was 232.9 million m<sup>3</sup> and the harvest in that year was 183.1 million m<sup>3</sup>. The cut is consistently below the annual allowance. Provincial governments own 71 percent of Canada's forest and the Federal Government owns 23 percent, while private interests own only 6 percent.

It is estimated that Canada and the United States had 19.3 billion m<sup>3</sup> and 12.7 billion m<sup>3</sup>, respectively, of softwood growing stock in 1992.<sup>7</sup> Most of the hardwood resource (9.5 billion m<sup>3</sup>) and production is in the United States, but Canada has a large volume of low-quality hardwoods (5.4 billion m<sup>3</sup>) that can be harvested and used to produce reconstituted wood panels and pulp.

North America is the world's leading producer and consumer of forest products; and in 1997 the United States and Canada together accounted for 38 percent of world production of lumber and panel products and 40 percent of pulp, paper, and paperboard (figures 2-2 and 2-3).<sup>8</sup> In 1997, North America accounted for 38 percent of the world's consumption of industrial wood and for 36 percent of world consumption of lumber and wood panels and pulp, paper, and paperboard.

U.S. consumption of forest products is estimated at \$280 billion in 1998.<sup>9</sup> Lumber, millwork, and wood panels accounted for more than one-half of all domestic wood product shipments; paper product shipments were more diverse, serving a wide variety

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<sup>6</sup> Natural Resources Canada, *The State of Canada's Forests, 1996-1997*, (Ottawa: Canadian Forest Service, 1998), p. 6.

<sup>7</sup> David Boulter and David Darr, *North American Timber Trends Study*, Geneva Timber and Forest Study Papers, No. 9 (New York and Geneva, United Nations, 1996), p. 8.

<sup>8</sup> Compiled from the FAO forest products database found at Internet address <http://www.fao.org>, retrieved on Jan. 8, 1999.

<sup>9</sup> Derived from data in the U.S. Department of Commerce (USDOC), *1996 Annual Survey of Manufactures* (the last year for which such data are available) and USDOC, ITA, U.S. Industry and Trade Outlook, 1999, (McGraw-Hill: New York 1999), pp. 7-9.

of end uses. Imports provided about 11 percent of 1997 U.S. consumption, while exports accounted for 7 percent of production.

Reflecting their significant forest resources and large market demand, the United States and Canada have developed efficient, modern forest product industries supported by vast infrastructures that are competitive throughout the world. North American trade is primarily concentrated in basic products such as lumber and wood panels, certain wood pulp, and commodity paper products. Most countries restrict the export of logs to assure supplies for domestic manufacturing industries. The United States is a notable exception; logs, primarily of softwood species, were the principal U.S. wood export item until the recent recession in Japan reduced the demand for raw material supplies. The volume of U.S. log exports has exceeded that for lumber in each of the years from 1994-98, but trailed in value. In 1998, exports of lumber (\$2.0 billion) and logs (\$1.4 billion) were the principal U.S. wood export items. Chemical wood pulp (\$2.0 billion) and kraft linerboard<sup>10</sup> (\$1.4 billion) were the top U.S. pulp and paper exports. Softwood lumber (\$6.3 billion), printing and writing paper (\$4.4 billion), and newsprint (\$3.8 billion) top the list of U.S. forest product imports. U.S. imports are supplied principally by Canada, which accounted for 94, 93, and 63 percent of U.S. imports in 1998 of softwood lumber, newsprint, and printing and writing paper, respectively. U.S. forest product imports from Canada amounted to \$20.3 billion, or 71 percent of total U.S. forest product imports. The industry in the United States is discussed further in chapter 3, and its trade in chapter 7.

Softwood lumber is the primary component of Canadian export trade. Canadian softwood lumber exports in 1998 totaled \$7.5 billion, down from \$8.1 billion in 1994 and \$9.0 billion in 1997. Canadian softwood lumber exports are shown in table C-4. The decline in the value of Canadian softwood lumber exports from the peak in 1997 is attributable to a lower volume of exports to Japan and falling prices in the United States and Japan. In 1998, Canada's softwood lumber exports exceeded its pulp and wastepaper exports, and were equivalent to 73 percent of its paper and paper product exports. As shown in table C-5, the value of wood and wood products and paper and paper product exports increased during 1994-98. Increased exports to the United States offset declines in other markets. The increase in the value of Canadian forest product exports totaled \$3.0 billion over the five-year period, while Canadian forest product exports to the United States increased \$4.5 billion (table H-1). In 1998, the United States accounted for nearly 79 percent of Canadian forest product exports. If U.S. and Canada intratrade is discounted, exports from North America totaled \$24 billion, about 14 percent of the rest of the world's total. Canada's imports of forest products totaled \$5.5 billion in 1998, up from \$3.9 billion in 1994 (40 percent). Paper and paper products accounted for almost 63 percent of the total. The United States was the major source of imports accounting for 87 percent of Canadian forest product imports in 1998.

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<sup>10</sup> Paperboard used in the manufacture of corrugated boxes.

## *Latin America*

Latin America ranks first among world regions in total forested land, with about 950 million ha of forest cover. This represents almost 28 percent of the world's total forested area. Major producers include Brazil, Chile, and Mexico. Brazil accounts for 566 million ha of the region's forested area, much of which is tropical hardwood in the Amazon region.<sup>11</sup> According to FAS, while Brazil relies heavily on its forest resources in the Amazon and other areas, most of the wood used in panel, pulp, and paper production comes from plantation forests, which are mainly comprised of eucalyptus and pine trees.<sup>12</sup>

While Latin America possesses a significant share of the world's forests, its role as a wood and paper producer is much smaller. Twelve percent of the world's wood is produced in Latin America, with more than 56 percent of Latin American production concentrated in Brazil. Brazil dominates the region's production of both fuelwood and industrial wood, with fuelwood production accounting for over 60 percent of Brazil's wood production. The next largest producers, Chile and Mexico, are smaller suppliers of wood. Almost two-thirds of wood production in Chile is industrial wood. The main types of trees in Chile are radiata pine and eucalyptus, which mature at a rapid rate relative to other parts of the world.<sup>13</sup> Over two-thirds of Mexico's wood consists of fuelwood. Residual suppliers of wood include Colombia and Guatemala in fuelwood and Argentina, Ecuador, and Paraguay in industrial wood. Latin America produces about 8 percent of the world's lumber and just 5 percent of its panels. Lumber and panel production is dominated by Brazil, which produces over one-half of the region's supply. Chile ranks a distant second in lumber and panel production, with 13 percent of the region's lumber production and 15 percent of its panel production. Latin America accounts for 6 percent of the world's pulp production. Brazil and Chile, the main regional suppliers, produce 64 percent and 19 percent, respectively, of the area's pulp. Just 5 percent of world paper production occurs in Latin America, primarily in Brazil and Mexico.

Latin America is a small contributor to world trade in forest products. About 7 percent of world trade in industrial wood, 4 percent of lumber, and 5 percent of panels originate in Latin America. Chile, despite its small share of the region's industrial wood production, leads Latin America with a 68 percent share of industrial wood exports. This represents over 31 percent of Chile's industrial wood production. Brazil and Chile are the region's main suppliers of lumber and panels. Brazil maintains a slight edge over Chile in lumber exports, with 35 percent of the region's exports (compared with 30 percent for Chile), and a much larger share of panel exports (46 percent for Brazil compared with 21 percent for Chile). Latin America supplies 12 percent of the world's pulp exports, nearly all of which is sourced from Brazil or Chile. Paper exports, at

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<sup>11</sup> Jared J. Hardner and Richard Rice, "Rethinking Forest Concession Policies," in Kari Keipi (ed.), *Forest Resource Policy in Latin America*, Washington, DC: IADB, 1999, p. 193.

<sup>12</sup> USDA, FAS, *Brazil Forest Products Annual 1998*, FAS Attache Report #BR8620, Dec. 1998.

<sup>13</sup> USDA, FAS, *Chile Forest Products Annual 1998*, FAS Attache Report #CI8031, Oct. 1998.

slightly over 2 percent of world exports, come primarily from Brazil, with Mexico and Chile residual suppliers.

Latin American imports are relatively small; less than 1 percent of world wood imports and less than 3 percent of world lumber and panel imports. Mexico is the region's leading importer of wood, lumber, and panels. Pulp imports are of minor importance, at just 3 percent of world imports. Imports of paper (about 6 percent of the world's total) are spread throughout Latin America, with Brazil, Argentina, and Mexico the main destinations.

## *Europe*<sup>14</sup>

Europe is a major producer and consumer of forest products. Europe annually consumes about a quarter of the world's pulp production and about 27 percent of global paper and paperboard production. The average European per capita consumption of paper and paperboard in 1997 was about 100 kilograms, about twice the world level.<sup>15</sup> During 1994-97, by quantity, European industrial wood consumption rose by about 1 percent, lumber declined by about 6 percent, wood panel consumption increased about 9 percent, pulp and paper and paperboard each rose by about 5 percent, and wastepaper increased almost 4 percent.

While Europe only accounted for 14 percent of total world wood production in 1997, it contributed about 26 percent of total world industrial wood production. Industrial wood is produced throughout much of Europe. Top producers are Russia (with 16 percent of total production), Sweden (14 percent), and Finland (12 percent). In 1997, 27 percent of the world's wood products, such as lumber and panels, were produced in Europe, down from the 28 percent share Europe held in 1994. Major lumber producers in Europe include Russia, Sweden, Germany, Finland, and France. Lumber production in 1997 declined to 115 million m<sup>3</sup>, from a high of 120 million m<sup>3</sup> in 1994, primarily reflecting a steep drop in Russian lumber production. Wood panel production increased by 13 percent over 1994-97 to 48 million m<sup>3</sup>. Germany produced 23 percent of Europe's panels in 1997, followed by France (9 percent) and Italy (9 percent).

Europe contributed 24 percent of world pulp production and 29 percent of world paper and paperboard production in 1997. Paper and paperboard production rose nearly 9 percent to about 87 million metric tons. Paper production is scattered throughout Europe, with Germany and Finland accounting for 18 percent and 14 percent of the region's production, respectively. Pulp production was up 4.5 percent to about 42 million metric tons, due to the addition of new capacity aimed at satisfying increased domestic and export demand for fiber, and a sharp rise in recovered paper utilization by European papermakers.<sup>16</sup> Finland and Sweden each produced 26 percent of Europe's pulp in 1997.

Most European production is consumed within Europe, although significant quantities are

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<sup>14</sup> For this discussion, Russia is included in Europe.

<sup>15</sup> Pulp & Paper International, *Annual Review, July 1998* (Brussels), p. 18.

<sup>16</sup> Mark Payne, *European Analysis and Forecast* (Brussels: Miller Freeman, 1998), p. 12.

exported to the United States and Japan. Europe accounted for 44 percent of the world's exports of industrial wood in 1997, up from 40 percent in 1994. Russia is the leading exporter of industrial wood, accounting for 36 percent of the region's exports. In 1998, 38 percent of the world's exports of wood products originated in Europe, including 39 percent of the world's lumber and 36 percent of the world's panel products. Sweden (25 percent) and Finland (17 percent) are the top exporters of lumber in Europe. Germany and Belgium each accounted for 14 percent of Europe's panel exports in 1997. Europe exported 30 percent of the world's pulp in 1997, mainly from Sweden, Finland, and Portugal. In paper products, Europe is the world's predominant source of exports, with a 57-percent export share. Finland (21 percent), Sweden (18 percent), and Germany (15 percent) are the top exporters of paper and paperboard in Europe.

In addition to being a major exporter of forest products, Europe is also a significant importer. In 1997, 40 percent of the world's industrial wood exports went to Europe, mainly to Sweden, Finland, and Austria, and about one-third of the world's wood products were purchased by Europe. In addition, in 1997, 19 percent of European lumber imports went to the United Kingdom, 18 percent was purchased by Italy, and 14 percent by Germany. Germany and the United Kingdom are the top importers of panel products in Europe. Nearly one-half of the world's imports of pulp and paper are consumed by Europe. Germany imports roughly 24 percent of the region's pulp imports, with significant amounts purchased by France, the United Kingdom, and the Netherlands. Germany and the United Kingdom each imported 18 percent of Europe's paper imports in 1997.

## *Asia*<sup>17</sup>

Asia accounted for 18 percent of the volume of world production of industrial wood during 1994-97.<sup>18</sup> China, Indonesia, and Malaysia were the largest producers within Asia, with aggregate production equal to 70 percent of the region's output. Production of lumber in Asia was flat during the period and totaled 22 percent of world lumber output in 1997. Asian output of wood panels rose from 44 million m<sup>3</sup> in 1995 to 46 million m<sup>3</sup> in 1997, but Asia's share of world production remained unchanged at 30 percent. Large Asian producers of lumber and wood panels included China, Japan, Malaysia, and Indonesia.

Production of paper and paperboard in Asia increased at a much faster pace than production in North America and Europe during 1994-97. Output in Asia jumped from 72 million metric tons to 86 million metric tons and Asia's share of world production rose from 27 percent to 29 percent. Asia is approaching Europe, the number-two producer, and will likely surpass it in the next few years. Japan, China, Korea, Indonesia, and Taiwan were the major Asian producers of paper and paperboard. Pulp production has

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<sup>17</sup> Excluding Russia.

<sup>18</sup> Asia also produces a significant volume of fuelwood and wood for charcoal. This wood is gathered by individuals, primarily in rural areas, and used for cooking and heating. China, India, and Indonesia accounted for more than two-thirds of Asian production of fuelwood and wood for charcoal.

also grown rapidly in Asia, increasing 28 percent between 1994 and 1997. This rate of growth has been much greater than that in North America or Europe. In 1997, Asian pulp production accounted for 21 percent of world pulp output, up from 17 percent in 1994. China, Japan, and Indonesia were the largest Asian pulp producers.

Consumption of industrial wood in Asia rose from 318 million m<sup>3</sup> in 1994 to 334 million m<sup>3</sup> in 1997. Asia's share of world consumption of industrial wood increased slightly from 21 percent to 22 percent. Consumption of lumber in Asia and the region's share of world consumption were flat during the period. Consumption of wood panels in Asia increased from 46 million m<sup>3</sup> in 1995 to 48 million m<sup>3</sup> in 1997.

Propelled by rapid economic growth, consumption of paper and paperboard in Asia has grown faster than consumption in North America and Europe. Consumption increased 20 percent between 1994 and 1997, compared with 4 percent in North America and 9 percent in Europe. By 1997, Asia had almost surpassed North America, the largest consumer of paper and paperboard. China, Japan, Korea, and Taiwan were the four largest consumers in Asia. Reflecting increased paper production, pulp consumption in Asia increased from 37 million metric tons in 1994 to 46 million metric tons in 1997. Consumption in 1997 trailed that in Europe, the second-largest consumer of pulp, by only 1.1 million metric tons.

The volume of Asia's exports of industrial wood declined by 7 percent between 1994 and 1997 and their share of world exports fell from 12 percent to 11 percent. Asia's exports of lumber also decreased during the period, by 14 percent in volume, and as a share of world exports, from 6 percent to 5 percent. Although exports of wood panels from Asia increased by 13 percent between 1994 and 1997, their share of world exports fell from 38 percent to 34 percent. Malaysia accounted for over one-half of Asia's lumber exports, while Indonesia and Malaysia were the two principal exporters of wood panels.

Exports of paper and paperboard from Asia increased 52 percent between 1994 and 1997, from 7 million metric tons to 10 million metric tons. Asia's share of world exports rose from 9 percent to 12 percent. Major Asian exporters included Indonesia, Korea, Japan, and Taiwan. Asia more than tripled its pulp exports during the period, but in 1997 these exports accounted for only 4 percent of world pulp exports.

Asia's share of world industrial wood imports was a little over 50 percent during 1994-97. Japan, Korea, and China accounted for over 90 percent of the region's imports. Asia's imports of lumber increased from 21 million m<sup>3</sup> in 1994 to 23 million m<sup>3</sup> in 1997, while imports of wood panels rose from 15 million m<sup>3</sup> to 19 million m<sup>3</sup>. In 1997, Asian lumber imports accounted for 20 percent of the world total, while wood panel imports accounted for 40 percent of the world total. Japan, China, and Korea were the most significant Asian importers of these products.

Asia's imports of paper and paperboard increased 33 percent between 1994 and 1997, and the region's imports of pulp rose 15 percent. China, Japan, Malaysia, and Taiwan were the principal importers of paper and paperboard; Japan, China, Korea, Indonesia, and Taiwan were the principal importers of pulp.

## *Africa*

Africa's forest area is estimated to be larger than that of North America, Europe, or Asia, with a total forested area of 520 million ha in 1995.<sup>19</sup> Nevertheless, Africa is a minor contributor to world forest products production and trade. While Africa accounts for 18 percent of the world's wood harvest, almost 90 percent of that is comprised of fuelwood and charcoal. In wood products, such as lumber and panels, Africa accounts for less than 2 percent of the world's production. Less than 2 percent of pulp and paper production is centered in Africa. While South Africa is a major producer of paper and pulp in Africa, the quantities produced are small in comparison to those in the United States. In 1997, South Africa produced 2 million tons of paper and 2.3 million tons of pulp, while the United States generated 86 million tons of paper and 59 million tons of pulp.<sup>20</sup>

Africa exports small amounts of logs and other industrial wood. Many countries, most notably Cameroon, Cote d'Ivoire, Gabon, and Ghana, impose export restrictions (in the forms of bans or taxes) to discourage the export of unprocessed logs in lieu of processed products.<sup>21</sup> Only about 6 percent of the world's exports of industrial wood come from Africa, primarily from South Africa, Gabon, and Cameroon. Exports of lumber and panels are negligible. Roughly 4 percent of world lumber exports go to Africa, mainly to Egypt, Morocco, and South Africa. African imports of other types of wood are extremely small. Only 2 percent of the world's paper exports are marketed in Africa, with the majority destined for Egypt, South Africa, and Morocco.

## *Oceania*

The majority of forest products production, consumption, and trade in Oceania takes place in Australia, New Zealand, and Papua New Guinea. In Australia and New Zealand, most wood products production is derived from plantation-grown radiata pine and eucalyptus. New Zealand's forest industry and plantations have been expanding and investment in forestland has increased.<sup>22</sup> Over 90 percent of industrial wood in New Zealand is radiata pine, with 62 percent of radiata pine plantings occurring in the past 15 years.<sup>23</sup> FAS reports that the softwood harvest is expected to double by 2010, as the current crop reaches maturity and private forestry companies continue their extensive replanting efforts. Australia has been increasing its utilization of plantation forests for its log production. According to FAS, while just 3 percent of Australia's forested land area consists of plantation forests, these produce one-third of Australia's log supplies; moreover, the Government plans to triple plantation area by 2020.<sup>24</sup> Papua New Guinea

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<sup>19</sup> *State of the World's Forests, 1997*, FAO, (Rome, 1997).

<sup>20</sup> *Pulp & Paper, 1999 North American Factbook -- World Review* (San Francisco: Miller Freeman, 1998), p. 131.

<sup>21</sup> International Tropical Timber Organization, *Annual Review and Assessment of the World Tropical Timber Situation 1997* (Yokohama, Japan: ITTO, 1998).

<sup>22</sup> USDA, FAS, *New Zealand Forest Products Situation & Outlook 1998*, FAS Attache Report No. NZ8048, Sept. 28, 1998.

<sup>23</sup> *Ibid.*

<sup>24</sup> USDA, FAS, *Australia Forest Products Annual 1998*, FAS Attache Report No. AS8049, Nov. 6, 1998.

contains about 240 species of trees, including tropical rainforests and upland alpine forests, though only around 40 species are harvested from commercial forests for use in the production of forest products.<sup>25</sup>

In a global context, Oceania is a very minor segment of the world forest products sector. Less than 2 percent of the world's production and consumption of wood, lumber, and panels is concentrated in Oceania. In 1997, Oceania wood production was mainly in Australia (46 percent of Oceania's production), New Zealand (33 percent), and Papua New Guinea (18 percent). The Solomon Islands, with 2 percent of Oceania's wood production, is a residual producer but exports almost all of its industrial wood production to Asia. The vast majority of wood production in Australia and New Zealand is industrial wood, while a majority (63 percent) of wood harvested in Papua New Guinea is used as fuelwood and for the production of charcoal. Australia and New Zealand accounted for 95 percent of lumber production and 99 percent of panels in 1997. Australia holds a slight edge in the production of both products. Less than 2 percent of world pulp and paper production and consumption is in Oceania. All production is concentrated in Australia and New Zealand, with Australia producing nearly three-quarters of the region's paper and New Zealand generating 60 percent of the region's pulp.

Oceania is insignificant as a world importer of forest products, accounting for under 1 percent of world imports of all wood products and 2 percent of paper products in recent years. Oceania plays a disproportionate role in export markets for wood. In 1997, 12 percent of the world's wood exports and 14 percent of its industrial wood originated in Oceania. Australia accounts for slightly less than one-half of these exports, with New Zealand contributing another one-third, and Papua New Guinea an additional 13 percent. Exports of lumber and panel products from Oceania are only about 1 percent of total world exports. About 2 percent of the world's paper is imported by Oceania, 80 percent of which is consumed in Australia, while 2 percent of the world's exports of pulp come from Oceania, almost all of which are from New Zealand.

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<sup>25</sup> "The Forestry Industry," found at Internet address <http://www.datec.com.au/png/forestry.htm>, retrieved on June 9, 1999.

# CHAPTER 3

## THE U.S. FOREST PRODUCTS INDUSTRY

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The United States is the world's largest producer of forest products, accounting for about 27 percent of the world's industrial wood production, 25 percent of the production of lumber and wood panels, one-third of pulp production, and 29 percent of paper production.<sup>1</sup> U.S. shipments of forest products totaled an estimated \$270 billion in 1998. The U.S. forest products industry is a significant contributor to the U.S. economy, with product shipments accounting for about 7 percent of the shipments of all U.S. manufacturing firms. Pulp, paper, and paper products accounted for 62 percent of shipments and wood and wood products the remainder.<sup>2</sup> Imports and exports for the sector totaled \$28.6 billion and \$19.5 billion, respectively, in 1998 (appendix table H-1). During the period 1994-98, U.S. production, exports, imports, and consumption of wood and wood products trended upward as overall economic conditions in the United States improved.

### Structure

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The forest products industry is divided into two distinct manufacturing groups: wood and wood products and pulp, paper, and paper products. Discussion of the wood and wood products group focuses on the lumber and wood panel industries which together accounted for 65 percent of U.S. wood product shipments and nearly 45 percent of exports in 1997.<sup>3</sup> Lumber and wood panels are manufactured from a variety of softwood and hardwood species, each with varying characteristics and sometimes significantly different end uses. A more diverse group of products are included in pulp, paper, and paper products; these range from commodity papers (paper and paperboard) through consumer products (converted paper such as boxes, paper sacks, tissue, and paper towels).

### *Manufacturers*

U.S. manufacturers of forest products typically establish operations near timber resources, in part due to the high cost of transport and relatively low value of the raw

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<sup>1</sup> United Nations, FAO Forest Products Database, found at Internet address <http://apps.fao.org>, retrieved on Apr. 7, 1999.

<sup>2</sup> U.S. Department of Commerce (USDOC), *1996 Annual Survey of Manufactures*, (Washington, DC, 1998).

<sup>3</sup> Wood products include logs and rough wood products, lumber, moldings, millwork and joinery, wood panel products, wooden containers, tools and tool handles of wood and miscellaneous articles of wood.

material. Important U.S. production regions include the Pacific Northwest and the Southeast (mainly softwood products) and the Northeast and Midwest (mainly hardwood products). Producing mills are found throughout forested regions of the United States, although most of the production is in the West and the South.

Concentration in the wood products industry varies from not highly concentrated, with thousands of producers (lumber), to highly concentrated, numbering in the hundreds or less (wood panels). In general, the pulp, paper, and paper product industries are more concentrated even though there are many thousands of paper converters and distributors. Fewer large firms usually lead to economies of scale, with the large number of small mills in the lumber industry resulting in lower productivity. The U.S. lumber industry is not unlike the lumber industries of other countries in this regard. The tabulation on page 3-6 indicates the value added (productivity) for selected segments of the forest products industry. Value added for the pulp and paper mills is nearly three times that for sawmills.

Although some large corporations have high volumes of production, most lumber producers are small firms. In 1997, the largest lumber producer accounted for 7 percent of total U.S. production, the 5 largest producers accounted for 21 percent, and the 20 largest firms accounted for 39 percent.<sup>4</sup> The large number of small mills are overlooked in government and industry counts, and no accurate count is available. However, some indication of trends in the number of mills can be gained from an examination of the largest firms. The industry appears to be slowly becoming more concentrated. In 1990, the top 100 firms in North America operated 589 mills and accounted for 60 percent of all lumber production. By 1997, there were about 50 fewer mills among the top 100 firms, accounting for 58 percent of production. The remaining production is manufactured in mills numbering in the thousands (5,500 in the 1992 Census of Manufactures).<sup>5</sup>

In 1997, there were 193 wood panel producers (table D-1). These included 135 structural panel plants.<sup>6</sup> Capital costs of building softwood plywood and other wood panel mills tend to limit the entry of firms. The number of panel mills declined by 10 percent during the period 1994-98. The biggest declines were in plywood mills, with nine mills closing in the Northwest and seven in the South.<sup>7</sup> During the same time, two new mills opened in the South for a net loss of 14 mills. The largest decrease came in 1995, but the number has remained stable since then in response to increased construction activity and production in the Southern region of the United States. The overall decline in the number of mills since 1994 is attributable in large part to the concentration of production in larger, more efficient mills.

The pulp and paper industry is also highly concentrated, partly reflecting the cost of

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<sup>4</sup> Calculated from data in: Lumber & Panel, *1998 North American Factbook* (San Francisco: Miller Freeman Inc., 1998).

<sup>5</sup> USDOC, *1992, Census of Manufactures* (Washington, DC, Feb. 1995).

<sup>6</sup> Henry Spelter, Dave McKeever, and Irene Durbak, *Review of Wood -Based Panel Sector in the United States and Canada*, General Technical Report FPL-GTR-99 (Madison, WI: USDA Forest Service, 1997), pp. 21-31.

<sup>7</sup> Craig Adair, "Panel and Engineered Wood Markets," *Proceedings, 15th Annual Marketing Forest Products Conference* (Seattle, WA: Center for International Trade in Forest Products, Dec. 6, 1998), p. 155.

building a modern pulp mill, which is estimated at \$2 billion.<sup>8</sup> The number of pulp, paper, and paperboard mills remained fairly constant during 1994-98, but capacity increased (table D-1). In primary papermaking, more than 300 U.S. companies operate over 500 mills.<sup>9</sup>

In recent years, significant consolidations have taken place among the larger firms. In 1998, U.S.-based International Paper Co. acquired Union Camp Corp.<sup>10</sup> International Paper is the world's largest forest products manufacturer based on sales, and Union Camp was among the top 20. Weyerhaeuser Co. announced an agreement to acquire MacMillan Bloedel Ltd. of Canada in 1999.<sup>11</sup> Other completed or announced acquisitions include the Boise Cascade Corporation's announced acquisition of Furman Lumber, a building supply distributor,<sup>12</sup> and Willamette Industries' announced acquisition of Darbo, S.A., a particleboard manufacturer in France.<sup>13</sup> One source lists 95 acquisitions involving U.S. pulp and paper mill assets during 1994-98.<sup>14</sup> These consolidations often include significant land holdings. International Paper, the largest forestland owner in the United States, added 0.6 million ha to its 2.6 million ha with the acquisition of Union Camp. Weyerhaeuser is the largest forestland owner in North America, and MacMillan Bloedel is one of the few large private land owners in Western Canada. Mergers such as these lead to consolidations in both the wood and wood products and pulp and paper industries, as these companies have operations in sawmills, panel mills, and pulp and paper facilities. Many more mergers have occurred in the last 5 years. During 1997-98, there were 26 mergers involving wood and wood products companies and 29 mergers involving pulp and paper companies.<sup>15, 16</sup>

The U.S. pulp and paper industry is integrated both horizontally and vertically, with many companies operating various solid-wood-processing mills, pulp mills, paper mills, and converting facilities making a variety of end products. A typical pulp and paper company may have a solid wood products division, several pulp mills, and many paper mills. The company may produce newsprint at a mill in the Northeast, coated printing/writing papers at a mill in the Mid-Atlantic States, linerboard at a mill in the Southeast, recycled corrugated medium at a mill in the Great Lakes States, and solid wood products in many sawmills throughout the country. Some companies have large

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<sup>8</sup> W. Henson Moore, testimony at the Commission hearing, May 26, 1999, transcript of the hearing, p. 49.

<sup>9</sup> Also a large unknown number of secondary (and tertiary) industries produce converted paper products.

<sup>10</sup> "Paper shares soar on International Paper deal," Reuters News, found at Internet address <http://www.pointcast.com>, retrieved on Nov. 25, 1998.

<sup>11</sup> "Weyerhaeuser to Acquire MacMillan Bloedel Limited," Weyerhaeuser news release, found at Internet address <http://www.weyerhaeuser.com>, retrieved on June 23, 1999.

<sup>12</sup> "Boise Cascade to acquire Furman Lumber," PRNewswire, found at Internet address <http://www.pointcast.com>, retrieved on June 16, 1999.

<sup>13</sup> "Willamette Industries to Acquire French Particleboard Plant," PRNewswire, found at Internet address <http://www.pointcast.com>, retrieved on June 8, 1999.

<sup>14</sup> Pulp & Paper, *1999 North American Factbook*, pp. 44-46.

<sup>15</sup> Lumber & Panel, *1998 North American Factbook*, pp. 82-87.

<sup>16</sup> Pulp & Paper, *1999 North American Factbook*, p. 44.

land and forest resources, while other companies generally purchase timber from private and government landowners.<sup>17</sup>

Foreign investment in U.S. operations, which is growing, is dominated by Canadian and European companies. By one accounting, Canadian companies owned 100 percent of 15 U.S. pulp and paper mills and had part ownership in 4 others.<sup>18</sup> Foreign-owned firms account for less than 5 percent of U.S. shipments of wood and wood products; most are Canadian. Likewise, U.S. companies are invariably looking for, and finding, international investment opportunities. U.S. investment is primarily concentrated in Canada.<sup>19</sup> U.S. firms account for about 10 percent of Canadian lumber production and about 15 percent of wood panel production. U.S. producers of lumber products are closely linked with Canadian producers in supplying the North American market; more than one-quarter of U.S. consumption is produced in Canada. U.S. ownership or investment in wood product facilities in other countries is growing. The larger U.S. forest product producers have ownership or some form of partnership in manufacturing facilities in South America, Europe, Asia, and Oceania. There are also many U.S.-operated sales and distribution offices worldwide.

## *Employment*

During 1994-98, employment in the U.S. forest products industry remained fairly stable as the strong economy and low interest rates supported demand for building materials and paper products. Overall employment in the forest products industry peaked in 1995 at 951,000 and then declined to 934,000 in 1998, down by 9 percent for the 5-year period (table D-1).

In the sawmill industry, employment increased slightly from 172,000 in 1994 to 179,000 in 1995, and then declined to 172,000 in 1996 and leveled off at 170,000 in 1997-98 (table D-1). The decline came even as lumber production was increasing and can be attributed to increased productivity. Older mills in the west were closed in the late 1980s and early 1990s and new capacity incorporating improved manufacturing technologies was added. The majority of production workers are employed in softwood lumber manufacturing. Hardwood products are much more specialized and are produced in mills with far fewer workers and lower hourly output. The increase in employment in the panel industry from 76,000 to 80,000 during 1994-98 came for the most part in the oriented strandboard industry as significant capacity was added during the period. Excluding plywood, employment in the panel industry increased from 24,000 in 1994 to an estimated 27,000 in 1998.<sup>20</sup> Employment in the pulp and paper industry decreased from 693,000 in 1994 to 684,000 in 1998, or by about 1 percent (table D-1). The majority (68 percent) of employees in the pulp and paper industry are employed in the converted paper products

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<sup>17</sup> Many mills in the Eastern United States rely on private landowners for resource supplies, whereas in the Pacific Northwest, private company land and government lands are more common sources for obtaining tree fibers.

<sup>18</sup> Pulp & Paper, *1999 North American Factbook*, p. 103.

<sup>19</sup> Lumber & Panel, *1998 North American Factbook*, pp. 29-30 and pp. 49-53.

<sup>20</sup> USDOC, ITA, *U.S. Industry and Trade Outlook*, 1999 (McGraw-Hill: New York 1999), pp. 7-9.

segment. This was the only industry segment that registered an employment increase (6,000) over 1994-98. Employment in pulp mills dropped by a 1,000 workers during the 5 years, while employment in the paper and paperboard mills declined by 14,000 workers.

Labor required to produce forest products ranges widely from unskilled to skilled. In older, smaller mills, production tends to rely on much unskilled labor. Since the 1980s, producers have rapidly acquired more automated and computer-controlled equipment in order to improve productivity. This has generally resulted in a reduced need for labor. Productivity in the various segments of the forest products industry indicated by value added per hour is compared in the following tabulation, as reported by the U.S. Department of Commerce, Annual Survey of Manufactures, 1998.

**Productivity indicators in the forest products industry, 1996**

Producer	Man hours		Value added
	Million	Million dollars	Dollars per man hour
Logging . . . . .	134	5,775	43
Sawmills . . . . .	314	10,404	33
Wood panels . . . . .	149	5,045	34
Pulp mills . . . . .	24	2,201	92
Paper mills . . . . .	197	18,848	95

Source: U.S. Department of Commerce, *Annual Survey of Manufactures*, (Washington, DC: 1998).

Value added per hour for the lumber products industry (sawmills) is generally the lowest of the industries processing forest products. In fact, the lumber and wood panel manufacturing industry adds less value than logging, which, despite trends toward more mechanization, continues to send many loggers into the woods with chainsaws. The low productivity in smaller hardwood lumber and hardwood plywood mills is mostly the result of the lack of economies of scale and the required labor intensity of these operations. The higher value added for pulp and paper mills generally reflects their level of automation and efficiencies of scale.

## *Government Support*

The U.S. Government provides little direct support to the wood products industry. Ownership of timberland is usually afforded Federal and State tax relief.<sup>21</sup> Federal and State Governments also own a little over 25 percent of the timberland in the United States from which standing timber is sold at auction to the industry.<sup>22</sup> The wood products industry also benefits from research activities of the USDA Forest Service (Forest

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<sup>21</sup> USDA Forest Service, *Forest Owners Guide to Timber Investments*, Agriculture Handbook No. 708 (Washington, DC, 1995). These most commonly include lower property taxes for dedicated uses, depreciation allowances for improvements to land, and investment credits.

<sup>22</sup> USDA Forest Service, *Forest Resources of the United States, 1992*, General Technical Report RM 234, rev. (Fort Collins, CO, June 1994).

Service), state forestry departments, and universities. These research activities, though not specifically directed at industry needs, often lead to cost savings or improved efficiencies and information on markets.<sup>23</sup> Both the Departments of Agriculture and Commerce offer assistance in exporting.<sup>24</sup>

## *Factors Affecting Supply*

Access to raw materials is crucial to the establishment and continued operation of a forest products industry. Only a few countries, such as Japan and Germany, are so situated near countries with excess raw material supplies and an efficient transportation infrastructure that such an industry can be established relying in large part on imported raw materials (see the discussion of Japan and Germany in chapters 5 and 6, respectively).

The forest resources of the United States are exceeded by few countries, and most of the resource is physically and economically accessible. Figure 3-1 shows the Forest Service estimate of the U.S. forest and timberland by region.<sup>25</sup> However, existing forestland under public ownership continues to be withdrawn from logging and other extractive use. In 1992, 14 million ha of Federal forestland was reserved from such use. By 1998, the total was up to 19 million ha, or about 18 percent of all Federal forestland and 6 percent of all U.S. forestland.<sup>26</sup> Seven percent of U.S. timberland is reserved from timber harvest or other resource extraction.

The forest products industry owns about 15 percent of the timberland in the United States and is heavily dependent on individual private landowners (59 percent) and the Federal and State Governments (26 percent) for its supply of raw material. Though

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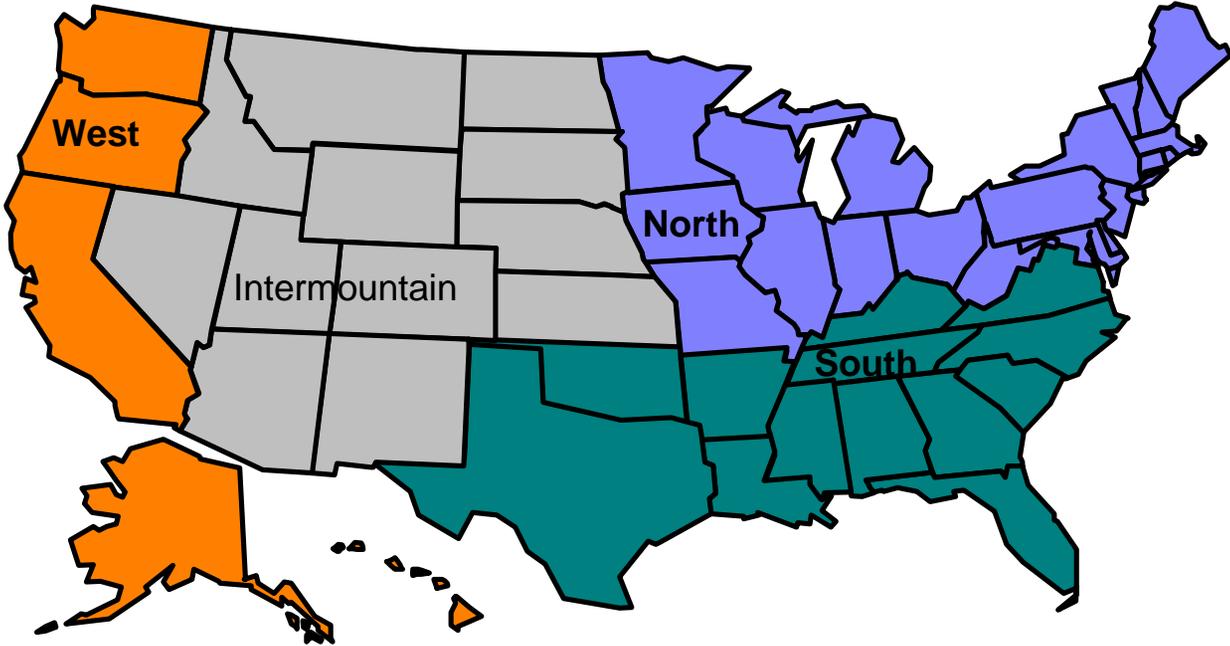
<sup>23</sup> Researchers in the Forest Service developed a chipping and sawing technique that significantly improved primary wood processing and has been widely incorporated in most modern sawmills since the 1970s.

<sup>24</sup> The Department of Agriculture has had a cooperative program for export development with the U.S. wood products industry since 1980. The program, in cooperation with industry trade associations, provides matching funds for export development programs, including loan guarantees, trade barrier identification and removal, market development, and trade information. The Department of Commerce provides assistance with market information and trade shows. Loan guarantees and working capital are also available to individual firms from the Export-Import Bank.

<sup>25</sup> The Forest Service defines forestland as land at least 10 percent stocked by forest trees of any size, and makes a further distinction for timberland as “. . . land that is producing or is capable of producing crops of industrial wood, and that is not withdrawn from timber utilization by statute or administrative regulation.” Timberland is therefore a more realistic accounting of the land base available for growing wood fiber than forestland. W. Brad Smith, Joanne L. Faulkner, and Douglas S. Powell, *Forest Statistics of the United States, 1992, Metric Units*, General Technical Report NC-168 (St. Paul, MN: USDA Forest Service, 1994), p. 135.

<sup>26</sup> W. Brad Smith, Joanne L. Faulkner, and Douglas S. Powell, *Forest Statistics of the United States, 1992, Metric Units*, General Technical Report NC-168 (St. Paul, MN: USDA Forest Service, 1994), p. 1.

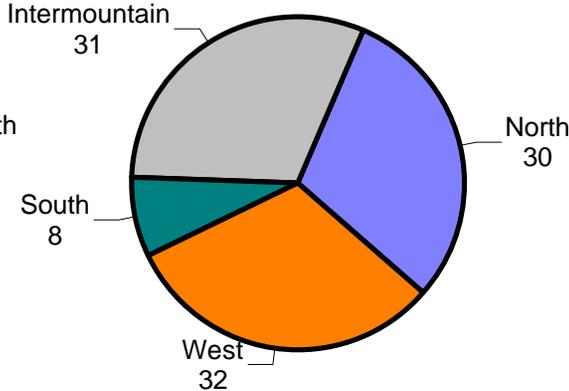
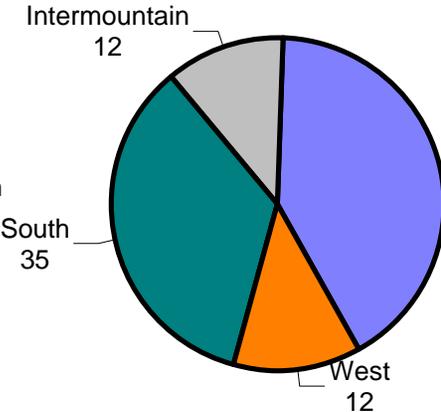
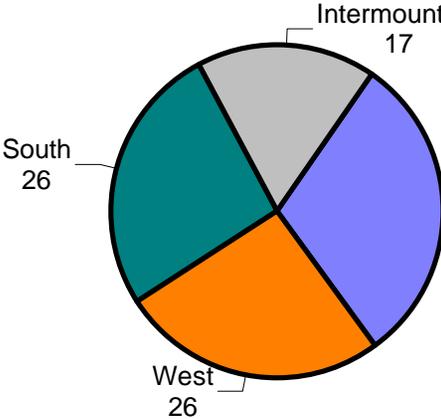
**Figure 3-1**  
**U.S. forest resources by region, 1992 (percent)**



**Forestland**

**Timberland**

**Reserved**



Source: W. Brad Smith, Forest Statistics of the United States, 1997, (USDA, FS, 1994) pp. 7-8.

industry ownership is relatively small, their holdings comprise some of the more productive lands in the United States and are intensively managed. They are also likely to be concentrated in the more heavily forested productive areas of the U.S. For instance, in Maine, the most forested State in the U.S., industry owns 47 percent of the timberland.<sup>27</sup> In many important forest products producing countries government ownership is more extensive. Ownership of U.S. timberlands (productive, nonreserved) is shown below.

**U.S. timberlands**

<b>Ownership</b>	<b>Thousand hectares</b>
Nonindustrial . . . . .	116,394
Industrial . . . . .	28,513
Government . . . . .	53,215
<b>Total . . . . .</b>	<b>198,123</b>

Source: W. Brad Smith, Joanne L Faulkner, and Douglas S. Powell, *Forest Statistics of the United States, 1992, Metric Units*, General Technical Report NC-168 (St. Paul, MN: USDA Forest Service, 1994).

At the Commission’s hearing, industry representatives noted that domestic public policy regarding access to fiber (timber supply), environmental standards, and taxes affected the industry’s competitive edge.<sup>28</sup> Others note that, “In this decade, the defining issue for the forest products industry has been the curtailment of public timber supply.”<sup>29</sup>

The principal U.S. Government land management agency affecting industry wood supplies is the Forest Service. The Forest Service administers 57 million ha of forestland in the National Forests, of which 34 million is classified as timberland. Until the early 1990s, the Forest Service sold the industry significant volumes of wood in the western United States, where 68 percent of the forest acreage is on public land. Since that time, the Forest Service has reduced timber sales and withdrawn land from the timber sale program, citing the need to protect endangered species and promote other land uses. In 1997, the Forest Service sold 833 million cubic meters (m<sup>3</sup>) of standing timber, down from 1,033 million m<sup>3</sup> in 1993 and 1,389 million m<sup>3</sup> in 1991.<sup>30</sup> Numerous medium and small mills in the West were entirely dependent on Forest Service sales and many closed as the Forest Service reduced sales.<sup>31</sup>

Laws and regulations aimed at protecting endangered species have curtailed logging on Federal and State lands and generally restricted the supply of logs for lumber products.

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<sup>27</sup> Government ownership of forestland in Canada is approximately 94 percent.

<sup>28</sup> W. Henson Moore, transcript of the hearing, pp. 9-10.

<sup>29</sup> Henry Spelter, Dave McKeever, and Irene Durbak, *Review of Wood -Based Panel Sector in the United States and Canada*, General Technical Report FPL-GTR-99 (Madison, WI: USDA Forest Service, 1997), p. 1.

<sup>30</sup> Western Wood Products Association, *Western Lumber Facts* (Portland, OR) Sept. 1998, and earlier issues.

<sup>31</sup> “Mill Closures Since 1980 Top 40%,” *Random Lengths* (Eugene, OR), Feb. 4, 1994, p. 1.

As noted above, the most significant reduction in logging as a result of these regulations has been on public lands in the Western United States.

In 1990, the U.S. Fish and Wildlife Service listed the northern spotted owl, which inhabits the forests of Washington, Oregon, and California, as a threatened species entitled to the full protection of the Endangered Species Act.<sup>32</sup> In 1991, an injunction was issued against all National Forest timber sales in western Oregon, Washington, and California until the Forest Service adopted a scientifically credible plan for protecting the owl. The injunction, issued by the U.S. District Court of Seattle, stopped logging on 163,000 ha of Federal lands in the three states.<sup>33</sup> The injunction significantly reduced the volume of timber available to western mills. Although the injunction was lifted in the summer of 1994, Government timber sales have fallen greatly, and are not expected to approach former levels. To a lesser extent, regulations to protect other endangered species, such as the red-cockade woodpecker in the Southeast, have also halted logging on some lands.

Government timber sales continue to be restricted by regulation regarding endangered species. As recently as August 2, 1999, the Forest Service and the Bureau of Land Management were ordered to “. . . conduct detailed wildlife surveys before proceeding to log up to 100 million bd. ft. (about 453,000 m<sup>3</sup>) of timber on Federal Land.<sup>34</sup> In addition, “. . . no new logging can take place on 100 other timber sales in Washington, Oregon, and California without court consent.”

Environmental regulations regarding manufacturing processes have increased costs for the forest products industry, particularly the pulp and paper manufacturers. Since the enactment of the Clean Air Act in 1970,<sup>35</sup> 19 additional regulations have been enacted which regulate manufacturing to protect air and water quality. All but the Cluster Rule were enacted before 1990.<sup>36</sup> The Cluster Rule, finalized in 1997, amends the Clean Air and Clean Water Acts, and sets new standards for effluent and air emissions to be implemented in stages beginning in 1998 and fully implemented by 2005. The Environmental Protection Agency estimates that total implementation will cost \$1.2 billion, while industry projects costs to be much higher.<sup>37</sup> Projections provided by firms indicate capital spending for compliance ranging from \$3.8 billion to \$4.2 billion between 1999 and 2008.<sup>38</sup> Canadian firms have also come under increasing environmental regulation. Spending plans for environmental controls totaled approximately \$1.8 billion for the period 1994 through 1996 and beyond.<sup>39</sup> Capital spending for pollution control totaled nearly \$600 million in both 1997 and 1998, about 6 percent of all capital spending by the pulp and paper industry in each year. Based on reported studies done for the AF&PA, compliance with environmental regulations was

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<sup>32</sup> 55 F.R. 26114-26194, June 26, 1990.

<sup>33</sup> *Forest industries*, “Judge Halts NW Timber Sales,” (Miller Freeman: July/Aug. 1991).

<sup>34</sup> “Judge Freezes 9 Timber Sales in Northwest,” Los Angeles Times, Aug. 4, 1999, p. 1.

<sup>35</sup> Air Quality Standards Act, P.L. 91-604.

<sup>36</sup> Pulp & Paper, *1999 North American Factbook*, p. 74.

<sup>37</sup> *Ibid.*, p. 77.

<sup>38</sup> *Ibid.*, p. 78.

<sup>39</sup> *Ibid.* p. 116.

higher in the United States than other developed countries, but “. . . the levels of protection in those countries are fairly close to ours, in some cases exceeding them.”<sup>40</sup>

The profitability of the U.S. forest products industry has generally been declining since 1995. The median profit margin for a selected group of large forest product manufacturers reached 7 percent in 1995, and then declined each year through 1997 to 2.6 percent.<sup>41</sup> Through the first six months of 1998, the industry’s average profitability increased to 4 percent, but then declined to third and fourth quarter averages of 2.5 percent and 2.2 percent, respectively. Industry profits were dampened by contrary returns in the wood and wood products and paper and paper products sectors. When one was doing well, the other was in decline. For instance, one company noted improved results for its wood products business in the first quarter of 1999, noting increased shipments of lumber and plywood, while poorer pulp and paper results reflected lower average prices.<sup>42</sup> Strong demand and high prices started an upturn in the paper industry in 1994 that continued into 1995. Declining prices and lower demand ended the upturn in 1996.<sup>43</sup> Since 1997, a strong dollar and the Asian financial crisis have negatively affected the paper industry, while an oversupply of lumber in North America has caused declining prices and profits for the wood industry.<sup>44</sup>

The Department of Commerce has estimated that capital spending by the wood and pulp and paper industries increased by 65 percent and 17 percent, respectively, between 1994 and 1998.<sup>45</sup> Capital spending in the wood products industry was greatest for the reconstituted wood panel industry (OSB and particleboard), up from \$333 million in 1994 to \$640 million in 1998 (92 percent). The expansion of capacity in OSB mills is the likely reason for the increase. It is currently reported that new plant construction and expansions are reportedly being postponed due, in part, to weak market conditions in 1999.<sup>46</sup> Capital expenditures in the pulp and paper industry (estimated at \$9.0 billion for 1998) increased modestly (below 20 percent) between 1994 and 1998. Only the pulp and box producers showed big increases. Capital spending by pulp producers increased by 55 percent, from \$315 million in 1994 to an estimated \$488 million in 1998. Pulp producers have been increasing capital spending mostly to comply with environmental regulations. Producers of corrugated and solid fiber boxes increased spending from \$532 million in 1994 to \$795 million in 1998. The strong U.S. economy and resulting demand for shipping containers has likely led to increased spending for capacity expansion, modernization, and conversion of linerboard capacity to other grades.<sup>47</sup>

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<sup>40</sup> W. Henson Moore, transcript of the hearing, p. 39.

<sup>41</sup> “Annual Survey of American Industry,” *Forbes*, various issues, 1994-98.

<sup>42</sup> “Champion profit beats estimates,” Reuters news release, Apr. 16, 1999.

<sup>43</sup> Pulp & Paper, *1999 North American Factbook*, pp. 17-18.

<sup>44</sup> “Industry Surveys, Paper and Forest Products,” Standard and Poor’s (McGraw-Hill: New York, Apr. 15, 1999).

<sup>45</sup> Calculated from data in USDOC, ITA, *U.S. Industry and Trade Outlook*, 1999 (McGraw-Hill: New York 1999).

<sup>46</sup> Lumber & Panel, *1998 North American Factbook*, p. 73.

<sup>47</sup> Pulp & Paper, *1999 North American Factbook*, pp. 395 and 423.

## *Factors Affecting Demand*

Demand and the factors affecting demand for forest products vary by product. However, in general, macroeconomic factors such as population, income, and interest rates are the basis for demand changes.<sup>48</sup>

The demand for wood products and housing construction are linked. Most of the products covered here are consumed in construction and home building, and consumption is directly correlated to construction spending and the number of new homes built. Construction and home building in turn fluctuate with the factors relating to the overall strength of the economy (e.g., interest rates, personal income, and saving). A one percentage point change in home mortgage interest rates would increase or decrease the cost of an average home by approximately \$37,000 dollars over the course of a 30 year mortgage, whereas a 20 percent change in the price of the lumber and panel components of the same home would increase or decrease the price by approximately \$1,400.<sup>49</sup> When new home construction declines, repair and remodeling of existing structures tend to increase, offsetting some of the decline.

The major consumers of wood products are construction firms, wood product manufacturers, and home builders. These consumers are found in all regions of the country and are concentrated, with the exception of the manufacturers, where population is dense. Flooring and siding manufacturers purchase lumber products for further processing; manufacturers of furniture, containers, and truck and railcars also purchase lumber to make their products. Manufacturers also purchase logs and lumber from each other. In addition, individual consumers purchase lumber products for home improvement and workshop (craft) projects. Purchases by individual consumers, although significant, are small when compared with builders' or manufacturers' purchases.

Softwood lumber and wood panels are used extensively in the unexposed framing of buildings, while hardwood is used for the manufacture of furniture and woodwork in exposed building applications (flooring and decorative wall paneling). Softwoods are usually sold in species groups such as fir, pine, or spruce. Most softwood species are preferred by builders for certain applications, but can be substituted for each other. Hardwoods are sold individually by species for the particular quality of the species.

Overall demand for paper and paper products generally correlates to GDP growth. During general economic downturns, certain segments of this group are adversely affected (e.g., those papers used as inputs to industrial container fabrication) while other segments are less affected (e.g., household tissue).

Paper and paperboard mills purchase and consume wood pulp and wastepaper as an input to the production of paper and paperboard. Consequently, demand for wood pulp and wastepaper is a direct function of demand for paper and paperboard, which again reflects economic growth and activity. However, consumers and environmental groups have

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<sup>48</sup> David Boulter and David Darr, *North American Timber Trends Study* (UN, FAO: Geneva, 1996), p. 24.

<sup>49</sup> Calculated from data in "Weekly Market Report of Lumber and Panel Products," *The Value of Forest Products Then and Now* (C.C. Crow's Pub.: Portland, OR, June 11, 1999).

successfully pressured paper producers for greater use of wastepaper in the production process. The demand for newsprint is based on the demand for newspapers, which in turn is responsive to circulation and advertising revenue. Such revenue is influenced by business activity and by competition from other media. Box and bag consumers are commercial and industrial users requiring a particular packaging container for a specific product. Most paper/paperboard boxes and bags are custom made and manufactured to meet a consumer's specific applications.

In general, variables that may influence a paper and paper product purchaser's decision include price, quality, service, custom design capabilities, stocking arrangements, and traditional customer-client relationships. The importance of these considerations varies among assorted product lines and may even vary within a major product grouping.

## **Production, Products, and Capacity**

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The output of forest products firms is, for the most part, indistinguishable without proprietary marking. Many of the products also substitute for each other in their principal uses (residential and commercial construction). For example, over time plywood, a structural panel, has replaced lumber in many of its traditional uses, and now panels manufactured from wood chips and shavings (structural panels of particleboard and oriented strandboard) are widely used as substitutes for plywood.<sup>50</sup> The larger firms in the forest products industry are highly integrated and are buffered from these substitution effects. Many of these products also face competition from products produced by other industries. Materials such as concrete, steel, aluminum, vinyl, and plastics compete with forest products in some of their most important markets.<sup>51,52</sup> However, most of these products are not commonly substituted for lumber products in residential construction, primarily because of the higher material and labor costs associated with their installation and use. Steel and aluminum are used in commercial construction because of their strength. Steel studs (a lumber substitute), which are used extensively in commercial building construction, have been increasingly used in residential construction as lumber prices increase. Paper also faces competition from other materials; plastic bags have taken a large share of the retail store market from paper bags, and plastic has replaced other flexible and rigid packaging and food containers.<sup>53</sup>

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<sup>50</sup> Henry Spelter, Dave McKeever, and Irene Durbak, *Review of Wood Panel Sector in the United States and Canada*, General Technical Report FPL-GTR-99 (Madison, WI: USDA Forest Service, 1997), p. 6.

<sup>51</sup> "Steelmakers Seek Larger Share of Housing Market, Weekly Report on North American Forest Products Markets," *Random Lengths*, Feb. 5, 1993.

<sup>52</sup> "Plastic Lumber Challenges Treated Wood," *Random Lengths*, Apr. 23, 1993.

<sup>53</sup> "Paperboard, Plastic Vie for Market Share," *Official Board Markets*, vol. 71, No. 25, June 24, 1995 (Avanstar Communications: June, 1995).

The degree of vertical and horizontal integration of firms in the U.S. forest products industry varies considerably with the size of the individual firm, by region, and end product. Most larger forest product producers are horizontally integrated and produce a wide variety of products, including lumber, plywood, and paper. Smaller mills generally produce a narrower range of products, and some only a single product. In general, the degree of vertical integration in the wood products industry is low, owing to the large number of lumber manufacturers. Many small and medium size producers of forest products purchase logs and pulpwood from sources outside their operations and sell their finished products through intermediaries.<sup>54</sup> This is particularly true for softwood lumber producers in the Pacific Northwest. Hardwood lumber producers, particularly in the eastern portion of the United States, rely more on privately owned timber for raw material supplies.

## *Wood and Wood Products*

The United States is the world's leading producer of wood and wood products, accounting for slightly more than 32 percent of the world's harvest of industrial wood and 25 percent of the quantity of world production of lumber and wood panels in 1997.<sup>55</sup> Production of wood and wood products is heavily influenced by general construction levels, which are in turn affected by macroeconomic factors such as GDP and interest rates. Production of softwood lumber and structural wood panels is highly correlated with residential construction. Housing starts and construction expenditures for the period 1994-98 are shown in table D-2. Housing starts in 1998 were up by 11 percent from the level in 1994, and were at the highest level since 1987. The value of construction increased from \$520 billion to \$655 billion over 1994-98 (table D-2). However, construction spending in constant dollars increased 10 percent over the 5-year period.

The value of U.S. shipments of wood and wood products increased by 1 percent over 1994-98 to an estimated \$100 billion. Lumber accounted for the largest percentage of U.S. industry shipments of wood and wood products (about 30 percent), followed by millwork and wood panels (15 percent). Softwood lumber production, the largest product category and the most closely correlated with housing starts, totaled 82.5 million m<sup>3</sup> in 1994 (table D-3). Housing starts declined in 1995 to a low for the 5-year period, and softwood lumber production followed, totaling 75 million m<sup>3</sup>. Similarly, softwood lumber prices reached a low in June 1995.<sup>56</sup> Home mortgage interest rates fell during 1995 from 9.15 percent in January to 7.03 percent in December. Interest rates increased in 1996, but stayed in a range between 7.6 percent and 8.3 percent from March through December, and housing starts surpassed the 1994 level. Softwood lumber production totaled 78 million m<sup>3</sup> in 1996, up 4 percent, but still below the 1994 volume. Softwood

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<sup>54</sup> Approximately 10 percent of the consumed timber comes from land owned by the forest industry. The majority of this timber is controlled by enterprises that are also large paper manufacturers.

<sup>55</sup> United Nations, FAO Forest Products Database, found at Internet address <http://apps.fao.org>, retrieved on Apr. 7, 1999.

<sup>56</sup> The Random Lengths composite rate was \$292 per thousand board feet in June, down from the year high of \$383 in February. Forest Products Market Prices and Statistics, 1995 Yearbook (Random Lengths, Eugene, OR: 1996), p. 204.

lumber prices generally increased during the year. The “Random Lengths” composite framing lumber price started the year at \$329 per thousand board feet (the standard unit of measure in the United States) and increased to a high of \$443 in September. The average composite price for 1996 was \$401 per thousand board feet, up by 19 percent from the 1995 average and 2 percent below the 1994 average. Home mortgage rates remained favorable during 1997 and 1998, dropping into the high 6 percent range for several months during 1998. Housing starts slowed in 1997, but in 1998 reached their highest level since 1987. Reflecting the increase in demand, softwood lumber production increased to 81.8 million m<sup>3</sup> in 1997 and 82.5 million m<sup>3</sup> in 1998 (table D-3). The composite price increased again in 1997 to \$417 per thousand board feet, but in 1998 declined by 5 percent to \$398. The drop in price in 1998 is generally attributed to the decline of log and lumber exports, thus increasing supplies for the domestic markets and reducing upward pressure on prices. Softwood lumber production in 1998 was up 2.6 percent from 1994 and 9.4 percent from the 1995 low.

Softwood lumber panel production is nearly evenly distributed between the South and West. U.S. production of softwood lumber is concentrated in the West (the location of remaining old-growth and large tracts of high-quality timber) and in the South (the location of extensive tree plantations of merchantable southern yellow pine). These two regions accounted for 48 and 46 percent, respectively, of U.S. softwood lumber production in 1998.<sup>57</sup> The highest concentrations of large mills are also in these regions. In 1997, some 300 Western mills each produced 25 million board feet or more of lumber, as did 175 mills in the South, compared with 14 mills in the North.

Hardwood lumber production increased each year during the period. Hardwood lumber, used primarily in furniture, decorative, and other consumer products, is more closely affected by consumer spending. Production in 1998 totaled 31.6 million m<sup>3</sup>, up from 30.2 million m<sup>3</sup> in 1994, or by 4.6 percent (table D-3). Two-thirds of the increase came between 1996 and 1997, at the same time that per capita income increased 2.7 percent and real GDP increased 3.8 percent, the largest annual increase in both during the 5-year period. Hardwood lumber production is concentrated in the East. In 1997, the States east of the Great Plains accounted for 96 percent of hardwood lumber production.<sup>58</sup>

Capacity in the lumber industry is estimated to have increased from 88 million m<sup>3</sup> in 1994 to 91.0 million m<sup>3</sup> in 1998 (table D-1). Capacity dropped to a low of 77 million m<sup>3</sup> for the period in 1995, as did capacity utilization, but then increased each year through 1998. Capacity in 1998 is up 18 percent from the 1995 low. In spite of many reported mill closures, new modern mills have been built, and capacity has been expanded in others.<sup>59</sup>

Wood panel production increased by slightly less than 1 percent during 1994-98 (table D-3). Production of every type of panel except oriented strandboard (OSB) decreased during the 5-year period. Oriented strandboard has been increasingly substituted for

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<sup>57</sup> Western Wood Products Association, *Western Lumber Facts* (Portland, OR: WWPA, Sept. 1998).

<sup>58</sup> USDOC, Census Bureau, “Current Industrial Report,” *Lumber Production and Mill Stocks*, found at Internet address <http://www.census.gov/cir/www/ma24t.html>, retrieved Oct. 20, 1998.

<sup>59</sup> “Lumber & Panel,” 1998.

softwood plywood in construction.<sup>60</sup> Both OSB and softwood plywood are rated for comparable strength and application by a single trade association and are marketed as structural panels. Structural panel production increased by 4.4 percent during 1994-98, a 9.5-percent decline in softwood panel production was offset by a 40.8-percent increase in OSB production. Softwood plywood capacity declined by 12 percent during 1994-98; in the same period, OSB capacity increased by 52 percent.<sup>61</sup> OSB is manufactured from lower cost hardwoods and has gained acceptance over plywood in part because of its lower cost.<sup>62</sup> The price spread between comparable grades of OSB and softwood plywood varied during 1994-98 from an annual average difference of \$46 per thousand sq. ft. in 1994, increasing annually to \$125 in 1997, and ending at \$84 for 1998.<sup>63</sup>

Particleboard production peaked in 1994. Production then followed the same pattern as softwood lumber, declining in 1995, and then rebounding in the following years. Production in 1998 is almost 2 percent lower than in 1994. Production of hardboard and fiberboard has declined as manufacturers comply with stricter water discharge standards.<sup>64</sup>

## *Pulp, Paper, and Paper Products*

A more diverse group of products are included in the pulp, paper, and paper products sector. Products range from commodity papers (paper and paperboard) through consumer products (converted paper, such as paper towels and tissues). The U.S. industry produces a wide variety of paper and paper products to serve the large domestic market with high disposable income.

The paper industry is the ninth-largest domestic manufacturing industry. Sales are estimated at about \$169 billion (up about 22 percent from the level in 1994).<sup>65</sup> Most of the pulp production in the United States is captive (produced into paper product in the same plant). Pulp sold on the market (market pulp) amounted to about 30 percent of pulp production in 1997. Chemical pulp accounted for almost 85 percent of U.S. production in each of the years 1994-98.<sup>66</sup> U.S. pulp production moved in a narrow band of plus or minus 2 percent during the period, peaking at nearly 60 million metric tons in 1995, and hitting its low in 1998 at just over 58 million metric tons (table D-3). Pulp production is constrained by capacity. The president of the AF&PA stated that no new mills have been built in the U.S. since 1992.<sup>67</sup> However, some capacity was added even as machines and mills were shut down. An estimated 23 paper and paperboard mills along with 116 paper

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<sup>60</sup> OSB Chews Panel Markets, *Weekly Market Report of Lumber & Panel Products*, Crows (Portland, OR: C. C. Crow's Pub.), Oct. 31, 1997.

<sup>61</sup> Lumber & Panel, *1998 North American Factbook*, p. 33.

<sup>62</sup> "Crow's," *Weekly Market Report of Lumber & Panel Products* (Portland, OR: C. C. Crow's Pub., Feb. 5, 1999).

<sup>63</sup> "1998 Yearbook" (Random Lengths: Eugene, OR, 1999), p. 182 and p. 193.

<sup>64</sup> Lumber & Panel, *1998 North American Factbook*, p. 47.

<sup>65</sup> USDOC, ITA, U.S. Industry and Trade Outlook, 1999 (New York: McGraw-Hill 1999) p. 10-3.

<sup>66</sup> Compared with a mechanical process.

<sup>67</sup> W. Henson Moore, Pres., transcript of the Commission hearing, May 26, 1999, p. 49.

machines were shut down during 1991-97. During the same time period, 7 new mill startups were announced, including 3 in 1997 and 1 in 1998. In 1995, high worldwide demand for pulp combined with constrained capacity pushed prices upward. The price of northern bleached softwood kraft pulp increased from an average annual price of \$700 per ton in 1994 to \$975 per ton in 1995. Thereafter, prices declined and averaged in the upper \$550 per ton range during 1996-98.<sup>68</sup> Pulp capacity increased to 64 million metric tons in 1998 from 62 million metric tons in 1994 (table D-1), but few new U.S. pulp mills are planned or proposed.<sup>69</sup> Capacity utilization was over 93 percent in each year during the period (table D-1).

Paper and paperboard production increased each year during 1994-97, from 81 million metric tons to 86 million metric tons, and then declined slightly in 1998 to just under 86 million metric tons (table D-3). The decline is attributed to weakness in global markets, but the strong market in the United States kept production relatively high.<sup>70</sup> Production declined by 0.4 percent from 1997 to 1998, but was up by 6 percent from 1994. Corrugating materials, the largest production category, increased from 28 million metric tons in 1994 to 31 million metric tons in 1998 (up 9 percent). The total for 1998 was 2 percent below that for 1997. Printing and writing paper production declined slightly from 1994 to a low of 23 million metric tons in 1996, and increased each year thereafter to 24 million metric tons in 1998 (up by 4 percent for the 5 years). Production of each of the major categories increased during the period with the exception of “other wrapping paper.”

Recovery of wastepaper increased from 36 million metric tons in 1994 to 41 million metric tons in 1998 (up 14 percent). The utilization rate of wastepaper increased steadily during 1994-98, from 34 percent in 1994 to an estimated 40 percent in 1998.<sup>71</sup> Use of recycled paper and paperboard in packaging reached a record 68 percent in 1998, and in some packaging products topped 90 percent.<sup>72</sup>

## Markets and Marketing Practices

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The United States is the world’s largest market for forest products and accounted for approximately 15 percent of world imports in 1997 (U.S. trade in forest products is covered in more detail in chapter 7). In addition, in 1998, 93 percent of U.S. forest product shipments was consumed domestically. The expansion of the U.S. economy during the 1990s has resulted in record consumption levels of most forest products.

Forest product manufacturers distribute their products through a variety of market channels. A number of factors such as market location, transportation costs, and product market (intermediate or final consumer) can play a role in the particular market channel

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<sup>68</sup> Pulp & Paper, *1999 North American Factbook*, p. 6.

<sup>69</sup> *Ibid.*, p. 33.

<sup>70</sup> Pulp & Paper International, *Annual Review* (San Francisco: Miller Freeman, July 1999), p. 43.

<sup>71</sup> Pulp & Paper, *1999 North American Factbook*, p. 232.

<sup>72</sup> Official Board Markets, *Recycled Content Reaches Record*, June 12, 1999.

used. In general, the more specialized the product, the fewer the levels in the distribution chain.

## ***Wood and Wood Products***

As noted above, strong construction activity in the United States during the late 1990s resulted in demand for wood building materials. Consumption of wood products hit a low for the 1994-98 period in 1995, and increased steadily thereafter. The volume of lumber consumption has increased by 10 percent since 1995, from 140 million m<sup>3</sup> to 153 million m<sup>3</sup> (table D-4), with imports accounting for 30 percent of the total. Imports are readily available to meet increases in U.S. demand, particularly from Canada (see chapter 7). Consumption of other wood building materials also increased. Structural panel (softwood plywood and OSB) consumption increased by 18 percent, from 25.6 million m<sup>3</sup> in 1994 to 30.2 million m<sup>3</sup> in 1998. A 64-percent increase in OSB consumption during the period offset a 7-percent decline in softwood plywood consumption. Imports, virtually all of which originate in Canada, accounted for 38 percent of U.S. consumption.

Consumption of hardwood plywood increased by 17 percent, from 3.2 million m<sup>3</sup> in 1994 to 3.8 million m<sup>3</sup> in 1998. Imported hardwood plywood accounted for slightly more than one-half of the quantity consumed in 1998. Most hardwood plywood is used for interior door facing and wall paneling. Imports are mostly of tropical wood and are usually further manufactured after importation.

Export markets for wood and wood products weakened during 1994-98, but strong U.S. demand and consumption of wood and wood products offset export declines. Export markets accounted for 5 percent of the U.S. industrial wood harvest and 4 percent of lumber and wood panel production in 1998, each down about one percentage point since 1994.

Mills in the lumber and wood panel industry usually sell to wholesalers, who in turn sell to building contractors or retailers. In a few instances, mills sell directly to large retail chains. A few of the larger producers have their own wholesale operations and control sales to the retailers.

Transportation costs account for an estimated 5 to 20 percent of the final delivered price of lumber products. Shipments are made predominantly by truck, rail, and, in a few limited instances, by barge. The mode of transportation usually depends on the distance between the distribution center of the mill or the importer and the location of the purchaser; shipments over longer distances are often made by rail, but shipments over shorter distances are more commonly made by truck. Most producers and importers report that the majority of sales are to customers more than 100 miles from their mills

or storage facilities, and a substantial proportion of these sales are to customers more than 500 miles away.<sup>73</sup>

Over the longer term, lumber and wood panel product prices tend to rise and fall with the level of new construction activity. Prices are affected by seasonal factors, tending to rise in the spring when construction resumes in cold climates. During a period of rapid growth in housing starts, prices can surge by 20 to 30 percent in a few months and can fluctuate considerably from day to day. Other factors, such as transportation disruptions, can lead to short-term price surges. Access to timber supplies, competition among different species within a particular region, and weather in the cutting/milling areas also affect prices. Domestic mills and importers most often negotiate selling prices with customers based on these factors, as well as on published prices<sup>74</sup> and inventories, the size of a particular order, and demand in export markets. Prices also differ substantially depending on the species, grades and dimensions, and final consumer.

## ***Pulp, Paper, and Paper Products***

The United States is the world's largest producer and consumer of pulp and paper, accounting for 29 percent of global pulp production and 30 percent of paper and paperboard production.<sup>75</sup> The growing U.S. economy during the 1990s created increased demand for a variety of business, packaging, and consumer products. Consumption of paper and paperboard, intermediate materials in the manufacture of paper products, increased by 5 percent during the period, from 87 million metric tons in 1994 to 91 million metric tons in 1998 (table D-4). Consumption declined slightly in 1995 to 86 million metric tons, and then declined by nearly 2 percent in 1996. In 1997, paper and paperboard consumption increased by 6 percent to 90 million metric tons. Imports supplied 15 percent of consumption in each year except 1996, when they fell slightly to 14 percent.

Newsprint was the only major product category that declined between 1994 and 1998 (down 3 percent). Newspaper publishers, the principal consumers of newsprint, have been switching to smaller page widths in order to control costs.<sup>76</sup> This is likely the main reason newsprint consumption has not recovered from the low of 1996 to the higher 1994 levels. The shift of some advertising to other media, particularly the Internet, has also had

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<sup>73</sup> USITC staff estimates that freight charges, not differentiating by the mode of shipment, range from \$5 to \$20 per thousand board feet for shipments within a 100-mile radius, \$15 to \$35 per thousand board feet for shipments within a 100-500 mile radius, and \$30 to \$100 per thousand board feet for shipments farther than 500 miles from a supplier's mill or storage facility.

<sup>74</sup> Such prices are published weekly, monthly, quarterly, and annually in such publications as *Random Lengths*, *Crow's*, *Madison's*, and *Hardwood Market Report*. These publications publish price reports for a wide range of forest products in the North American and offshore markets. Prices are gathered through weekly pricing surveys with buyers and sellers throughout the United States.

<sup>75</sup> United Nations, FAO Forest Products Database, found at Internet address <http://apps.fao.org>, retrieved on Apr. 7, 1999.

<sup>76</sup> Pulp & Paper, *1999 North American Factbook*, p. 277.

an effect on newsprint demand.<sup>77</sup> However, newsprint consumption has increased by nearly 6 percent since the low of 1996. Export markets in 1998 accounted for about 12 percent of production, down from 15 percent in 1997. Imports, almost all of which originate in Canada, accounted for 53 percent of U.S. consumption in 1998. Printing and writing paper consumption increased by nearly 9 percent, from 26 million metric tons in 1994 to 28 million metric tons in 1998, again reflecting a robust U.S. economy and increase in business and home demand.

Primary paper mills sell paper on large rolls or sheets to smaller mills that cut and convert the paper into specific end products (e.g., textile cones, paper filters, paper towels). A significant portion of paper mill sales is sold to industrial users (e.g., paper box fabricators, commercial printers, food container manufacturers). A few end products are sold to household consumers. Domestic mills and importers generally concentrate their sales within certain regions of the United States (e.g., Northeast, Southeast, or upper Midwest) or within certain market areas or local markets (e.g., New York/New Jersey or Houston, TX). The market area of a domestic mill or an importer is determined primarily by the mill location or the distribution center and the freight charges of delivering to a particular customer's facility.

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<sup>77</sup> Pulp & Paper, *1999 North American Factbook*, p. 278.

# CHAPTER 4

## MAJOR PRODUCERS IN LATIN AMERICA

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### Overview

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During the last decade, several Latin American countries have experienced rapid economic growth and development, following the implementation of key policy reforms that opened markets, liberalized trade and investment rules, privatized state-owned enterprises, and removed price controls. In particular, the recent strong economic performance in the region has been spurred by a resurgence of investment activity, including foreign investment, and the reduction of trade barriers through the formation of several regional trade agreements, such as the MERCOSUR agreement (Argentina, Brazil, Paraguay, and Uruguay) and the Andean Pact (Colombia, Ecuador, Bolivia, Peru, and Venezuela).

Strong population and income growth in the region has provided U.S. forest product exporters with new opportunities, and forecasts indicate that Latin America will continue to be important in the future, particularly for paper and paper products. At the same time, several factors have improved the production and marketing efficiency of the region, and increasingly Latin American producers are competing with U.S. producers in world markets, particularly in Asian wood products and pulp markets.

As discussed in detail later in the chapter, the key to Latin America's global competitiveness is the advantageous growing conditions for forest plantations, which have accelerated development of commercial forests in the region. The fast-growing tree species on these plantations represent one of the region's most important competitive advantages. Virtually all of the region's pulp, paper, and softwood lumber development has been based on manmade plantations of fast-growing species. Another key factor affecting the region's global competitiveness, especially in the pulp, paper, and wood panels industries, has been the massive investments in state-of-the-art processing plants which have rapidly increased production capacity. Much of this capacity expansion has resulted from the growth of foreign investment. North American companies with a major presence in Latin America include Champion International, Kimberley-Clark, Westvaco, Sonoco, and Riverwood International. Latin America's international competitiveness has also been enhanced by several government programs, such as tax benefits for reforestation in Brazil and tree planting support in Chile and Mexico. However, offsetting these advantages are factors which adversely affect the ability of Latin American exporters to compete in world forest product markets. For instance, in many Latin American countries exporters are hampered by poor infrastructure (especially inadequate roads and ports), and the region is disadvantaged geographically by being far from the major markets of Asia, Europe, and the United States.

The two basic types of forest in Latin America are native forests and plantations. Native forests are primarily tropical hardwoods, but include temperate hardwoods in Chile and

Argentina, as well as some softwood species, especially in Central America. Two-thirds of commercial native forests in Latin America is located in Brazil. Although Brazil also has the largest plantation base, Chile has almost as much area in softwood plantations; several other countries also have sizeable areas of plantation forests.

In spite of the importance of the forest sector to several Latin American countries, Latin America is not a major world producer or exporter. For example, between 1994 and 1997, Latin America's annual production of industrial wood, which remained fairly stable at about 140 million m<sup>3</sup>, represented about 9 percent of total world industrial wood production (appendix table C-1). More than one-half of this output was supplied by Brazil (60 percent), while Chile produced 14 percent, and Mexico and Argentina each produced 5 percent (figure 4-1). In 1997, Latin America's contribution to global production of lumber and wood panels amounted to 8 percent and 5 percent, respectively, with Brazil, Chile, and Mexico the major suppliers. Although pulp and paper industries in the region have increased their share of world production since 1994, Latin America remains a relatively small producer. For example, in 1997, the 10 million metric tons of Latin American pulp represented only 6 percent of world production, while in the same year the region produced 14 million metric tons of paper and paperboard, accounting for under 5 percent of global output. Major producers of pulp are Brazil (63 percent), Chile (20 percent), and Argentina (7 percent), while Brazil (47 percent) and Mexico (26 percent) are the region's major paper producers (figure 4-1).

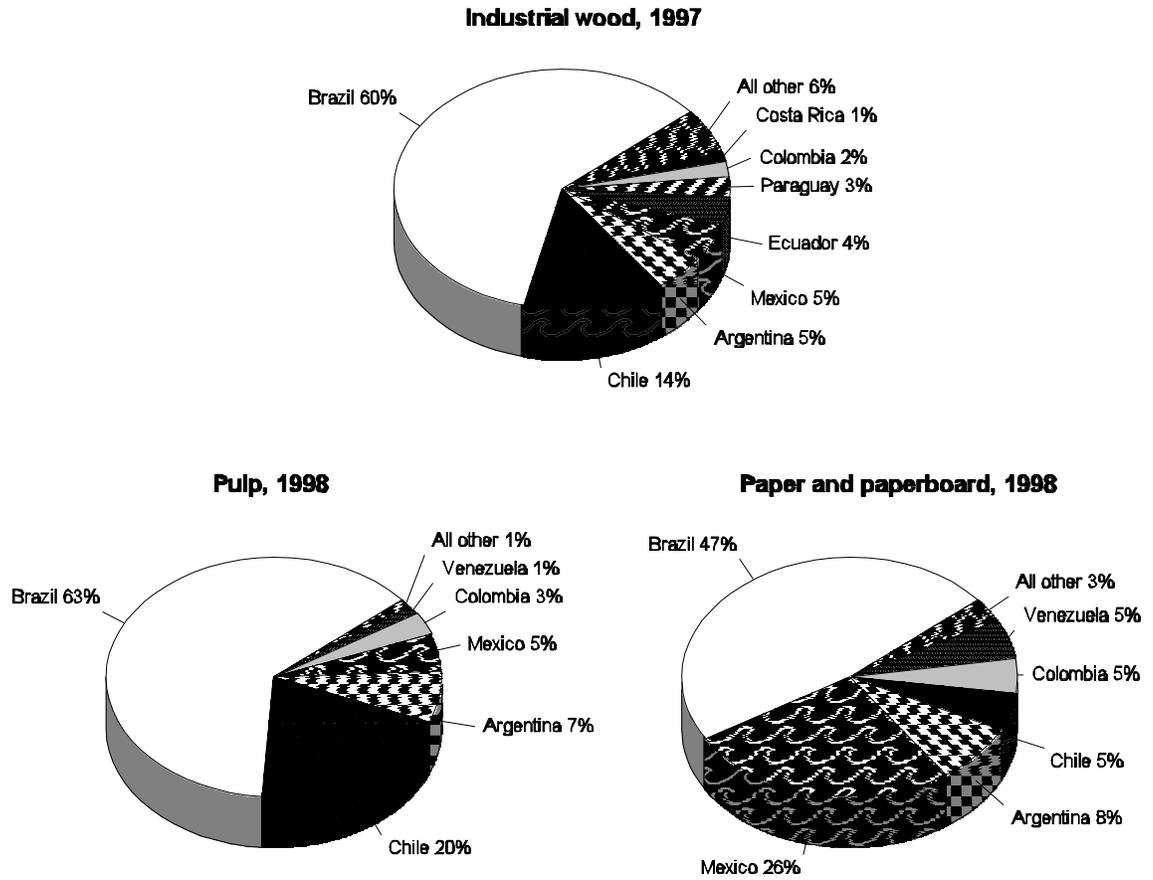
In 1997, Latin America's total exports of forest products amounted to \$5.7 billion, representing 4 percent of world exports. Wood and wood products are the major exports, accounting for 41 percent of the region's forest product exports in 1997. Logs and woodchips made up about 8 percent of the 1997 export values, while softwood and hardwood lumber made up about 19 percent, and wood panels made up 14 percent. Exports of wood products from Latin America, primarily from Brazil and Chile, account for 4 percent of world exports of these products. Brazil and Chile are also the largest exporters of pulp, together accounting for 95 percent of the region's \$1.8 billion pulp exports in 1997 (representing 12 percent of global pulp exports). Paper exports make up only 2 percent of world exports, although the region's export volume and share of world exports are steadily increasing. The major markets for all categories of forest products exports from Latin America are the EU, the United States, and Japan.

One-quarter of Latin America's consumption of forest products is supplied by imports, which amounted to \$5.8 billion in 1997.<sup>1</sup> The major forest product import category in 1997 was paper, which amounted to \$4.1 billion (71 percent of all forest product imports), followed by wood and wood products (\$1.1 billion), and pulp (\$0.6 billion). Latin American imports make up 4 percent of world imports, with major suppliers being the United States, the EU, and Canada. The largest importing countries of the region are Mexico, Brazil, and Argentina.

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<sup>1</sup> United Nations, Food and Agriculture Organization, *Yearbook of Forest Products*, 1997 (Rome: 1999).

**Figure 4-1**  
**Latin American forest product production: Industrial wood, 1997, pulp, and paper and paperboard, 1998**



Source: UNFAO forest product database; *Pulp & Paper International, Annual Review*, July 1999.

International trade in forest products between Latin America and the United States increased significantly during 1994-98. In 1998, U.S. imports of forest products from Latin America were valued at \$2.8 billion, up by 73 percent from the \$1.6 billion of imports in 1994; the region's share of U.S. forest product imports increased from 5 percent to 7 percent over the same time period.<sup>2</sup> The United States imported \$1.3 billion of wood products in 1998, over 60 percent of which was supplied by Brazil and Mexico. U.S. imports of Latin American lumber more than doubled between 1994 and 1998, while imports of millwork and builders' joinery also grew significantly over this period. In 1998, U.S. pulp and paper imports from Latin America reached \$0.9 billion and \$0.6 billion, respectively, with Mexico by far the largest supplier in the region.

Latin America is a large and expanding market for U.S. forest products. In 1998, U.S. exports to the region reached \$4.5 billion (representing 22 percent of all U.S. forest product exports), which was 30 percent higher than in 1994.<sup>3</sup> Almost 60 percent of U.S. exports to Latin America was shipped to Mexico. Over 70 percent of U.S. forest product exports to the region was paper and paper products, while wood products and pulp each had a 15-percent share. Latin America imported over 30 percent of all U.S. exports of paper in 1998 (\$3.2 billion), an increase of almost 40 percent between 1994 and 1998. Forecasts of income and population growth indicate that the region will continue to be an important market for U.S. forest product exports in the future.

## **Brazil**

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### *Structure*

#### **Resource Base and Landownership**

The total area of natural forest in Brazil is estimated at 560 million ha, of which almost one-half (260 million ha) is accounted for by the Amazon hardwood forests.<sup>4</sup> According to the USDA, the cerrado (savanna), with 140 million ha in the Southeast, and the Caatinga, with 83 million ha in the drylands in the Northeast, are other regions containing important natural forest resources. Other forest ecosystems include the Pantanal in the Central Brazil wetlands, the Atlantic forest, and the temperate forest of the South.<sup>5</sup> Most of the native forests are made up of hardwoods, including the Amazon region, which encompasses nearly 20 percent of the world's tropical hardwood forest resources.

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<sup>2</sup> Official U.S. trade statistics, U.S. Department of Commerce.

<sup>3</sup> Ibid.

<sup>4</sup> "Profile Report. Brazil," Wood Resources Quarterly (WRQ), July 1995, p. 14.

<sup>5</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, AGR No. BR8620, Dec. 15, 1998.

Although native forests are the major source of timber for Brazil's forest products industry, a large amount is also supplied by industrial plantations.<sup>6</sup> In 1967, the Government introduced a program giving tax incentives to companies and individuals who made investments in planting trees. The program was ended in 1986, by which time 6.4 million ha of plantations had been established.<sup>7</sup> Almost all reforestation projects are now undertaken within the private sector. The industrial plantations mainly utilize eucalyptus (50 percent) and pine (40 percent) and provide the raw materials for the fast-growing panel products and the pulp and paper industries.<sup>8</sup>

The area under plantations currently stands at about 5 million ha, most of which is used by the pulp and paper, charcoal, and panel industry sectors.<sup>9</sup> About one-third of this area is owned by the steel industry which was dependent on charcoal for fuel.<sup>10</sup> The pulp and paper industry also operates about 1.4 million ha of viable industrial plantations. The remaining industrial plantations are owned and operated by wood products industries, as well as by nonforest product industries.<sup>11</sup> Although there are no publicly owned plantations, a few of the remaining publicly owned companies in the steel, minerals, and transportation sectors have industrial plantation forests.<sup>12</sup>

For several years, a major concern of the Government and the international environmental community has been the rate at which Brazil's forests (and in particular the Amazon tropical rainforest) are being depleted. According to some estimates, about 5 percent of the Amazon region has been deforested (about 108,000 square miles).<sup>13</sup> However, logging has caused only about 2 percent of this deforestation (agriculture accounted for more than 90 percent).<sup>14</sup> Land clearing for urban uses has also reduced the area under forests in a number of areas, such as the Atlantic and Center-South regions.<sup>15</sup>

Lack of Government incentives and long-term policy combined with increased environmental and conservation policy restrictions are the predominant influences on the Brazilian forest products industry. The USDA has reported that tougher laws concerning illegal logging have not stopped this practice in the Amazon. In 1997, the government seized nearly 710,000 m<sup>3</sup> of illegally logged timber from the Amazon.<sup>16</sup> Efforts to address deforestation have included Government controls over logging and funding from multilateral lending organizations to support reforestation programs and to provide technical assistance. These efforts are continuing and have helped to slow the rate of deforestation. Even though about 100,000 ha per year are reforested in Brazil, industry

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<sup>6</sup> "Profile Report. Brazil," WRQ, 1995, p. 14.

<sup>7</sup> The area of viable industrial forest plantation is estimated to be significantly less than 6.4 million ha. According to industry sources, a more accurate figure is 4.5 million ha. For more information, see "Profile Report. Brazil," WRQ, 1995, p. 15.

<sup>8</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1998.

<sup>9</sup> *Ibid.*

<sup>10</sup> "Profile Report. Brazil," WRQ, 1995, p. 15.

<sup>11</sup> *Ibid.*, p. 16.

<sup>12</sup> *Ibid.*

<sup>13</sup> *The Forestry and Wood Processing Industries of the ABC Countries: Argentina, Brazil, Chile*. 2ed., (San Francisco: Miller Freeman, 1997), p. 54.

<sup>14</sup> *Ibid.*

<sup>15</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, AGR No. 6627, 1996.

<sup>16</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1998.

leaders estimate that by 2005 domestic wood supplies will be insufficient to meet domestic demand, due to high interest rates that make major, long-term investments in the sector risky and, in some cases, unprofitable.<sup>17</sup>

## Industry Size, Capacity, and Employment

Brazil's sawmill industry is mainly composed of very small mills.<sup>18</sup> In the Amazon region alone, 3,000 to 4,000 of these mills process native species,<sup>19</sup> using logs selectively cut from private and Government lands, as well as timber cut from areas cleared for conversion into agricultural land.<sup>20</sup> Sawmills in the Amazon region have installed annual capacity of about 8 million m<sup>3</sup> of lumber. The Southern States have more than 5,000 mills.<sup>21</sup> The plywood industry in Brazil consists of nearly 400 plywood mills with a total production capacity of 2.5 million m<sup>3</sup>.<sup>22</sup>

In 1997, Brazil had 35 pulp mills in operation, although only about one-third of these produce more than 500 metric tons per day (appendix table E-1). Total pulp production capacity increased from 6 million metric tons in 1994 to more than 7 million metric tons in 1998, while production remained at about 90 percent of capacity during the 1994-98 period. The pulp industry is dependent on plantation-grown wood. Pulp production is centered in southern Brazil with some production also located in coastal areas north of Rio de Janeiro.<sup>23</sup> The pulp industry is concentrated among a small number of companies, with roughly 60 percent of production in the hands of four producers. Concentration has taken place largely through mergers and acquisitions.<sup>24</sup> The largest company is Aracruz which, with output in excess of 1 million metric tons per year,<sup>25</sup> is a major exporter of eucalyptus pulp. The company is one of the most cost competitive in the world and has diversified into the ownership of plantations and a port.<sup>26</sup> The Suzano, Klabin, and Votorantim industrial groups account for the remainder of the 60 percent of pulp production.<sup>27</sup> Most of the major companies are increasing their production capacity<sup>28</sup> in response to growing domestic demand and strong export markets.<sup>29</sup>

Brazil's paper industry consists of an estimated 139 paper mills (table E-1). In general, these mills are small scale operations, many with daily production of less than 50 metric

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<sup>17</sup> Ibid.

<sup>18</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 103.

<sup>19</sup> Ibid.

<sup>20</sup> "Profile Report. Brazil," WRQ, 1995, pp. 17-18.

<sup>21</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 104.

<sup>22</sup> Ibid., p. 66.

<sup>23</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 58.

<sup>24</sup> "Brazil: Latin America's paper superpower," *Papermaker*, Aug. 1996, p. 30.

<sup>25</sup> "Aracruz continues leadership tradition with recent modernization," *Pulp & Paper International*, Oct. 1998, p. 55.

<sup>26</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 58.

<sup>27</sup> Ibid.

<sup>28</sup> "Latin America: From comparative to competitive advantage," *Pima's Papermaker*, Feb. 1998, p. 20.

<sup>29</sup> "Latin America demand, trade and global competition expanding," *Pulp & Paper International*, Oct. 1998, p. 50.

tons.<sup>30</sup> Paper capacity increased from 6.5 million metric tons in 1994 to 7.5 million metric tons in 1998, while production ranged between 84 percent and 92 percent of capacity over the same time period (table E-1). As in the case of the pulp industry, the Brazilian paper industry is highly concentrated. It is estimated that less than 10 mills have a daily capacity in excess of 500 metric tons, and that the top 10 mills supply roughly 70 percent of the country's paper production.<sup>31</sup> The three major producing companies are Klabin, Suzano, and Votorantim, and together these account for 37 percent of total paper production.<sup>32</sup> The Klabin group has a 29 percent share of packaging grade papers production and a 25 percent share of the tissue market.<sup>33</sup> The Suzano group specializes in producing newsprint, printing and writing paper, and cartonboard, while Votorantim is the leading printing and writing papers producer.<sup>34</sup>

Total employment in the forest products sector is estimated at 600,000, with another 3.5 million people relying indirectly on the sector.<sup>35</sup> Employment in the pulp and paper industry is approximately 100,000 persons (table E-1).

## Government Programs and Support

Several regulations regarding exploitation of forest resources have been introduced by the Government. These included Decree No. 1.963 (published on July 26, 1996) which halted concessions for harvesting mahogany and virola hardwoods in the Amazon region for two years, and No. 1.511-2 (published on September 20, 1996) which mandated that landowners in the Amazon keep 5 percent of their forestland intact.<sup>36</sup> While new laws were passed in 1998 to protect the forests, it is unclear whether they will be successful.<sup>37</sup>

Environmental certification of timber, and especially tropical timber, is becoming increasingly important.<sup>38</sup> In Brazil, the Certificacao Florestal (CERFLOR), or "green seal," has been developed by the forestry industry in order to certify the origin and management practices associated with wood used in processing forest products. While widely supported, some industry groups are concerned that the costs associated with CERFLOR (which may increase importer costs by 15 percent or more) may put Brazilian exports at a competitive disadvantage.<sup>39</sup>

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<sup>30</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 59.

<sup>31</sup> *Ibid.*

<sup>32</sup> "Brazil: Latin America's paper superpower," *Papermaker*, Aug. 1996, p. 30.

<sup>33</sup> *Ibid.*

<sup>34</sup> *Ibid.*

<sup>35</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 65.

<sup>36</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1996.

<sup>37</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1998.

<sup>38</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1996.

<sup>39</sup> *Ibid.*

As mentioned above, between 1967 and 1987/88, government tax incentives led to the establishment of about 6.4 million ha of industrial plantations. Currently, laws exempt primary and semiprocessed forest products from a state value-added tax on exports. Further, the Brazilian tax code allows the forest products industry to expense up to 20 percent of its reforestation costs.<sup>40</sup>

## *Production, Products, and Capacity*

While Brazil has huge forest resources, its production of forest products and role in world markets is fairly limited. According to the FAO, total wood production amounted to about 220 million m<sup>3</sup> during 1995-97 (down slightly from the 223 million m<sup>3</sup> reported for 1994) (table E-2), of which native forests supply roughly 70 percent and industrial plantations the remainder.<sup>41</sup> About 60 percent of this production is fuelwood and wood for charcoal, 70 percent of which is estimated to be used in the production of pig iron and steel.<sup>42</sup> Industrial wood production increased during 1994-97, reaching almost 85 million m<sup>3</sup> in 1997, including 48 million m<sup>3</sup> of logs and 31 million m<sup>3</sup> of pulpwood and wood chips (table E-2).

Over time, increasing amounts of wood have been supplied from industrial plantations.<sup>43</sup> Meanwhile, increased production from the tropical hardwood forest in the Amazon continues to be prevented by economic and environmental ecological factors, such as high harvesting and extraction costs (owing to the poor infrastructure in the area).<sup>44</sup>

Brazil produces about 19 million m<sup>3</sup> of lumber annually (table E-2), with about one-half coming from the Amazon region and one-half from plantations in the south.<sup>45</sup> Although lumber production remained stable during 1994-97, industry experts expect production to grow in the future, owing to the growth of vertically integrated mills (using chips from sawmill residues for pulping) and better sawmill technology.<sup>46</sup> Further, both the domestic and export markets provide important opportunities for growth in the production of eucalyptus lumber products.<sup>47</sup> Brazilian production of wood panels remained stable during 1994-97 at 3.5 million m<sup>3</sup> (table E-2). Plywood represents over one-half of the volume of wood panels, and particleboard and fiberboard each account for about 20 percent. In Brazil, most producers of wood panels use wood from plantations, instead of residual wood, as raw materials.<sup>48</sup>

Total pulp production was 6.7 million metric tons in 1998, up by 15 percent from its 1994 level (table E-2). Of this production, 50 percent is integrated with paper manufacturing, 35 percent is exported (mainly bleached eucalyptus important in the

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<sup>40</sup> Industry representative from American Forest and Paper Assn., Feb. 1999.

<sup>41</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1998.

<sup>42</sup> "Profile Report. Brazil," WRQ, 1995, p. 17.

<sup>43</sup> USDA, FAS, *Forest Products, Annual Report*, Brasilia, 1996.

<sup>44</sup> *Ibid.*

<sup>45</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 50.

<sup>46</sup> *Ibid.*

<sup>47</sup> *Ibid.*

<sup>48</sup> "Profile Report. Brazil," WRQ, 1995, p. 18.

production of printing and writing papers), and 15 percent is sold domestically. Total paper production reached 6.5 million metric tons in 1998, with two-thirds of production based on eucalyptus pulp.<sup>49</sup> Between 1994 and 1998, paper production grew by 15 percent, following installation of increased production capacity during the 1990s.

## ***Markets and Marketing Practices***

### **Consumption**

During 1994-97, total wood consumption was fairly stable at around 220 million m<sup>3</sup> (table E-3). Residual wood, largely used for domestic heating and cooking, made up over 60 percent of this total. Over 90 percent of fuelwood came from native forests.<sup>50</sup> The largest industrial consumer of wood in Brazil is the charcoal industry, which consumed approximately 80 million m<sup>3</sup> of wood in 1997 (20 percent from native forests). In Brazil, the sawmill industry is the second largest industrial consumer of wood (estimated to consume 40 million m<sup>3</sup> annually), followed by the pulp and paper industry (table E-3). Brazil is a major consumer of plywood. Plywood is used in the furniture sector and for packing, as well as in making concrete forms for the construction industry.<sup>51</sup> The furniture sector is Brazil's major wood products consumer (over 40 percent in recent years), particularly of particleboard and hardboard, and it is estimated that more than 80 percent of plantation pines are used to make furniture for exports.<sup>52</sup> Over 800,000 m<sup>3</sup> annually are used by furniture factories.<sup>53</sup>

Per capita consumption of paper is only around 35 kilograms a year, though industry sources suggest that with strong economic growth "paper consumption could easily double or triple."<sup>54</sup> During 1994-98, consumption of pulp and paper increased by 12 percent and by 35 percent, respectively. Consumption of paper rose sharply in early 1995 as the domestic economy strengthened, and continued to grow to reach 6.2 million metric tons in 1998.

### **Imports**

Largely because of its abundant forest resources, Brazil is not a major importer of forest products. However, over the past 5 years, forest products imports have increased rapidly, from \$0.6 billion in 1994 to \$1.3 billion in 1997 (table E-4). In 1997, imports of forest products consisted of \$1 billion of paper and paper products, \$0.2 billion of pulp and wastepaper, and \$0.1 billion of wood. In 1997, one-third of sector imports

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<sup>49</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 104.

<sup>50</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1998.

<sup>51</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 51.

<sup>52</sup> *Ibid.*, pp. 68-69.

<sup>53</sup> *Ibid.*, p. 69.

<sup>54</sup> *Ibid.*, p. 62.

(\$446 million) was supplied by the United States, while the EU supplied 27 percent (or \$358 million) and Canada supplied 14 percent (or \$189 million).

Less than 1 percent of Brazil's consumption of wood and lumber is imported. Imports of wood panels, particularly particleboard and fiberboard, rose during 1994-97, reaching 7 percent of total wood panel consumption by 1997 (table E-5). Brazilian imports of wood, lumber, and wood panels are mostly from the MERCOSUR countries and reflect border trade with no tariffs. For example, Paraguay is the major supplier of tropical hardwood lumber, while Argentina and Bolivia are the major suppliers of hardwood logs and softwood lumber.<sup>55</sup> Brazil is an insignificant market for U.S. exports of wood, lumber, and panels. In 1998, U.S. exports of these products amounted to \$5.8 billion, of which Brazil imported \$7.6 million.

Pulp and paper imports increased rapidly between 1994 and 1998 in response to growing domestic demand. Pulp imports tripled from 109,000 metric tons in 1994 to 314,000 metric tons in 1998 (table E-5). Paper and paperboard imports increased from 480,000 metric tons to 904,000 metric tons over the same period (table E-5). The most significant imports were newsprint and printing and writing papers. Imports of newsprint increased by 25 percent between 1994 and 1998, rising to 400,000 metric tons, or 61 percent of total apparent consumption of newsprint. This is due to the tax structure in Brazil, whereby imported newsprint is not taxed, giving imports a 15 percent price discount relative to Brazilian newsprint.<sup>56</sup> Imports of printing and writing papers almost tripled between 1994 and 1998, with imports making up 17 percent of domestic consumption.

## Exports

Brazilian exports of forest products reached \$3.2 billion in 1997, compared with \$2.9 billion in 1994 (table E-4). Exports increased by \$1 billion between 1994 and 1995, due largely to growth in overseas sales of pulp and paper. However, because of strong demand from the domestic market due to the improvement of the economy, exports dropped in 1996 and 1997.<sup>57</sup> Brazilian forest product exports reached a wide variety of markets, although concentrated in the EU and the United States. Argentina is increasingly becoming an important export market for Brazilian forest products, while Brazilian sales to Japan and Korea have also expanded and compete vigorously with U.S. exports to these markets.

The total value of Brazilian wood and wood products exports in 1997 reached an all time record of \$1.2 billion, up by 14 percent from \$1 billion in 1994. The Amazon region accounted for 40 percent of total Brazilian exports of wood products, Parana 20 percent, while the rest of the country accounted for the remainder. Industrial wood exports increased by 16 percent during 1994-97 (table E-6), a large share of which was hardwood log exports to the EU. Lumber is the most significant wood product export, with 1.4 million m<sup>3</sup> exported in 1997, followed by plywood (584,000 m<sup>3</sup>), fiberboard and particleboard (318,000 m<sup>3</sup>), and veneer (167,000 m<sup>3</sup>). The major market for Brazilian

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<sup>55</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1998.

<sup>56</sup> Pulp & Paper International, *Annual Review*, Brussels, July 1998, p. 78.

<sup>57</sup> USDA, FAS, *Forest Products. Annual Report*, Brasilia, 1998.

wood and wood products is the EU, which accounted for almost 40 percent of total exports in 1997. The United States was Brazil's second largest market for wood products with a 33-percent share (table E-4).

Exports of pulp and wastepaper, valued at \$1 billion, made up 32 percent of all forest product exports in 1997 (table E-4). The value of sales was highly volatile during 1994-97, increasing from \$851 million in 1994 to \$1.5 billion in 1995, then dropping to \$999 million in 1996. Over the same period, the quantity of exports remained fairly stable at about 2 million tons. The increase in value in 1995 was attributable to a hike in the world pulp price that was caused by a shortage of production capacity combined with strong demand. By 1996, additional production capacity alleviated shortages, and prices fell back to close to the 1994 levels. The quantity of pulp exports increased by 31 percent between 1994 and 1998 due to the strong growth in production and production capacity during the period (table E-6). The major markets for Brazilian pulp exports are the EU, followed by the United States, Japan, and Indonesia (table E-4).

The value of paper and paper products exports reached \$966 million in 1997, down from the record 1995 level of \$1.2 billion, but up slightly over the 1994 level of \$942 million (table E-4). This pattern largely reflected trends in the international prices of paper and paper products that spiked in 1995, and then declined in 1996 and 1997. In quantity terms, exports declined by 20 percent between 1994 and 1998, reflecting strong domestic demand for paper and paper products during the period. In the early 1990s, the EU was the major destination for Brazilian exports of paper and paper products. However, in 1996, Argentina became the most important market, with other MERCOSUR countries also increasing in importance.<sup>58</sup>

The reforms introduced by the Real Plan since 1994 and the timely policy response by the Government mitigated the effects of the Asian crisis on the overall economic conditions of the country.<sup>59</sup> However, according to industry sources, the forest products sector was affected by the financial turmoil in Asia, largely because of the importance of the Japanese and Korean markets. In 1997, these countries accounted for \$341 million, or 11 percent of the value of Brazilian forest product exports. The crisis also affected exports of pulp to Indonesia.

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<sup>58</sup> Pulp & Paper International, *Annual Review*, 1998, p. 77.

<sup>59</sup> World Bank, found at Internet address <http://www.worldbank.org/html/extdr/faq/faqf98-106.htm>, retrieved on Mar. 15, 1999.

## *Structure*

### **Resource Base and Landownership**

It is estimated that about one-half of Chile's total area (35 million ha) is suitable for supporting trees.<sup>60</sup> However, the actual area under forests is approximately 16 million ha, of which 14 million ha is native forests and 2 million ha is industrial plantations.<sup>61</sup> Logging is banned on about one-half of Chile's native forests, so that the area of productive native forest is only about 7 million ha.<sup>62</sup>

Chile's forest products sector has developed mostly as a result of expanded commercial forestry plantations.<sup>63</sup> Radiata pine is the dominant species in plantations (over 75 percent), although eucalyptus is becoming increasingly important (16 percent). There has been an increasing trend (which began in the mid-1980s) toward large holder ownership of plantations.<sup>64</sup> Radiata pine matures rapidly in Chile relative to other countries. According to the USDA, it takes 20 to 24 years, while it takes 30 years in New Zealand and up to 60 years in North America and Europe.<sup>65</sup> For the last few years, plantings of eucalyptus have increased more rapidly than plantings of radiata pine. Prices for eucalyptus products are higher and the trees can be harvested after only 10 to 15 years.<sup>66</sup> Most of Chile's forest production areas are in the Central and Southern parts of the country and contain 90 percent of the country's 1.4 million ha of radiata plantations and 80 percent of Chile's 300,000 ha of eucalyptus plantations.<sup>67</sup> Growth in the Chilean forestry sector likely will take place in the south of the country where its native forests (mostly temperate hardwood species) are as yet relatively unexploited. Currently about 800,000 ha are of commercial grade wood.<sup>68</sup>

### **Industry Size, Capacity, and Employment**

Chile has about 1,500 sawmills which cut over 4 million m<sup>3</sup> of lumber annually. Slightly over 300 of the sawmills are permanent, while the others are mobile and produce relatively small amounts (less than 5,000 m<sup>3</sup> of lumber each year).<sup>69</sup> The industry is dominated by a small number of large firms (less than a dozen mills produce more than 50,000 m<sup>3</sup> of lumber annually) which account for most of the country's production and

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<sup>60</sup> "Profile Report. Chile," WRQ, July 1996, p. 13.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid.

<sup>63</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, AGR No. CI8031, Oct. 28, 1998.

<sup>64</sup> "Profile Report. Chile," WRQ, July 1996, p. 16.

<sup>65</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, 1998.

<sup>66</sup> Ibid.

<sup>67</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 26.

<sup>68</sup> Ibid., p. 20.

<sup>69</sup> Ibid., p. 27.

exports.<sup>70</sup> Chile's wood panel industry is efficient and highly concentrated, with annual capacity reaching 1.5 million m<sup>3</sup> in 1997; 800,000 m<sup>3</sup> is available for export annually. As increasing amounts of timber become available for harvest in the future, Chilean wood processing firms will be required to make large investments in processing capacity.<sup>71</sup> Substantial investment is already taking place. For example, one of the world's leading forest products companies, Arauco y Constitucion SA, has 400,000 ha of radiata plantations and is currently constructing several large sawmills.<sup>72</sup> These are expected to increase Arauco's wood consumption from 300,000 m<sup>3</sup> to 1 million m<sup>3</sup>.<sup>73</sup>

Chile's six pulp mills produced about 2 million metric tons of pulp in 1998 (compared with production capacity of 2.3 million metric tons) (table E-7). Five of Chile's six chemical pulp mills are located near Concepcion, manufacturing mostly for export.<sup>74</sup> Chile's largest pulp producing firms are CMPC and Arauco y Constitucion SA,<sup>75</sup> both of which have increased capacity and utilize a growing amount of domestic timber.<sup>76</sup> Chile also has 16 mills that produce newsprint, paperboard, and printing and writing papers. Capacity in the paper and paperboard sector is 750,000 metric tons. Paper capacity increased by 27 percent between 1994 and 1998 (table E-7).

## Government Programs and Support

The major government assistance to the Chilean forestry sector was through Decree Law (DL) 701 of 1974. Under the program, funds were made available to landowners for tree planting on depressed lands. Funds covered 75 percent of the estimated cost for planting, trimming, and management of planted forest areas.<sup>77</sup> The value of the assistance was adjusted for inflation and companies were required to repay the government once the timber was extracted.<sup>78</sup>

DL 701 expired in March of 1996 but was extended for 1 year in the expectation that a new law would be approved in the Congress. In 1998, Congress agreed to replace DL 701 with a new program directed mainly toward assisting small farmers. According to the USDA, under the new scheme, small farmers will receive 90 percent of planting costs for the first 15 ha and 75 percent of planting costs on additional hectares, while large farmers will receive 15 percent of planting costs but are limited to areas where land has been degraded.<sup>79</sup> The program also includes an exemption on land tax obligations.<sup>80</sup> In 1997, more than 30,000 ha qualified for the planting assistance (\$6.6 million), 20,000 ha qualified for the trimming assistance (\$0.9 million), and 61,000 ha received management

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<sup>70</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 28.

<sup>71</sup> *Ibid.*

<sup>72</sup> *Ibid.*

<sup>73</sup> *Ibid.*, p. 29.

<sup>74</sup> *Ibid.*, p. 33.

<sup>75</sup> *Ibid.*

<sup>76</sup> *Ibid.*

<sup>77</sup> *Ibid.*, pp. 16-17.

<sup>78</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, pp. 16-17.

<sup>79</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, 1998.

<sup>80</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, 1998.

payments (\$0.2 million).<sup>81</sup> Total government assistance under DL 701 for 1997 was \$7.7 million, compared with \$15.3 million in 1996. Between 1974 and 1997, the Chilean Government spent almost \$175 million on the program.<sup>82</sup>

Government assistance to the forest sector would also be given through the proposed Law for the Recovery and Promotion of the Native Forest, which has been pending since 1992.<sup>83</sup> The bill aims at measures geared toward the sustainable management of Chile's native forests. The proposed Native Forest Law, when approved, will add 7.5 million ha of forests.<sup>84</sup>

## *Production, Products, and Capacity*

Chilean timber production is rising steadily and is projected to double by the year 2025.<sup>85</sup> About three-quarters of the radiata pine plantations is less than 15 years old<sup>86</sup> and typically radiata is cut between the ages of 20 and 25 years.<sup>87</sup> In addition to radiata pine, the country's eucalyptus harvest is expected to exceed 7 million m<sup>3</sup> a year by the end of the decade, which would be sufficient to supply Chile's pulp industry.<sup>88</sup> At present, however, Chilean pulp mills mainly use radiata pine, since eucalyptus is bound for export markets in Asia.<sup>89</sup>

Total wood production in Chile reached 30.6 million m<sup>3</sup> in 1997, slightly higher than in 1996 (table E-8). About 65 percent of wood output is used by the forestry industry for pulp, wood chips, and lumber production. The remainder is used mainly for firewood, with more than 50 percent of Chileans using firewood in their homes for heating and cooking.<sup>90</sup>

Production of logs for lumber and veneer increased by more than 20 percent between 1994 and 1997 in response to strong domestic and export markets.<sup>91</sup> For 1998, a large decline in the harvest of softwood logs is expected because of the downturn in the economy of South Korea, Chile's main export market for softwood logs.<sup>92</sup> Additionally,

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<sup>81</sup> Ibid.

<sup>82</sup> Ibid.

<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, pp. 25-26.

<sup>86</sup> Ibid., p. 26.

<sup>87</sup> "Profile Report. Chile," WRQ, July 1996, p. 17.

<sup>88</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 18.

<sup>89</sup> Ibid.

<sup>90</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, 1998.

<sup>91</sup> Ibid.

<sup>92</sup> Ibid.

domestic demand for logs that are processed into softwood lumber is also expected to fall as construction started slowly in 1998.<sup>93</sup>

During 1994-97, production of lumber increased from 3.4 million m<sup>3</sup> to 4.7 million m<sup>3</sup>, an increase of almost 40 percent (table E-8). Pine logs make up almost 90 percent of lumber production, with almost two-thirds consumed domestically and the rest exported. Production growth resulted in large part because of increased activity in the domestic construction industry, together with strong export demand. Softwood lumber production is expected to increase in the future. However, exports of lumber will probably not rise as much because more lumber will be processed into value-added products for export.<sup>94</sup>

Chile's wood panel industry is small in comparison with the country's sawmill and pulp industries.<sup>95</sup> However, the panel industry has grown rapidly since 1988 when the first MDF plant in the country went into operation.<sup>96</sup> In 1997, the industry produced over 1 million m<sup>3</sup> of wood panels, compared with only 722,000 m<sup>3</sup> in 1994 (table E-8). Production is dominated by fiberboard and particleboard, which together make up about 80 percent of all panel production.<sup>97</sup> Wood chips are a by-product of sawmill operations; Chile also has a large number of chipping facilities with widely varying capacities. A large portion of domestic wood chip production is exported, mainly to Japan.<sup>98</sup>

Chilean pulp production exceeded 2 million metric tons in 1998, compared with only 1.5 million metric tons in 1994 (table E-8). Of this amount, three-quarters is bleached sulfate, with the remainder split evenly between unbleached sulfate pulp and mechanical pulp. Slightly over one-half of the production is exported, although domestic consumption increased sharply during 1994-98. Pulp production uses about 10 million m<sup>3</sup> of wood, 80 percent of which is produced from logs and 20 percent from wood chips supplied by the sawmill industry.<sup>99</sup> Paper and paperboard production increased from 487,000 metric tons in 1994 to 728,000 metric tons in 1998, an increase of 50 percent (table E-8). More than 40 percent of the 1998 production was newsprint, while the production of printing and writing papers and tissue was also significant. Most of the production of paper and paperboard is consumed domestically.

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<sup>93</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, 1998.

<sup>94</sup> *Ibid.*

<sup>95</sup> "Profile Report. Chile," WRQ, July 1996, p. 27.

<sup>96</sup> *Ibid.*

<sup>97</sup> *Ibid.*

<sup>98</sup> *Ibid.*, p. 23.

<sup>99</sup> *Ibid.*, p. 22.

## *Markets and Marketing Practices*

### **Consumption**

During 1994-97, total wood consumption was stable, averaging about 25 million m<sup>3</sup> per annum (table E-9). Industrial wood made up almost 60 percent of this total, while fuelwood for domestic heating and cooking accounted for the remaining 40 percent. The sawmill, pulp, and wood chip export industries account for close to 85 percent of wood consumption.<sup>100</sup>

Over the 1994-97 period, consumption of lumber and wood panels increased by 43 percent and 26 percent, respectively (table E-9). This growth was the result of Chile's continued economic expansion, and, particularly, continued strong domestic demand by the construction industry, as well as growth in production and exports of wood products and furniture.<sup>101</sup> A little over one-half of this increase results from higher demand for wood for building homes and other structures. Particleboard dominates Chile's domestic panel market with a share of over 60 percent of consumption in 1997. Particleboard consumption reached 378,000 m<sup>3</sup> in 1997, up by 40 percent from the 1994 level (table E-9).

Apparent consumption of pulp increased by 54 percent during 1994-98, from 560,000 metric tons to 860,000 metric tons. Chilean apparent consumption of paper increased by 16 percent between 1994 and 1998 (table E-9). Close to 40 percent of paper consumption in 1998 was printing and writing papers, while strong growth occurred in the consumption of newsprint over the same period. Steady growth in paper consumption reflects the Chilean economy's strong performance during the mid- and late-1990s.

### **Imports**

Chile's imports of wood and wood products are small, totaling only \$50 million in 1998. The major suppliers of these products are the EU, the United States, and Brazil. In 1997, Chile imported only 24,000 m<sup>3</sup> of lumber and 21,000 m<sup>3</sup> of wood panels, representing less than 1 percent and 3 percent, respectively, of apparent domestic consumption (table E-11). Chile imported no pulp during 1994-98, while imports of paper and paperboard (made up entirely of printing and writing papers) declined by 51 percent, from 164,000 metric tons to 80,000 metric tons over the same period (table E-11). As with wood imports, the major suppliers of paper and paper products are the EU, the United States, and Brazil.

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<sup>100</sup> "Profile Report. Chile," WRQ, July 1996, p. 18.

<sup>101</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, AGR No. CI7033, Oct. 27, 1997, p. 2.

## Exports

Given its small domestic economy, the Chilean forest products industry is highly dependent on exports. In 1998, the value of Chilean exports of forest products reached \$1.6 billion, up by 3 percent from 1994 exports of \$1.5 billion, but significantly less than the record \$2.3 billion for 1995 (table E-10). In 1998, wood and wood products accounted for 45 percent of total exports, pulp and wastepaper accounted for 45 percent, and paper and paper products the remainder.

Chile is the only major log exporter in Latin America. Exports of logs began in 1975 and were 1.7 million m<sup>3</sup> in 1997. For 1998, a significant decline in the domestic production of softwood logs was expected because of a virtual halt in exports to Korea, Chile's main export market. The USDA predicts that exports may drop in 1999, given uncertainties about Korea's economy and difficulties producers have had in developing new markets for softwood logs.<sup>102</sup> Exports of logs are not expected to increase at the same rate as log supply, because increasing capacity will result in more logs being processed in Chile. Chile is by far the largest woodchip exporting country in Latin America. Chip exports from Chile reached a record 6.3 million m<sup>3</sup> in 1995 (table E-12). The vast majority of Chilean wood chips are exported to Japan, although some are sent to the United States to supply Georgia Pacific's plant in Bellingham, Washington.<sup>103</sup>

Chile's exports of lumber increased by 28 percent between 1994 and 1997, from 968,000 m<sup>3</sup> to over 1.2 million m<sup>3</sup> (table E-12), with major markets being Japan, Korea, and the United States. According to the USDA, exports of softwood lumber will increase as more knot-free lumber is made available; this can be attributed to the larger supplies of knot-free lumber as a result of successful management of radiata pine forests under DL 701.<sup>104</sup> Wood panel exports increased from 259,000 m<sup>3</sup> in 1994 to 483,000 m<sup>3</sup> in 1997, an increase of 86 percent. Roughly 70 percent of panel exports is fiberboard, which increased by 94 percent between 1994 and 1997. The major markets for Chilean panel exports are Japan, Korea, and the United States. Chile also increased its exports of value-added wood products, which reached \$250 million in 1996, three-quarters of which was sent to the United States.<sup>105</sup>

Chile's pulp exports were 1.2 million metric tons in 1998, up by 24 percent from the 980,000 metric tons exported in 1994 (table E-12). Almost all exported pulp is bleached sulfate pulp. Major markets for pulp include Japan, Taiwan, China, and Korea, with the United States emerging as a potential market.<sup>106</sup> During 1994-97, the value of pulp exports was highly erratic, with exports reaching \$1.3 billion in 1995, when pulp prices reached record highs. Chile is a net importer of paper and paper products. In 1998, 245,000 metric tons of paper and paperboard were exported, over 85 percent of which was newsprint (table E-12). The major markets for Chilean paper are MERCOSUR countries, especially Argentina (table E-10).

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<sup>102</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, 1998.

<sup>103</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 110.

<sup>104</sup> USDA, FAS, *Forest Products. Annual Report*, Santiago, 1998.

<sup>105</sup> *The Forestry and Wood Processing Industries of the ABC Countries*, p. 110.

<sup>106</sup> *Ibid.*, p. 33.

## *Structure*

### **Resource Base and Landownership**

According to the National Forest Inventory, Mexico's total forest resource base is 57 million ha (about 30 percent of the nation's total land area), made up of about 30 million ha of temperate forests (21 million ha softwoods and 9 million ha hardwoods) and 27 million ha of tropical and subtropical forests.<sup>107</sup> Mexico has only about 21 million ha of commercial forest area, of which about 15 million ha consists of temperate forest.<sup>108</sup> The remaining 6 million ha is commercial tropical forests located in the South.<sup>109</sup> The total volume of commercial forests is 2.8 billion m<sup>3</sup>, comprising 1.8 billion m<sup>3</sup> in temperate forests and 1.0 billion m<sup>3</sup> in tropical forests.<sup>110</sup> The area under industrial plantations is small compared with Brazil and Chile, estimated at 15,000 ha in the early 1990s.<sup>111</sup>

Land ownership in Mexico is highly complex.<sup>112</sup> Roughly 80 percent of the forest area is held by rural communities (or ejidos). Land titles held by the ejidos gave them the right to reside on forestland and to exploit its resources, but not to purchase, sell, or lease the land. This made it very difficult for the ejidos to obtain financing for forest infrastructure and improvements, since it disallowed the use of land as collateral for loans.<sup>113</sup> Consequently, in spite of favorable growing conditions, annual productivity of the Mexican forest is only about 1.5 m<sup>3</sup> per hectare.<sup>114</sup> Forestland not controlled by the ejidos is mainly under small independent owners.<sup>115</sup> In 1992, Article 27 of the Constitution was changed in order to give smallholders, ejidos, and communities greater legal rights to their forests. This involved clarifying property rights on communal lands through titling of agricultural parcels.<sup>116</sup>

### **Industry Size, Capacity, and Employment**

According to the USDA, the Mexican timber industry is characterized by small-scale production units.<sup>117</sup> Most of the Mexican sawmills are owned by the ejidos, located

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<sup>107</sup> USDA, FAS, *Forest Products. Annual Report*, Mexico City, AGR No. MX8124, Oct. 16, 1998.

<sup>108</sup> Ibid.

<sup>109</sup> Ibid.

<sup>110</sup> Based on data from the Secretariat for the Environment, Natural Resources and Fishing (SEMARNAP).

<sup>111</sup> "Profile Report. Mexico," WRQ, Apr. 1992, p. 11.

<sup>112</sup> Ibid.

<sup>113</sup> Ibid., p. 16.

<sup>114</sup> USDA, FAS, *Forest Products. Annual Report*, Mexico City, 1998.

<sup>115</sup> "Profile Report. Mexico," WRQ, Apr. 1992, p. 11.

<sup>116</sup> Ibid., p. 16.

<sup>117</sup> USDA, FAS, *Forest Products. Annual Report*, Mexico City, 1998.

mainly in the Northern States of Durango, Chihuahua, and Michoacan.<sup>118</sup> Of the 1,425 operations in 1997, 1,375 were lumber mills, 42 were plywood mills, 1 was a fiberboard plant, and 7 were resin-processing plants.<sup>119</sup> It is estimated that Mexican wood-based plants operate at well below full capacity owing to the unavailability of inputs and poor technology.<sup>120</sup>

Mexico has approximately 55 mills producing paper and paperboard. Most production is by 45 medium and large companies, which provide jobs for about 73,000 people.<sup>121</sup> There are also eight mills that produce pulp.<sup>122</sup> For several years, the industry has experienced increased concentration, particularly following the surge in U.S. exports to Mexico in 1993-94. In efforts to improve efficiency, three Government-owned mills were to be sold during the second half of 1998.<sup>123</sup>

The Mexican paper industry is concentrated in a few large companies, several of which are U.S.-based. For example, Kimberly-Clark de Mexico (affiliate of Texas-based parent Kimberly-Clark Corp.) is the largest paper producing company, operating five mills with a combined annual capacity of over 450,000 metric tons. Its major products include tissue products, uncoated free-sheet, and specialty papers.<sup>124</sup> Between 1991 and 1996, the company invested some \$680 million on projects to expand its capacity.<sup>125</sup> Mexico's second-largest paper company is Copamex SA, which is based in Monterrey and has an annual capacity of about 300,000 metric tons.<sup>126</sup> Mexico's third-largest tissue producer, Loreto y Pena Pobre, was bought by Proctor and Gamble (P&G) in 1997.<sup>127</sup>

## Government Programs and Support

The thrust of government programs in Mexico concerns reforestation. According to the USDA, the main reforestation program is The National Program of Reforestation (PRONARE), which aims to "reforest rural areas with native species that possess desirable genetic characteristics."<sup>128</sup> The program's goal is to restore forest lands in areas affected by tree felling and other forms of land degradation.<sup>129</sup> Program incentives include income tax rebates and cost supports. Officials with the Secretariat for the Environment, Natural Resources and Fishing (SEMARNAP) estimate that in 1998 270 million trees were planted under PRONARE, with an additional 285 million ha

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<sup>118</sup> USDA, FAS, *Forest Products. Annual Report*, Mexico City, 1998.

<sup>119</sup> *Ibid.*

<sup>120</sup> "Profile Report. Mexico," WRQ, Apr. 1992, p. 12.

<sup>121</sup> Estimates provided by Camara Nacional de las Industrias de la Celulosa y del Papel (CNICP), reported in *Pulp & Paper 1999 North America FactBook*, (San Francisco: Miller Freeman, Inc.,) p. 120.

<sup>122</sup> *Ibid.*

<sup>123</sup> *Ibid.*, p. 125.

<sup>124</sup> *Ibid.*, p. 123.

<sup>125</sup> *Ibid.*

<sup>126</sup> *Ibid.*, p. 124.

<sup>127</sup> *Ibid.*

<sup>128</sup> USDA, FAS, *Forest Products. Annual Report*, Mexico City, 1998.

<sup>129</sup> *Ibid.*

planned for trees in 1999.<sup>130</sup> Another government program, the Forestry Plantations Support Program (PRODEPLAN), was started in 1997 and provides financial assistance to private investment for plantations.<sup>131</sup>

In 1997, SEMARNAP also promoted an additional program (PRODEFOR) to promote forest development on close to 200,000 ha.<sup>132</sup> The main focus of PRODEFOR is the ejidatarios (common lands and its communities) through the provision of funds for forest development. These funds can be used to promote better handling practices to increase productivity, infrastructure improvements in forested areas, and technical services.<sup>133</sup> According to the USDA, a key element of this program is to refurbish land affected by forest fires in 1998 and to limit land clearing for crop and livestock production.<sup>134</sup>

### *Production, Products, and Capacity*

During 1994-97, Mexican industrial wood production expanded from 6 million m<sup>3</sup> to 7.3 million m<sup>3</sup>, an increase of 21 percent (table E-14). Sawlogs and veneer logs (mainly pine but also including temperate and tropical hardwood) made up 80 percent of this total and increased by over 1 million m<sup>3</sup> over the period. Pulpwood and particles, which make up about 20 percent of industrial wood production, also increased by 21 percent during 1994-97. Industrial wood makes up only about 30 percent of total wood production. The remaining 70 percent consists of fuelwood and wood for charcoal. The production of lumber grew by 10 percent over the same period, while wood panels remained stable.

The timber industry faces several problems that impact the commercial viability of the sector. These include: (1) a dearth of marketing information with respect to production volumes, stocks, and prices, (2) an absence of internationally recognized formal standards for forest products and classification scheme for domestic wood quality, and (3) poor infrastructure.<sup>135</sup>

Production of pulp totaled 526,000 metric tons in 1998, almost double the production in 1994 (table E-14). This increase occurred as a result of the reopening of one of Grupo Durango's pulp mills and greater production efficiencies at two other pulp mills in Mexico.<sup>136</sup> Kraft or sulfate pulp (both bleached and unbleached) are the major types of pulp produced in Mexico.<sup>137</sup>

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<sup>130</sup> USDA, FAS, *Forest Products. Annual Report*, Mexico City, 1998.

<sup>131</sup> *Ibid.*

<sup>132</sup> *Ibid.*

<sup>133</sup> *Ibid.*

<sup>134</sup> *Ibid.*

<sup>135</sup> *Ibid.*

<sup>136</sup> *Pulp & Paper 1999 North America FactBook*, p. 121.

<sup>137</sup> "Profile Report. Mexico," WRQ, Apr. 1992, p. 13.

Government programs have been designed to improve efficiency in natural forests and commercial plantations development. For instance, industry sources report that Grupo Pulsar is investing in eucalyptus and pine plantations in southern Mexico, while Simpson Paper and Temple-Island Forest Products have created a partnership to establish eucalyptus on 50,000 acres in Veracruz and Tabasco and to ship wood chips to their U.S.-based paper mills.<sup>138</sup>

In 1998, paper and paperboard production reached 3.7 million metric tons, up from 2.9 million metric tons in 1994, an increase of 29 percent. About 40 percent of paper and board production is corrugating materials, such as kraftliner, while printing and writing papers and tissue each have a share in the 15 to 20 percent range. Between 1994 and 1998, the production of printing and writing papers grew 43 percent, newsprint output rose 43 percent, and tissue output rose 34 percent.

## *Markets and Marketing Practices*

### **Consumption**

The majority of wood products in Mexico are consumed by the packaging (mainly boxes or pallets), furniture, and construction industries.<sup>139</sup> The peso devaluation, starting in November 1994, led to higher interest rates and inflation in the country. Thousands of business were forced to close during 1995 and millions of people lost their jobs. As wage earners lost substantial purchasing power, consumption of most wood, pulp, and paper products either fell (lumber, wood panels, and paper) or rose only modestly (wood and pulp) in 1995 (table E-15). However, as the economic conditions improved in 1996, consumption of all products picked up and overall sector growth was strong throughout 1996-98. This growth was led by the construction industry, which grew by over 10 percent between 1996 and 1997.

### **Imports**

Total forest product imports amounted to \$3.5 billion in 1997, of which \$2.5 billion were paper and paper products, \$444 million were wood and wood products, and \$513 million were pulp and wastepaper (table E-16). Overall imports grew by 11 percent between 1994 and 1997, in spite of a decline in 1995 following the peso devaluation. Almost 90 percent of the imports was supplied by the United States in 1997. Other suppliers were the EU (paper and paper products) and Canada (pulp and paper).

Imports of industrial wood were minimal, only 76,000 m<sup>3</sup> in 1997, consisting mainly of softwood and temperate hardwood logs (table E-17). Imports of lumber increased by almost 50 percent between 1994 and 1997, despite declining sharply in 1995 following the devaluation of the peso. Imports recovered in 1996 and grew rapidly during 1997 in response to the construction boom during this period. In 1997, almost 60 percent of

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<sup>138</sup> *Pulp & Paper 1999 North America FactBook*, p. 121.

<sup>139</sup> "Profile Report. Mexico," WRQ, Apr. 1992, p. 12.

Mexico's imports of softwood lumber, 95 percent of temperate hardwood lumber, and 93 percent of softwood plywood came from the United States. The only significant competition faced by the United States in the Mexican market is with Brazil in softwood lumber and Indonesia and Bolivia in temperate hardwood lumber.<sup>140</sup>

Import trends for wood panels show a similar pattern: a decline in 1995 followed by a steady recovery during 1996 and 1997. The United States supplies the vast majority of these imports, although Indonesia has increased its market share in the Mexican tropical-hardwood plywood market with lower prices.<sup>141</sup>

Imports of pulp and wastepaper amounted to \$513 million in 1997, with the United States supplying 90 percent and Canada most of the remainder (table E-16). Mexican paper and paper product imports reached \$2.5 billion in 1997, up from \$2.1 billion, 3 years earlier. About 90 percent of these imports was supplied by the United States, with the EU and Canada supplying most of the remainder (table E-16). Mexican imports of paper and paperboard declined by 39 percent between 1994 and 1995, and then rose steadily over the next 3 years. In 1998, imports totaled 1.1 million metric tons, an increase of 8.4 percent over imports in 1994 (table E-17).

## Exports

During 1994-97, Mexican exports of forest products increased from \$790 million to \$1.3 billion, or by 69 percent (table E-16). The United States, the EU, and Chile were the major markets. In 1997, 57 percent of forest product exports was accounted for by paper and paper products. Industrial wood exports amounted to only 12,000 m<sup>3</sup> in 1997, down from 147,000 m<sup>3</sup> in 1994 (table E-18), reflecting efforts by major Mexican wood exporters to supply more value-added products, such as moldings. Exports of lumber increased by 125 percent during 1994-97 (table E-18). These exports were sent mainly to the United States and occurred in response to the devaluation of the peso during this period. Paper and paperboard exports rose irregularly between 1994 and 1998, from 134,000 metric tons to 229,000 metric tons (table E-18).

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<sup>140</sup> USDA, FAS, *Forest Products. Annual Report*, Mexico City, 1998.

<sup>141</sup> *Ibid.*

# CHAPTER 5

## MAJOR PRODUCERS IN ASIA

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### Overview

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Rapid economic growth in many Asian countries in recent years has led to increased demand for forest products and growing opportunities for United States forest products producers to meet some of this demand. These opportunities have been tempered, however, by the Asian economic crisis, which has reduced demand for forest products in many Asian countries, and by the output of other forest products producers both within and outside the region.

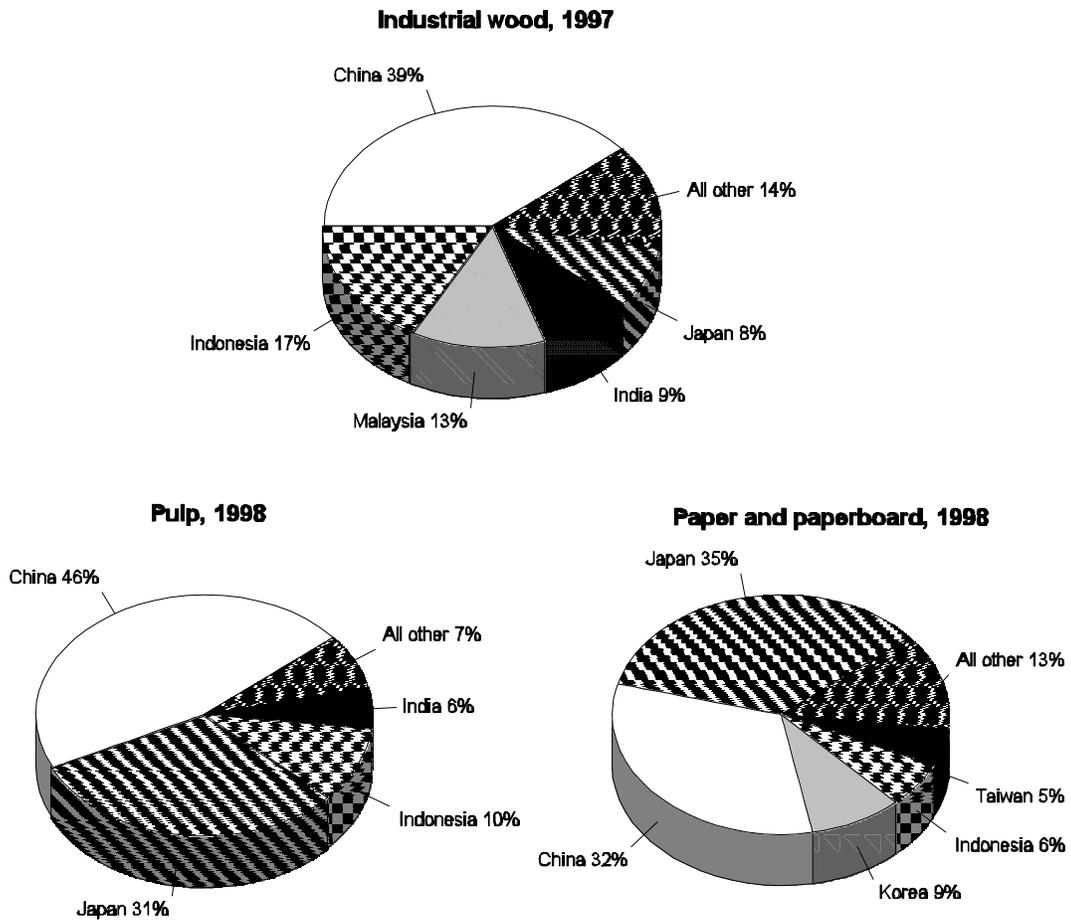
Japan, Indonesia, Malaysia, China, Korea, and Taiwan are major Asian producers of forest products (figure 5-1). Japan, China, Korea, and Taiwan are net importers of forest products, while Indonesia and Malaysia are net exporters. As discussed hereinafter, Japan's forest products industry has been hampered by the declining competitiveness of the country's forests and the downturn in domestic demand. A multitude of countries compete to supply the Japanese market with forest products. Indonesia and Malaysia have utilized their abundant forest reserves by developing large export-oriented forest products industries that have experienced declines in domestic and export markets for many products due to the Asian economic crisis. Indonesia, however, was able to significantly boost exports of pulp and paper during 1998 and become a more important player in world pulp and paper markets. The forest products industries in Indonesia and Malaysia have begun to face some constraints on their supplies of logs as the Indonesian and Malaysian Governments have attempted to balance the demands of production and forest sustainability. China has mostly avoided the effects of the Asian economic crisis but its sizeable forest products industry suffers from dwindling forest resources and low productivity. China's relatively strong market for forest products has attracted many foreign suppliers. The forest products industries in Korea and Taiwan struggled during 1998 with weak domestic demand; Korea partially offset this with increased exports of paper.

### Japan

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Japan is a major producer, consumer, and importer of forest products. As the competitiveness of the country's forests has declined in recent years, Japan has become a significant importer of raw wood materials. As such, it has become an important export market not only for many Asian countries but also for the United States, Canada, Russia, New Zealand, Chile, and a host of other countries. Japan has also gradually increased its imports of some processed forest products, becoming an important export market for these products as well.

**Figure 5-1**  
**Asian forest product production: Industrial wood, 1997, pulp, and paper and paperboard, 1998**



Source: UNFAO forest product database; *Pulp & Paper International, Annual Review*, July 1999.

Japan's economic problems predated the Asian downturn that began in the summer of 1997. Nevertheless, the downturn has exacerbated the economic situation in Japan and the country suffered through a recession during 1998. As discussed hereinafter, the wood industry, already struggling with increased import market share and changing demand, has been hit hard as a drop in housing starts in 1997 and 1998 caused a decline in demand for wood. The pulp and paper industry has experienced falling sales and profits as paper demand has dropped. Imports of raw wood materials and processed products have fallen dramatically, negatively affecting the forest products industries in the many countries that export to Japan. Absent an economic recovery, Japan's wood and paper industries likely will continue to struggle.

## *Structure*

Japan is one of the most heavily forested countries in the world: in a total land area of 37.7 million hectares (ha), 25.1 million ha (67 percent) are forests. Many of these forests, however, are in mountainous terrain. Of the total forested area, natural forests account for 13.4 million ha (53.2 percent), plantation forests account for 10.4 million ha (41.3 percent), and other areas, 1.4 million ha (5.4 percent). The extensive plantation forests in Japan are the result of reforestation programs begun after World War II in response to deforestation and timber shortages. Unlike many countries in Asia, a large portion of the forested area (14.6 million ha) is privately owned. The remaining portions consist of 2.7 million ha of public forests and 7.8 million ha of national forests.<sup>1</sup>

Although Japan has abundant forests and a steadily increasing stock of potentially harvestable trees, the economic viability of logging these forests has deteriorated significantly in recent years, causing Japan to become ever more dependent on imports to meet its wood needs. Falling domestic prices for wood, increasing labor costs, and rising costs of logging in steep terrain have greatly reduced the profitability of harvesting in many areas. Private forest owners consequently have little incentive to harvest or even to maintain or efficiently manage their forests. The harvestable areas of the national forests face similar economic constraints. The situation is aggravated by a sharp drop in the number of workers in the forest industry and the aging of the work force as people leave the rural areas for opportunities elsewhere. Thus despite abundant potential wood resources, it is likely that Japan will continue to rely heavily on wood imports in the future.<sup>2</sup>

The magnitude of Japan's dependence on imported wood to meet its wood and paper needs is shown in appendix table F-1. Japan's total wood demand, on a log basis<sup>3</sup>, increased from 108.5 million m<sup>3</sup> in 1992 to 112.3 million m<sup>3</sup> in 1996. Imported wood accounted for 75 percent of total demand in 1992. A steady decline in domestic wood production and an increase in imported wood pushed import penetration up to 80 percent by 1996. Japan's heavy reliance upon imported wood continued in 1997 and 1998.

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<sup>1</sup> Forestry Agency, Ministry of Agriculture, Forestry and Fisheries, Government of Japan, *Japan-In-Depth Country Study*, Jan. 1998.

<sup>2</sup> Food and Agriculture Organization of the United Nations (FAO), "Asia-Pacific Forestry Towards 2010," *Asia-Pacific Forestry Sector Outlook Study*, 1998.

<sup>3</sup> Log basis represents the volume of logs necessary to produce the product.

Japan depends not only upon imports of raw material (logs and wood chips) but also upon processed products (sawn wood, veneer and plywood, and pulp). During the period, Japan's imports shifted away from the raw material and toward the processed products. In 1992, Japan's imports of logs and wood chips accounted for 65 percent of total wood imports and its imports of the processed products accounted for 35 percent. In 1996, these percentages had shifted to 57 percent and 43 percent, respectively (table F-1).

## Wood and Wood Products

Japan's wood products industry is one of the largest in the world. With mills located throughout the country and thousands of employees, it produces a range of products to serve the needs of the construction, furniture, and material handling products (pallets, crates, and boxes) industries. In recent years, however, the industry has generally contracted in response to the recession and falling demand, and the growing import market share.

The industrial wood industry in Japan consists of thousands of log-producing enterprises, most of which are quite small and produce less than 1,000 m<sup>3</sup> of logs annually. Individuals own 62 percent of these enterprises and 35 percent is company owned. Company-owned enterprises typically produce much larger volumes of logs than individually owned enterprises.<sup>4</sup> As noted earlier, the economic viability of logging in Japan has seriously deteriorated in the past two decades. Increased production costs and falling prices have reduced the profitability of logging, employment has fallen, and the industry faces serious problems in attracting young workers to replenish an aging work force.

The lumber industry in Japan consists of thousands of sawmills located throughout the country. These are generally either small custom mills producing limited volumes of a myriad of wood products from domestically sourced logs, or large mills tending to produce a large volume of fewer, standard-sized lumber products from imported logs. The custom mills tend to be in the interior of the country, while the large mills are generally near ports for easier access to imported logs. The large mills, although much fewer in number than the small mills, account for the great majority of lumber production.<sup>5</sup>

Beset with rising production costs, increased import market share, and greater use of substitute products, the lumber industry has contracted. During 1994-97, the number of sawmills declined by 10 percent, from 15,012 to 13,496.<sup>6</sup> Employment also declined over the period. As Japan's economic problems have worsened, the industry's financial

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<sup>4</sup> Japan Wood-Products Information and Research Center, *Wood Industries in Japan* 1998, Mar. 1998, pp.14-15.

<sup>5</sup> Ibid., pp.16-17.

<sup>6</sup> Ibid.

woes have intensified. In 1996, some 300 lumber firms went bankrupt; in 1997, the number was over 370. Bankruptcies continued in 1998.<sup>7</sup>

The Japanese lumber industry is heavily dependent on imported logs to supply its mills. Imported logs accounted for an average of 55 percent of total logs (by volume) consumed by the industry during 1994-97. The logs, primarily softwood, came from a number of countries, including the United States, Russia, and New Zealand.<sup>8</sup> To further ensure a stable supply of logs, the industry has also made investments in the forestry sectors of Russia and New Zealand.<sup>9</sup>

Although the plywood industry in Japan is one of the world's largest, it is smaller in scale than Japan's lumber industry. The plywood industry consists of several hundred mills, of which approximately 68 percent produce only special plywood; 17 percent produce ordinary plywood; 6 percent, ordinary and special plywood; and 9 percent, only veneer.<sup>10</sup> The mills producing ordinary plywood are relatively large and account for most of the industry's plywood production as well as its employment. Veneer mills and special plywood mills are generally small in terms of production and employment. Ordinary plywood mills, which use imported logs as raw material, are concentrated near major ports around the country; mills that use domestic logs are in Hokkaido and the Tohoku region. Special plywood mills are near large cities and furniture-producing areas.<sup>11</sup>

Like the lumber industry, the plywood industry in Japan has been contracting in response to increasing import market share, rising production costs, increased use of substitute products, and changes in raw material sourcing. The number of plywood/veneer mills steadily declined between 1994 and 1997, from 472 to 420. Employment also declined.<sup>12</sup>

Traditionally, the plywood industry in Japan has been heavily dependent on imported tropical hardwood logs from several Asian countries for its raw material requirements. But as these countries have imposed export bans on such logs (to promote the development of their own plywood industries), the Japanese industry in recent years has moved to find alternative sources of tropical hardwood logs, as well as to increase the use of softwood logs as raw material.<sup>13</sup> Imports of tropical hardwood logs have shifted from Indonesia, the Philippines, and Malaysia to Papua New Guinea, the Solomon Islands, Cameroon, Equatorial Guinea, and Gabon. The industry's campaign to increase the use of softwood logs has also progressed rapidly, not only to reduce dependence on tropical hardwood logs, but also because of softwood's greater availability and relatively lower price. An estimated 1.6 million m<sup>3</sup> of softwood was used as raw material in the production of plywood in Japan in 1998, accounting for 26 percent of total raw material use. Almost all this softwood was imported, primarily from Russia, Chile, and New

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<sup>7</sup> United Nations Economic Commission for Europe (UNECE), *Forest Products Annual Market Review, 1997-1998*, 1998, p. 32.

<sup>8</sup> Japan Wood-Products Center, *Wood Industries in Japan 1998*, pp.16-17.

<sup>9</sup> UNECE, *Forest Products Annual, 1997-1998*, p. 33.

<sup>10</sup> Specialty plywood producers make prefinished plywood or customized panels with a hardwood veneer and a milled, laminated, or embossed overlay.

<sup>11</sup> Japan Wood-Products Center, *Wood Industries in Japan 1998*, pp. 18-19.

<sup>12</sup> Ibid.

<sup>13</sup> USDA, FAS, *Forest Products Annual Report Japan*, Tokyo, AGR No. JA7028, July 30, 1997.

Zealand.<sup>14</sup>

## Pulp, Paper, and Paper Products

In 1998, Japan had approximately 482 paper and paperboard mills and 45 pulp mills scattered throughout the country (table F-2). These mills produce a full range of products to meet the demands of the Japanese economy. The industry consists of numerous producers, ranging from small to among the largest in the world. In 1997, the top six paper and paperboard producers accounted for 51 percent of total Japanese production of paper and paperboard.<sup>15</sup>

Producers have begun to consolidate in an effort to increase operating efficiencies, reduce costs, and eliminate excess capacity.<sup>16</sup> Oji Paper Co., Ltd. merged with Kanzaki Paper Mfg. Co., Ltd. in October 1993, and then in October 1996 merged again with Honshu Paper Co., Ltd. to become the largest paper producer in Japan and one of the largest producers in the world.<sup>17</sup> In early 1999, Settsu, the second-largest containerboard manufacturer in Japan, merged with Rengo, the fourth-largest manufacturer. The new company, Rengo, became the largest containerboard producer in Japan with a 15 percent share of the market.<sup>18</sup>

Consolidation has taken on greater urgency in the past 2 years as Japan's recession has led to declining demand and deteriorating prices for pulp, paper, and paperboard. Japanese producers have experienced falling sales and profits. Total sales for Japan's leading producers fell from \$42.0 billion in 1996 to \$38.7 billion in 1997; operating profit declined from \$2.4 billion to \$1.6 billion.<sup>19</sup> In the fiscal first half ending September 1998, all of the major producers reported declining sales and lower profits, with two companies reporting pretax losses.<sup>20</sup> Reflecting the cost cutting and consolidation, employment in the industry fell from 55,000 in 1994 to 49,000 in 1998 (table F-2).

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<sup>14</sup> "More Softwood Used for Plywood in Japan, Taking 26% Share in 1998," *Japan Lumber Journal*, Jan. 15, 1999. Conversations with industry representatives, Tokyo, Mar. 1999.

<sup>15</sup> Pulp & Paper, *1999 North American Factbook*, Miller Freeman, Inc., (San Francisco: 1998).

<sup>16</sup> Japan Paper Assn., "Chairman's New Year Greetings," found at Internet address [http://www.paper-jpa.or.jp/saishin/pre99\\_e.htm](http://www.paper-jpa.or.jp/saishin/pre99_e.htm), retrieved on Jan. 19, 1999.

<sup>17</sup> Oji Paper Co., Ltd., *Annual Report 1998*. The second-largest producer in Japan, Nippon Paper Industries Co., Ltd., was formed from the merger of Jujo Paper and Sanyo-Kokusaky Pulp in 1993. Nippon Paper Industries Co., Ltd. corporate profile, found at Internet address [http://www.npaper.co.jp/e\\_html/html/cont1.html](http://www.npaper.co.jp/e_html/html/cont1.html), retrieved on Jan. 19, 1999.

<sup>18</sup> Stuart Hoggard, "Asia File," *International Paper Board Industry*, Jan. 1999.

<sup>19</sup> PricewaterhouseCoopers, *Global Forest & Paper Industry Survey, 1998 ed.*

<sup>20</sup> Hoggard, "Asia File."

To obtain the raw materials needed to make paper and paperboard, the Japanese industry relies upon the recycling of wastepaper, imports of pulp, and domestic production of pulp from domestically produced wood chips and imported wood chips. In 1997, wastepaper accounted for 54 percent of the raw materials used to make paper and paperboard, imported pulp accounted for 10 percent, pulp made from domestic wood chips, 12 percent, and pulp made from imported wood chips, 24 percent.<sup>21</sup> To reduce the amount of solid waste generated, as well as recover and reuse wood fibers, local governments, paper-consuming industries, consumers, and paper producers have undertaken major efforts to collect and recycle wastepaper. The paper and paperboard industry has steadily increased its consumption of wastepaper, from 15.7 million metric tons in 1995 to 16.5 million metric tons in 1997. Japan's wastepaper utilization rate (wastepaper consumption as a percent of paper and paperboard production) of 54 percent in 1997 was one of the highest recycling rates in the world.<sup>22</sup> Japan has achieved great success in recycling paperboard, which had a wastepaper utilization rate of 88 percent in 1997. However, printing and writing paper is more difficult and costly to recycle into new paper products, and the wastepaper utilization rate for this paper was a much lower 27 percent in 1997.<sup>23</sup> The industry has set a goal of achieving a wastepaper utilization rate of 56 percent by the end of fiscal year 2000.<sup>24</sup>

The paper and paperboard industry has become increasingly dependent on imports of wood chips, which have a cost advantage over wood chips sourced domestically. The change in sourcing has been dramatic. In 1985, domestically sourced wood chips accounted for 63 percent of demand and imported wood chips, 37 percent. In 1998, the percentages were more than reversed as domestically sourced wood chips accounted for 32 percent of demand and imported wood chips, 68 percent. The industry has also diversified its sources of imports to ensure reliability of supply. In 1998, the industry imported wood chips from more than 10 countries. The largest suppliers were the United States, Australia, New Zealand, China, Canada, South Africa, Chile, and Brazil.<sup>25</sup>

To have even greater control over wood chip supplies, some Japanese producers have established tree-growing plantations in foreign countries. In early 1998, Nippon Paper Industries Co., Ltd. and two other firms agreed to form a forest company to develop a eucalyptus plantation in China. This plantation, the first by a Japanese firm in China, will initially have an area of 2,000 ha and will be expanded to 10,000 ha. Harvesting will begin in 2003. This plantation is the sixth to be established by Nippon Paper Industries;

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<sup>21</sup> Japan Paper Assn., "Breakdown of raw materials for papermaking," found at Internet address <http://www.paper-jpa.or.jp/ekanren/egenryou.htm>, retrieved on Jan. 19, 1999.

<sup>22</sup> Japan Paper Assn., "Japan's wastepaper utilization rate is among the world's highest," found at Internet address <http://www.paper-jpa.or.jp/ekanren/ekoshiagain01.htm>, retrieved on Jan. 19, 1999. Almost half the wastepaper consumed in 1997 was containerboard and one-quarter was newspapers. Magazines and other types of paper comprised the remainder.

<sup>23</sup> Japan Paper Assn., "Wastepaper surplus," found at Internet address <http://www.paper-jpa.or.jp/ekanren/ekoshiagain02.htm>, retrieved on Jan. 19, 1999.

<sup>24</sup> Japan Paper Assn., "Recycle 56 Program-Expanding wastepaper utilization," found at Internet address <http://www.paper-jpa.or.jp/ekanren/ekoshiagain03.htm>, retrieved on Jan. 19, 1999.

<sup>25</sup> Japan Paper Assn.

others are in Chile, Australia, and South Africa.<sup>26</sup> Oji Paper Co., Ltd. has six tree-growing plantations in Australia, New Zealand, Papua New Guinea, and Vietnam.<sup>27</sup> In total, the industry has 18 plantation projects in 8 countries covering 210,000 ha, with another 340,000 ha to be planted by 2010.<sup>28</sup>

## *Production, Products, and Capacity*

### **Wood and Wood Products**

Industrial wood production in Japan declined steadily between 1994 and 1997, from 24.5 million m<sup>3</sup> to 21.5 million m<sup>3</sup> (table F-3). Production probably declined further in 1998.<sup>29</sup> Industrial wood production consisted primarily of softwood species; in 1997, 80 percent of production was softwood and 20 percent was hardwood. The majority of industrial wood went into the production of lumber and plywood, while smaller volumes were used to produce pulp. The respective percentages in 1997 were 73 percent and 26 percent. The production capability of the industrial wood sector has been, and will continue to be, impeded by its declining competitiveness.

Japan is a major producer of lumber but production fell steadily during the period, from 25.9 million m<sup>3</sup> in 1994 to 19.2 million m<sup>3</sup> in 1998 (table F-3). Over 90 percent of Japanese lumber production is softwood lumber. During 1994-97, the number of sawmills declined by 10 percent and capacity (reported in Japan on a kilowatt basis) was down 6 percent. Although overall industry capacity has declined, some sawmills have expanded in size in an attempt to achieve greater economies of scale.<sup>30</sup> The lumber industry has also invested in joint-venture sawmills in Russia to produce lumber for the Japanese market.<sup>31</sup>

Japan is a major producer of plywood but its plywood industry, like the lumber industry, has endured difficult times in recent years. During 1994-97, plywood production fell by 21 percent, from 4.9 million m<sup>3</sup> to 3.8 million m<sup>3</sup>. In 1998, production fell by another 22 percent to an estimated 3.0 million m<sup>3</sup> (table F-3). The majority of plywood production is tropical hardwood plywood, but the percentage of softwood plywood increased rapidly during the period as producers shifted to greater use of softwood logs.

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<sup>26</sup> Nippon Paper Industries Co., Ltd., "Plantation Project in China," release No. 19, found at Internet address [http://www.npaper.co.jp/e\\_html/sinchaku/e0\\_2\\_9.html](http://www.npaper.co.jp/e_html/sinchaku/e0_2_9.html), retrieved on Jan. 19, 1999.

<sup>27</sup> Oji Paper Co., Ltd., *Annual Report 1998*.

<sup>28</sup> Japan Paper Assn., "Cultivated raw materials-Overseas afforestation program," found at Internet address <http://www.paper-jpa.or.jp/ekanren/egenryou02.htm>, retrieved on Jan. 19, 1999.

<sup>29</sup> USDA, FAS, *Forest Products Annual Report Japan*, Tokyo, AGR No. JA8064, Aug. 3, 1998.

<sup>30</sup> Japan Wood-Products Center, *Wood Industries in Japan 1998*, pp. 16-17.

<sup>31</sup> *Ibid.*, p. 6.

The industry responded to the drop in production by reducing capacity. The number of plywood/veneer mills fell by 11 percent between 1994 and 1997.<sup>32, 33</sup>

## **Pulp, Paper, and Paper Products**

In 1998, Japan was the second-largest producer of paper and paperboard in the world, after the United States. Production of paper and paperboard grew steadily between 1994 and 1997, from 28.5 million metric tons to 31.0 million metric tons (table F-3). In 1998, production dropped by 3.7 percent to 29.9 million metric tons. Printing and writing paper and corrugating materials were the largest segments of paper and paperboard production, accounting for 36 percent and 30 percent, respectively, of total production in 1998. Production trends for printing and writing paper and corrugating materials followed that of total paper and paperboard, increasing between 1994 and 1997 and then declining in 1998.

Japan was the fifth-largest producer of pulp in 1998, after the United States, Canada, China, and Finland. To supply rising paper production, pulp production increased by 8.6 percent between 1994 and 1997, from 10.6 million metric tons to 11.5 million metric tons (table F-3). As paper and paperboard production turned down in 1998, so too did pulp production, falling by 5.0 percent to 10.9 million metric tons. Almost 90 percent of Japanese pulp production is consumed internally, with the remainder sold on the open market. Bleached sulfate pulp, unbleached sulfate pulp, and mechanical pulp accounted for 70 percent, 13 percent, and 15 percent, respectively, of total pulp production in 1998 (table F-3).

Capacity to produce paper and paperboard in Japan declined slightly between 1994 and 1995, and then trended upward to 33.3 million metric tons in 1997 and 34.0 million metric tons in 1998, as Japanese producers became more optimistic about growth in demand (table F-2). Capacity utilization in the industry rose from 88 percent in 1994 to 94 percent in 1995, reflecting the increase in production and decline in capacity. Capacity utilization dipped slightly to 93 percent in 1996 and 1997; in 1998, a decline in production and an increase in capacity caused capacity utilization to fall to 88 percent (table F-2). Capital investment in the pulp and paper industry in Japan totaled \$2.2 billion in 1998 compared with capital investment of \$3.3 billion in 1997.<sup>34</sup>

In 1998, Japanese producers brought on stream three new printing and writing paper machines (594,000 metric tons of capacity) and two new newsprint machines (490,000 metric tons of capacity). As demand faltered during 1998, the ability of the market to absorb this new capacity became questionable. Even accounting for the shutdown of old machines and a gradual increase in production by the new machines, there was concern

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<sup>32</sup> Ibid., pp. 18-19.

<sup>33</sup> Japan is also a producer of other wood panels, including laminated lumber, laminated veneer lumber, particleboard, and fiberboard. These products are used primarily in construction and furniture and can be substituted for lumber and plywood in some applications. Production of these panels is small relative to the production of lumber and plywood but has increased in the past few years. Ibid., pp. 22-29.

<sup>34</sup> Japan Paper Assn., *Pulp & Paper Statistics 1999*, May 1999.

in the industry that the incremental capacity would lead to excess production and pressure on prices.<sup>35</sup>

Capacity to produce pulp rose irregularly over the period, from 15.1 million metric tons in 1994 to 15.8 million metric tons in 1998 (table F-2). Capacity utilization increased from 70 percent in 1994 to 76 percent in 1997, but then declined to 69 percent in 1998.

The Japanese industry has increasingly invested in overseas production facilities in recent years, not only to obtain product to sell in the Japanese market, but also to participate in the growth in demand for pulp and paper in other countries. Japanese foreign investment is worldwide and involves many different kinds of paper, paperboard, and pulp. Oji Paper Co., Ltd. has invested in pulp mills in New Zealand, Canada, and Brazil, a printing, writing, and newsprint mill in Canada, and a carbonless copy paper mill in Thailand. The company foresees rapid long-term growth in paper demand in China and Southeast Asia and intends to expand aggressively into the region.<sup>36</sup> Nippon Paper Industries Co., Ltd. has invested in a thermal paper mill in Finland; a printing, writing and newsprint facility in the United States; a carbonless base paper mill in China; and a pulp mill in Indonesia. One-half of the production of the United States mill is exported to Japan; output from the mill in China is sold into the fast-growing Chinese market as well as to other countries.<sup>37</sup> Rengo, a large containerboard producer, has a containerboard plant in China, and Daishowa Paper has a pulp mill in Canada.<sup>38</sup>

## *Markets and Marketing Practices*

### **Consumption**

#### *Wood and wood products*

Although Japan is a large consumer of lumber and plywood, fire and building codes restrict their use in residential construction and land use and tax policies keep land prices high for construction, significantly dampening demand for wood products. Japan's per capita wood consumption is thus much lower than it would otherwise be; indeed, it is significantly lower than that of the United States.<sup>39</sup> Japan has recently taken some limited steps to relax the building and fire codes and thus potentially increase the

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<sup>35</sup> Robert Ryan, "Japan Riding Out Rough Times," *Asia Pacific Papermaker*, June 1998.

<sup>36</sup> Oji Paper Co., Ltd., *Annual Report 1998*.

<sup>37</sup> Nippon Paper Industries Co., Ltd., "Corporate Profile Globalization Activities in the Overseas Countries," found at Internet address [http://www.npaper.co.jp/e\\_html/html/cont10.html](http://www.npaper.co.jp/e_html/html/cont10.html), retrieved on Jan. 19, 1999.

<sup>38</sup> Japan Pulp & Paper Co., Ltd., *The Japanese Pulp & Paper Industry, in Charts and Figures, 1998 Issue*, Nov. 1998.

<sup>39</sup> Japan Economic Institute, *Japan Market Access Agreements: Wood Products*, Dec. 9, 1994.

demand for lumber and plywood. But these steps have been overwhelmed by the recession in Japan, which has caused a severe downturn in the construction market.<sup>40</sup>

As output of lumber and plywood declined during the period, so too did the consumption of industrial wood used in their production. Consumption of industrial wood by the pulp and paper industry increased between 1994 and 1997, and then turned downward in 1998 as pulp production fell. Overall consumption of industrial wood decreased from 70.0 million m<sup>3</sup> in 1994 to 68.9 million m<sup>3</sup> in 1997 (table F-4). Consumption of industrial wood fell further in 1998. With approximately 80 percent of total lumber consumption used in construction, the demand for lumber in Japan is driven overwhelmingly by activity in the construction market, particularly the residential construction market. Construction activity has declined significantly, however, as Japan's economy has stagnated and then fallen into recession, causing increased unemployment, falling consumer spending and confidence, and serious banking problems.<sup>41</sup> After a good year for housing starts in Japan in 1996, total housing starts fell by 16 percent in 1997 and a further 14 percent in 1998. Wooden housing starts exhibited a similar trend, falling by 28 percent between 1996 and 1998.<sup>42</sup> The decline in housing starts and, to a lesser extent, increased substitution of lumber by plywood and other wood panels caused consumption of lumber to fall by 26 percent between 1994 and 1998 (table F-4).

Consumption of plywood also decreased during the period, falling from 8.9 million m<sup>3</sup> in 1994 to an estimated 6.9 million m<sup>3</sup> in 1998 (table F-4). Plywood is used primarily in construction and the manufacture of furniture. With furniture output in Japan falling in response to rising imports and weak consumer demand,<sup>43</sup> plywood experienced difficult conditions in both of its major markets. Some substitution of plywood by other wood panels also contributed to the decline in demand.

The distribution system for lumber and plywood in Japan is a multilayered structure based on personal relationships between suppliers and customers, service, tradition, and the financing of customer purchases by suppliers. Sawmills purchase their logs from loggers or engage in their own logging operations. Sawmills sell their lumber to other wood processing firms (for conversion into moldings, window frames, etc.), construction companies, and wholesalers. Wholesalers then resell the lumber to construction companies or to retailers.<sup>44</sup> Mills producing ordinary plywood sell their output primarily to trading firms and wholesalers for further distribution to retailers and consumers.

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<sup>40</sup> USDA, FAS, *Forest Products Annual Report Japan*, Tokyo, 1998.

<sup>41</sup> USDA, FAS, *Forest Products Imports Diving—a Mid-Year Review*, Tokyo, AGR No. JA8095, Oct. 6, 1998.

<sup>42</sup> Japan Wood-Products Center, *Wood Supply and Demand Information Service*, Feb. 1999.

<sup>43</sup> USDA, FAS, *Forest Products Annual Report Japan*, Tokyo, 1998.

<sup>44</sup> Conversations with industry representatives, Tokyo, Mar. 1999.

## *Pulp, paper, and paper products*

In 1998, Japan was the third-largest consumer of paper and paperboard, after the United States and China. Japan's per capita consumption of paper and paperboard was 237.1 kilograms in 1998 compared with worldwide per capita consumption of 50.4 kilograms.<sup>45</sup> Because paper and paperboard have so many uses and are ubiquitous in a modern economy, demand for them tends to rise and fall with the ups and downs of the overall economy. Thus as Japan's economy grew slowly during 1994-97, consumption of paper and paperboard also grew slowly, from 28.8 million metric tons to 31.4 million metric tons. When Japan entered into a recession in 1998, consumption fell by 4.5 percent to 30.0 million metric tons (table F-4).

Printing and writing paper and corrugating materials were the largest segments of Japanese paper and paperboard consumption, accounting for 35 percent and 30 percent, respectively, of total consumption in 1998 (table F-4). Increased demand from commercial printers (printing such things as catalogues, newspaper inserts, and flyers) as well as the growth of home printing caused consumption of printing and writing paper to rise from 9.7 million metric tons in 1994 to 11.0 million metric tons in 1997. Consumption of corrugating materials, driven by the demand for corrugated boxes, grew more slowly, from 8.8 million metric tons in 1994 to 9.5 million metric tons in 1997. Demand for corrugated boxes during this period was negatively affected by increased substitution of recyclable plastic boxes for corrugated boxes and the overall sluggishness of the economy. Consumption of printing and writing paper during 1994-97 grew at a faster rate than that for overall consumption of paper and paperboard, while consumption of corrugating materials increased at a slower rate. As overall consumption fell in 1998, so did demand for these two products.<sup>46</sup>

Apparent consumption of pulp increased irregularly during 1994-97, from 14.3 million metric tons to 14.9 million metric tons (table F-4). In 1998, consumption of pulp declined by 5.4 percent to 14.1 million metric tons. Bleached sulfate pulp and mechanical pulp accounted for 71 percent and 14 percent, respectively, of total pulp consumption in 1998.

The distribution system for paper and paperboard in Japan is a complex, multilayered structure controlled by the producers. It has evolved, in part, as a way to meet the multitude of small orders placed by many small customers, particularly in the printing and publishing industries. The system consists of producers, distributors, and end users. Although some large end users bypass the distributors and order direct from the mills, the great majority of product moves from the producers through one or more distributors and then to the end user.<sup>47</sup>

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<sup>45</sup> Rhiannon James, Heide Matussek, Ilse Janssens, and Jim Kenny, "P & B Breaks the 300 Million Ton Barrier," *Pulp & Paper International*, July 1999.

<sup>46</sup> Newsprint was the third-largest component of demand, accounting for 13 percent of overall Japanese consumption of paper and paperboard in 1998. Consumption of newsprint, used principally in the production of newspapers, rose steadily during 1994-1997 and increased further in 1998, thus becoming the only segment of the industry to avoid a downturn in 1998.

<sup>47</sup> USDOC, ITA, *Market Research Report, Japan-Paper*, Aug. 1996.

The three major types of distributors are first-tier distributors (dairiten), second-tier distributors (oroshisho), and general trading firms. First-tier distributors are affiliated with, or closely tied to, a particular producer and usually purchase most of their paper from that one producer. There are approximately 30 major first-tier distributors; the top 10 distribute more than 50 percent of all paper and paperboard in Japan. Second-tier distributors are under the first-tier distributors but may have national distribution networks; they usually maintain close relationships with particular first-tier distributors. Japan has more than 9,000 second-tier distributors, although most are quite small and serve only small, local customers. General trading firms, although not major paper distributors in Japan, have become even less of a factor in the market as some of them have exited the business in the past few years.<sup>48</sup>

In 1997, 80 percent of domestically produced paper was channeled to first-tier distributors, 14 percent went to general trading firms, and 6 percent, to second-tier distributors. First-tier distributors then resold about 41 percent of their paper to second-tier distributors (for further distribution to end users) and most of the remainder to end users. About 75 percent of the paper purchased by general trading firms was resold to first-tier distributors for further sale to second-tier distributors or end users. Distribution of paperboard followed a similar pattern. In 1997, 62 percent of domestically produced paperboard went to first-tier distributors, 31 percent went to general trading firms, and 7 percent, to second-tier distributors. First-tier distributors then resold their paperboard to second-tier distributors, general trading firms, and end users.<sup>49</sup>

## Imports

Japan is a major importer of forest products, especially industrial wood, lumber, and plywood. During 1994-97, Japanese imports of forest products increased irregularly from \$18.1 billion to \$18.8 billion (table F-5). In 1998, imports tumbled by 34 percent to only \$12.4 billion. Wood and wood products accounted for 78 percent of total imports during the period. Major suppliers included the United States, Canada, and Indonesia.

### *Wood and wood products*

In recent years, Japan has influenced world trade flows in wood and wood products in a number of ways. As discussed herein, first, it has expanded the number of country suppliers to ensure reliability of supply as well as to meet changing raw material requirements. Second, although imports of industrial wood to make lumber and plywood are still significant, these imports have declined as Japan has increased its imports of lumber and plywood. Lastly, the recession in Japan in 1998 caused a large drop in consumption of wood products and led to a significant reduction in wood

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<sup>48</sup> Ibid.

<sup>49</sup> Japan Pulp & Paper Co., Ltd., *The Japanese Pulp & Paper Industry, 1998*.

imports, which has hurt the forest products industries of countries dependent upon the Japanese market.

Japan's imports of industrial wood increased from 45.6 million m<sup>3</sup> in 1994 to 47.3 million m<sup>3</sup> in 1997, and then fell off sharply in 1998 (table F-6). Reflecting Japan's heavy dependence upon imported wood, import penetration in the industrial wood market was 65.1 percent in 1994 and 68.7 percent in 1997. Industrial wood imports consisted principally of logs for lumber and plywood production and wood chips for pulp production. As noted earlier, Japanese paper and paperboard producers have increasingly replaced domestically sourced wood chips with imported wood chips. They have also expanded the number of wood chip suppliers and currently import from more than 10 countries.

Japan's imports of logs for lumber and plywood production steadily declined during the period, from 22.4 million m<sup>3</sup> in 1994 to 15.2 million m<sup>3</sup> in 1998 (table F-6). The drop in imports reflected increased imports of lumber and plywood (which displaced domestic production of these products and thus reduced demand for logs), the overall drop in demand for wood products caused by the recession, and log export restrictions in certain countries.<sup>50</sup> The United States, Malaysia, Papua New Guinea, Russia, and New Zealand were the major suppliers of logs to Japan. During the period, Russia displaced the United States as the largest supplier of logs. Relatively lower prices for Russian logs and greater demand for softwood logs as raw material for plywood production accounted for this shift in suppliers.

Between 1994 and 1997, lumber imports made steady inroads in the Japanese market, increasing in volume by 17 percent and in market share from 29.3 percent to 36.7 percent (table F-6). Imports fell sharply, by 38 percent, in 1998 and import penetration fell to 28.8 percent. Major Japanese lumber suppliers included Canada, the United States, Malaysia, Indonesia, Russia, Chile, and the Scandinavian countries. Canada was the largest supplier, and in 1997 accounted for 45 percent of total lumber imports. Lumber imports from Europe, particularly the Scandinavian countries, have made rapid inroads in the Japanese market. These imports almost quadrupled between 1994 and 1997, and increased their share of total lumber imports from 5 percent to 17 percent. Although lumber imports from Europe, like imports from the other major suppliers, declined in 1998, they maintained a large share of total imports. High quality, grain and color characteristics similar to Japanese softwood, extensive marketing and promotion efforts, and greater cost competitiveness due to the depreciation of European currencies against the United States dollar accounted for Europe's success in the Japanese market.<sup>51</sup>

Plywood imports have had a significant presence in the Japanese plywood market for many years. Like lumber imports, plywood imports increased steadily during 1994-97, from 4.1 million m<sup>3</sup> to 5.4 million m<sup>3</sup> (table F-6). In 1998, plywood imports declined an estimated 27 percent to 3.9 million m<sup>3</sup>. Import penetration grew from 45.6 percent in

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<sup>50</sup> USDA, FAS, *1998 White Paper on Japanese Forestry*, Tokyo, AGR No. JA8043, June 12, 1998. Countries imposing restrictions or bans on log exports include Indonesia, Malaysia, Ghana, and Cote d'Ivoire.

<sup>51</sup> USDA, FAS, *Forest Products Annual Report Japan*, Tokyo, 1997. Conversations with industry representatives, Tokyo, Mar. 1999.

1994 to 58.7 percent in 1997, and then fell slightly to 56.9 percent in 1998. Indonesia and Malaysia were the principal suppliers of plywood to Japan and accounted for 90 percent of total plywood imports in 1997. Imports from Indonesia, however, were flat during 1994-97, while imports from Malaysia more than tripled. Indonesia's share of total imports thus fell from 80 percent in 1994 to 61 percent in 1997, while Malaysia's share jumped from 13 percent to 29 percent. Concern in the Japanese plywood industry that the large depreciation of the Indonesian and Malaysian currencies that occurred in the second half of 1997 would lead to increased imports of plywood from Indonesia and Malaysia during 1998 was unfounded. Imports from the two countries declined sharply in 1998, as the contraction in plywood demand offset the benefits from depreciating currencies.<sup>52</sup>

Trading companies are the primary importers of logs, lumber, and plywood into Japan. These companies import logs for resale to lumber and plywood producers, and import lumber for sale to construction companies and wholesalers. Wholesalers then resell the product to construction companies or to retailers.<sup>53</sup> Most imported plywood is distributed by trading companies to wholesalers, who then resell it to end users or to retailers. In an attempt to bypass this distribution structure, some foreign firms have established distribution and marketing subsidiaries in Japan to sell directly to end users.

### *Pulp, paper, and paper products*

Although Japan is the third-largest consumer of paper and paperboard in the world, its imports and the level of import penetration are relatively low. According to the United States Department of Commerce, the distribution system for paper and paperboard in Japan is tightly controlled by the Japanese paper producers. The close relationships between the producers and the distributors make it extremely difficult for imports to penetrate the distribution system and reach end users. New suppliers are also disadvantaged because company procurement policies are frequently secretive and procurement is usually directed toward existing suppliers, making it difficult for new suppliers to know about or take advantage of possible business opportunities. Imports that do enter the country are frequently brought in on behalf of the Japanese paper producers themselves for distribution through their own distribution networks. These imports include product from Japanese joint-venture mills overseas, discrete products for which there is no domestic production, and products for which there is a temporary shortfall in domestic production.<sup>54</sup>

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<sup>52</sup> USDA, FAS, *Japan's Current Plywood Imports and Softwood Plywood Production*, Tokyo, AGR No. JA8078, Oct. 13, 1998.

<sup>53</sup> Conversations with industry representatives, Tokyo, Mar. 1999.

<sup>54</sup> USDOC, ITA, *Market Report, Japan-Paper*, 1996. The elimination of trade barriers to allow more access for U.S. paper products in the Japanese market has been the subject of negotiations between the United States and Japan in recent years. A 5-year bilateral agreement (1992-1997) between the two countries to increase access for imported paper in the Japanese market, however, led to "[n]o meaningful increase in Japanese imports of paper and paperboard products." United States Trade Representative, *1998 National Trade Estimate Report on Foreign Trade Barriers*, 1998.

The primary importers of paper and paperboard are the general trading firms. In 1997, these firms accounted for 88 percent of paper imports and 62 percent of paperboard imports. First-tier distributors and second-tier distributors accounted for the remainder. General trading firms resold the imports to first-tier distributors (for further distribution to end users or second-tier distributors) or to end users.<sup>55</sup>

Japanese imports of paper and paperboard increased gradually from 1.2 million metric tons in 1994 to 1.6 million metric tons in 1996, and then declined to 1.3 million metric tons in 1997 and 1.2 million metric tons in 1998 (table F-6). Import penetration rose slightly from 4.1 percent in 1994 to 5.1 percent in 1996, but then dropped back to 3.9 percent in 1998. The United States, Canada, and Finland were the largest paper suppliers to Japan and accounted for over 80 percent of total paper imports in 1998. The United States and Taiwan were the largest suppliers of paperboard to Japan and accounted for 77 percent of total paperboard imports in 1998. Other paperboard suppliers included Canada, Finland, and Sweden.

Newsprint, printing and writing paper, and corrugating materials were the largest segments of Japanese paper and paperboard imports, accounting for 53 percent, 24 percent, and 10 percent, respectively, of total imports in 1998 (table F-6). Newsprint imports, almost all of which are from Japanese joint-venture mills in the United States and Canada, increased from 536,000 metric tons in 1994 to 620,000 metric tons in 1998. Imports of printing and writing paper increased from 360,000 metric tons in 1994 to 626,000 metric tons in 1996, in large part because Japanese paper producers resorted to importing paper in response to a temporary supply shortage caused by lack of capacity.<sup>56</sup> Imports of printing and writing paper fell sharply to 387,000 metric tons in 1997 as additional Japanese capacity came on stream and relieved the supply shortage. In 1998, imports declined further to 286,000 metric tons.

Some foreign producers have recently made limited inroads into the Japanese paper market. A large Indonesian paper producer has been able to penetrate and capture about 10 percent of the Japanese plain-paper copier market. Traditionally, this market had been served primarily by the large copier manufacturers, who distributed the paper to their customers. But a new market for copy paper has developed as United States shop-front stationery chains have established branches in Japan to serve the growing needs of small offices and home businesses. The Indonesian producer is successfully serving this market, using three Japanese general trading firms and its own Japanese subsidiaries to distribute its paper.<sup>57</sup> In addition, a large Japanese newspaper publisher has begun to use Korean newsprint for its newspapers.<sup>58</sup>

In contrast to the limited imports of paper and paperboard, Japan imports large volumes of pulp to supplement domestic pulp production, which is insufficient to meet demand. Imports of pulp totaled 3.7 million metric tons in 1994, and then gradually declined to 3.2

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<sup>55</sup> Japan Pulp & Paper Co., Ltd., *The Japanese Pulp & Paper Industry*, 1998.

<sup>56</sup> USDOC, ITA, *Market Report, Japan-Paper*, 1996.

<sup>57</sup> Ryan, "Japan Riding Out Rough Times," and Brian Stafford, "Japanese Paper Industry in Crisis," *Asia Pacific Papermaker*, Dec. 1998. Conversations with industry representatives, Tokyo, Mar. 1999.

<sup>58</sup> Ryan, "Japan Riding Out Rough Times."

million metric tons in 1998 (table F-6). Bleached sulfate pulp accounted for three-quarters of total pulp imports. Pulp imports declined during this period as domestic pulp production increased and larger volumes of wastepaper were recovered and recycled to make paper. Nevertheless, imports maintained a significant presence in the market, with import penetration falling moderately from 26 percent in 1994 to 22.8 percent in 1998. Canada and the United States were the major suppliers of pulp to Japan, accounting for 67 percent of total imports in 1998. Brazil, New Zealand, Chile, and Indonesia were other large pulp suppliers.<sup>59</sup> Much of the imported pulp came from Japanese-owned mills in these countries. Pulp and wastepaper imports amounted to \$1.6 billion in 1998 (table F-5).

## Exports

The value of Japanese exports of forest products was relatively stable during 1994-98, and amounted to \$2.1 billion in 1998 (table F-5). Paper and paper products exports accounted for 94 percent of the total. The principal export markets were the United States, Hong Kong, China, and Taiwan.

Japanese exports of wood and wood products are small in relation to Japanese imports, production, and consumption. The value of 1998 exports was \$67 million and was equivalent to 3 percent of total Japanese forest product exports (table F-5). Exports were primarily wood panels and lumber and went to Korea, the United States, and Taiwan (tables F-5 and F-7).

Japan's paper and paperboard industry is not heavily dependent upon exports. Exports of paper and paperboard as a percent of total production averaged only 3 percent during 1994-98.<sup>60</sup> As Japanese producers have become more international in their outlook, however, they have stepped up their exporting efforts, particularly in Asia.<sup>61</sup> Japan's exports of paper and paperboard increased irregularly from 869,000 metric tons in 1994 to 1.1 million metric tons in 1998 (table F-7). Asian countries, particularly Hong Kong, China, and Taiwan, were the principal export markets; in 1998, Asia accounted for 77 percent of Japan's total paper exports and 99 percent of its paperboard exports.<sup>62</sup> The industry's export performance was particularly noteworthy during 1998, as the industry managed to increase its exports by 11 percent over 1997 despite the sharp economic downturn throughout most of Asia. Printing and writing paper and board were the largest segments of Japanese exports, accounting for 53 percent and 20 percent, respectively, of total exports in 1998. Exports of printing and writing paper rose from 445,000 metric tons in 1994 to 570,000 metric tons in 1998, while exports of board grew from 168,000 metric tons to 212,000 metric tons.

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<sup>59</sup> Japan Paper Assn., *Pulp & Paper Statistics 1999*, May 1999.

<sup>60</sup> Japan's exports of pulp were minimal and accounted for less than 1 percent of total pulp production during 1994-1998 (table F-7).

<sup>61</sup> Oji Paper Co., Ltd., *Annual Report 1998*.

<sup>62</sup> Japan Paper Assn., *Pulp & Paper Statistics 1999*, May 1999.

# Indonesia

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With abundant forests and a desire to develop them as a means to foster economic growth and development, Indonesia over the past 25 years has become a large producer and exporter of forest products. Initially, Indonesia was involved only in the raw material aspect of forest products, producing and exporting logs. During the 1970s, the country quickly became a major exporter of logs. In an attempt to capture the added economic benefits of downstream processing, Indonesia in the 1980s rapidly developed lumber and plywood industries to produce and export wood products rather than logs. The country became a major exporter of plywood. In the 1990s, Indonesia developed its pulp and paper industries as another means to add value to its forest resources. The Indonesian Government, through trade and forest management policies, has played an important role in this evolution of the forest products industry from a raw material supplier to a finished goods producer.<sup>63</sup>

The forest products industry in Indonesia has become an important part of the overall economy, accounting for 10 percent of the country's gross domestic product<sup>64</sup> and providing jobs for 3.7 million people, who in turn sustain millions more.<sup>65</sup> Forest products exports are substantial and rank only behind oil as a source of export revenue for the country. The growth of the forest products industry, however, has been sharply curtailed by the Asian economic crisis, and particularly the economic and political crisis in Indonesia. Domestic demand for wood products and paper has fallen and important export customers for wood products have greatly reduced purchases. The industry has cut output; sales and profits have fallen; and capacity expansion plans have been postponed or canceled. The industry is expected to continue to suffer until the economic situation improves.

## *Structure*

Indonesia is heavily forested and accounts for 10 percent of the world's tropical forests and 60 percent of Asia's tropical forests.<sup>66</sup> Approximately 80 percent (155.9 million ha) of the country's total land area is forested.<sup>67</sup> The Indonesian Government has classified 131.7 million ha of the forested area as follows: protected forest (34.6 million ha), national park and wildlife reserves (20 million ha), limited production forests

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<sup>63</sup> Abbas Adhar, "Indonesian Forestry-Driven by Markets, Shaped by Policy," *Asian Timber*, Apr. 1996.

<sup>64</sup> FAO, *Asia-Pacific Forestry Towards 2010*, p. 17.

<sup>65</sup> Don Hammond, "Commentary on Forest Policy in the Asia-Pacific Region," *Asia-Pacific Forestry Sector Outlook Study*, FAO, Oct. 1997, p. 36.

<sup>66</sup> *Ibid.*

<sup>67</sup> Estimates differ as to the actual amount of forested area in Indonesia. The FAO estimated a forested area of about 110 million ha in 1995. FAO, *State of the World's Forests 1997*, 1997, annex 3. Some environmental groups have estimated an even smaller area of forests.

(23.9 million ha), permanent production forests (34.8 million ha), and conversion forests (18.4 million ha).<sup>68</sup>

The national park and wildlife reserves are for research, recreation, and the protection of wildlife and plant species, and are protected by legislation from any commercial activities. The protected forest area, which is preserved for soil and water conservation, is also protected by legislation from any commercial activity.<sup>69</sup> The conversion forests are areas that the Government has set aside for conversion into agricultural cropland (primarily for rubber, oil palm, and rice) and conversion into plantation forests through an industrial forest development program. This program involves the gradual harvesting (roughly 250,000 ha a year) of forested area and the planting and development of fast-growing tree plantations (teak, mahogany, pine, eucalyptus, and acacia) by Government and private companies on the cleared land. Under the program, 2.1 million ha have thus far been converted to plantations, most of which will provide wood for the pulp and plywood industries.<sup>70</sup> The Indonesian Government's activities involving the conversion forests serve a number of economic and social purposes, including increasing food production for a growing population, increasing employment opportunities for its people, and relieving pressure on its natural forests by greater dependence on tree plantations to serve the raw-material needs of its forest products industry. The Government intends to continue its efforts in this area and expand the area devoted to tree plantations.<sup>71</sup>

Most commercial logging in Indonesia occurs in the two remaining forested areas—the limited production forests and the permanent production forests. These forests are concentrated principally in Kalimantan, Sumatra, and Irian Jaya. Under the 1946 Constitution, almost all property rights to forestland are owned by the Indonesian Government. The Government controls the level of harvesting by setting annual production goals and dividing the total amount among the various regions of the country.<sup>72</sup> In the late 1960s, the Government began to open up the limited production forests and permanent production forests to large-scale commercial logging. Over the ensuing years, the Government issued concession (logging) rights to hundreds of private firms for a period of 20 years, with many of the rights renewable for another 15 years. Most of the land in the limited production forests and the permanent production forests is under concession. Concessionaires must pay a variety of fees to the Government, including a onetime forest concession license fee, a land and improvement tax, a forest products royalty (based on the volume and type of wood harvested), and a reforestation fee (based

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<sup>68</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, AGR No. ID8075, Nov. 27, 1998.

<sup>69</sup> Colin McKenzie, "Indonesian Pulpwood," in *Issues in Global Timber Supplies*, (San Francisco: Miller Freeman, 1999), pp. 159-160.

<sup>70</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, 1998.

<sup>71</sup> Republic of Indonesia, Ministry of Forestry, *Country Report-Indonesia*, Feb. 1998, pp. 13-14. There are some indications that the government's industrial forest development program is not progressing as rapidly as planned. A lack of technical knowledge and insufficient return on investment may be hindering the development of tree plantations. J. L. Blanchez, "Forest Resources and Roundwood Supply in the Asia Pacific Countries: Situation and Outlook to the Year 2010," *Asia-Pacific Forestry Sector Outlook Study*, FAO, July 1997, p. 85.

<sup>72</sup> World Forest Institute, *Indonesia Forestry and the Wood Products Industry*, Feb. 1994, pp. 10-14.

on the volume of harvested logs). This revenue is used, in part, to control illegal logging activities and to finance reforestation efforts. The Government regulates many aspects of the concessionaires' logging activities, including the building of roads in the concession area, the type of harvesting method employed, management of the forest, and reforestation efforts.<sup>73</sup>

The involvement of the Indonesian Government in the forest products industry has extended beyond control of the forests and the granting of logging concessions. To capture the benefits of downstream processing of raw materials, the Government has pursued policies that fostered the development of a large plywood industry geared primarily toward export markets. In 1980, the Government issued a regulation phasing out log exports by 1985; the Government also instructed all concession holders to develop plywood mills.<sup>74</sup> These policies, coupled with favorable tax provisions for plywood producers, led to the rapid growth of the plywood industry in Indonesia. To prevent plywood producers from undercutting each other in export markets, the Government helped establish an export cartel, APKINDO, that controlled the volume and price of plywood exports through export licenses, export quotas, and Joint Marketing Boards. The log export ban was abolished in 1993 but replaced with an export tax so high as to effectively preclude any exports of logs. The Government also imposed a very high export tax on lumber in 1990 to encourage domestic processing of lumber into downstream wood products.<sup>75</sup>

In the second half of 1997, the Asian economic crisis caused a severe downturn in the Indonesian economy. In an attempt to halt the decline, in early 1998 the Government entered into an agreement with the International Monetary Fund (IMF) for financial assistance in return for a series of structural reforms covering many areas of the economy, including the forestry sector. The reforms in the forestry sector included the immediate dismantlement of APKINDO, the gradual reduction of export taxes on logs and lumber to 10 percent by December 2000, and a change in regulations to allow logging firms without wood processing facilities to hold forest concessions and to allow the transfer of concessions by sale. These reforms were intended to reduce the level of Government control over the sector and consequently allow market forces to play a larger role. For example, Indonesian plywood mills are now able to market their exports through any entity they wish, to develop new markets, and to freely negotiate prices and product mix.<sup>76</sup>

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<sup>73</sup> Ibid.

<sup>74</sup> Michael J. Lyons, "Export Marketing of Plywood from Indonesia," FAO, 1995, pp. 8-12. The ban on log exports was also a major impetus in the development of a domestic lumber industry.

<sup>75</sup> Michael J. Lyons, "Export Marketing of Plywood from Indonesia," FAO, 1995, pp. 8-12. World Bank, *Indonesia Sustaining High Growth with Equity*, May 30, 1997, pp. 118-124. According to the World Bank, the trade restrictions on logs have enabled Indonesian plywood producers to obtain logs at prices lower than those prevailing in world markets.

<sup>76</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, 1998. There are some indications, however, that the Indonesian Government is hindering exports of logs by levying export taxes higher than that agreed to and by imposing bureaucratic obstacles upon firms wanting to export.

Up until the late 1980s, the main objective of the Government's forest management plans was to exploit and develop the forests as rapidly as possible to generate significant foreign exchange and to assist in the country's economic development. The Government was successful in this endeavor, but the country experienced rapid deforestation caused by clearing of land for agricultural purposes, illegal logging, and the failure of many concessionaires to abide by Government regulations concerning harvesting. To achieve some balance between development and preservation, in the past decade the Government has undertaken a number of steps to reduce the pressure on the forests. These have included the development of tree plantations, stricter enforcement of harvesting regulations, greater attempts to control illegal logging, increased reforestation fees, and greater involvement of citizens and nongovernmental organizations in the development of forestry policy.<sup>77</sup> The Government has also pledged that the country's natural forests will be sustainably managed by the year 2000.<sup>78</sup>

## Wood and Wood Products

The Indonesian wood products industry has had remarkable growth over the past 2 decades, evolving from a raw material producer to a major producer of lumber and plywood. Indonesia has become the largest exporter of tropical hardwood plywood in the world. The Asian economic crisis has hit the industry hard, however, reducing demand in both export and domestic markets. The industry has contracted and some firms have attempted to expand into the production of higher valued wood items such as furniture and moldings.

The industrial wood industry in Indonesia consists principally of private logging firms that have been granted Government concessions to harvest trees (subject to Government regulation) in a given area. In 1998, 437 private concessionaires managed 61.7 million ha of forest.<sup>79</sup> The average size of these concessions was 141,000 ha. Six Government timber firms manage approximately 7.5 million ha.<sup>80</sup> Most of the private concessions are in Kalimantan, Sumatra, and Irian Jaya; Government-managed forests are located throughout the country. Many concessionaires have wood processing facilities to process their logs. The number of concessionaires has declined in recent years as the Government has revoked the concessions of firms that have failed to follow harvesting regulations.<sup>81</sup>

The economic environment for the industry deteriorated during 1998 amid indications that it was about to undergo a major restructuring. Higher production costs, due to logging in more remote areas and stricter Governmental enforcement of harvesting regulations, coupled with declining demand and prices for logs increased the competitive pressure felt by concessionaires. Uncertainty with respect to the Government's forest management

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<sup>77</sup> Hammond, "Commentary on Forest Policy in the Asia-Pacific Region."

<sup>78</sup> World Bank, *Indonesia Sustaining High Growth with Equity*, p. 124.

<sup>79</sup> USDOC, ITA, *Indonesia's Timber Companies*, Market Research Report, Feb. 1998. Employees of these concessionaires numbered in the thousands.

<sup>80</sup> USDOC, ITA, *State Timber Firms to Merge*, Market Research Report, Feb. 1998.

<sup>81</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, AGR No. ID7024, July 1, 1997.

plans, as well as whether the Government would renew logging concessions for a large number of firms only exacerbated the situation. As much as 40 percent of the country's logging firms was reported as planning to leave the business.<sup>82</sup> In early 1998, the Indonesian Government indicated that it planned to consolidate the industry by reducing the number of concessionaires from 437 to only 50 within the next 5 years. The Government indicated that such consolidation would lead to more efficient production and facilitate Government regulation.<sup>83</sup> Government regulations published in late 1998, however, suggested that the Government's position with respect to the size of concessionaire forest holdings was changing. Under the regulations, concessionaires would be limited to a total of only 400,000 ha. In 1998, a number of large firms had concessions of more than 400,000 ha.<sup>84</sup>

Indonesia has a sizeable lumber industry. In 1996, the lumber industry consisted of 2,708 sawmills, many of which were on the major log-producing islands. Only 360 of the 2,708 sawmills were affiliated directly with log concessionaires; and, on average, these were much larger than the independent sawmills.<sup>85</sup> The lumber industry is oriented primarily toward the domestic market. As mentioned earlier, the Government imposed a steep export tax on lumber in 1990 to encourage the development of downstream wood-processing industries. Sawmills source logs domestically but must compete with plywood mills for large diameter logs, which are the most suitable for the sawmills' processing equipment.<sup>86</sup> The collapse of the Indonesian economy in 1998 reduced prices and demand for lumber, causing mills to shut down and lay off workers.<sup>87</sup>

The plywood industry in Indonesia consists of 117 plywood mills located primarily in Sumatra and Kalimantan, which are the principal sources of logs for the mills. Concern in 1996 about a shortage of domestic logs for the plywood mills gave way to a belief in 1998 that domestic supplies would be sufficient for the next 3 to 5 years.<sup>88</sup> Almost all of the mills are integrated with large log concessionaires, and the average capacity of these mills is much greater than that of the independent plywood mills.<sup>89</sup> The industry is large and heavily oriented toward export markets, having successfully pursued a strategy of export-led growth over the past 20 years. It has also begun to diversify its exports away from commodity plywood and toward higher-valued

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<sup>82</sup> "Many Timber Firms Facing Closure," *The Jakarta Post*, Oct. 7, 1998.

<sup>83</sup> USDOC, ITA, *Indonesia's Timber Companies*.

<sup>84</sup> U.S. Department of State telegram No. 001874, prepared by U.S. Embassy, Jakarta, Apr. 1999.

<sup>85</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, AGR No. ID6032, July 3, 1996. Republic of Indonesia, Ministry of Forestry, *Country Report-Indonesia*, Feb. 1998, p. 19.

<sup>86</sup> International Tropical Timber Organization (ITTO), *Forest Industry Structure and the Evolution of Trade Flows in the Asia-Pacific Region-Scenarios to 2010*, May 1997, p. 26.

<sup>87</sup> UNECE, *Forest Products Annual, 1997-1998*, pp. 35-36.

<sup>88</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, 1998.

<sup>89</sup> Republic of Indonesia, Ministry of Forestry, *Country Report-Indonesia*, 1998, p. 19.

decorative plywood.<sup>90</sup> The industry is a major employer, with an average-size mill employing 1,000 workers.<sup>91</sup>

The abolition of APKINDO in 1998 brought opportunities for the mills to seek new foreign markets and to establish new marketing arrangements with existing foreign customers. The Asian economic crisis, however, had a harmful effect on the industry, causing demand and prices in domestic and foreign markets to plunge. The volume of plywood exports in 1998 fell by an estimated 16 percent as Japan and Korea, two key export markets, reduced purchases. Plywood prices in export markets declined by 40 to 50 percent from the previous year. Plywood mills serving the domestic market cut production as construction activity declined sharply. To weather the crisis, industry sources suggest that the plywood industry may undergo some consolidation and restructuring as well as move further into the manufacture of more value-added wood products such as furniture and moldings.<sup>92</sup>

## **Pulp, Paper, and Paper Products**

During the 1990s, Indonesia moved rapidly to develop its pulp, paper, and paperboard industry. The growth of the industry has been remarkable, transforming the country from an insignificant player to an important world producer. Fueled by increased domestic demand and exports, the industry's production of pulp rose ninefold between 1987 and 1997, and its production of paper and paperboard increased sixfold. This rate of growth of production was much higher than that of established producing countries in North America and Europe, albeit from a much lower base. By 1997, Indonesia had become the world's 13th-largest producer of paper and paperboard and the 9th-largest producer of pulp.<sup>93</sup> Although slowed down by the Asian economic crisis, the industry remains a potent force in pulp and paper markets.

The pulp, paper, and paperboard industry in Indonesia consists of 84 paper and paperboard mills and 14 pulp mills principally in Java and Sumatra (table F-8). Most of the paper mills are not integrated with pulp mills. As the industry has expanded capacity and output, employment has risen rapidly, from 71,000 in 1995 to 96,000 in 1997. The industry produces a wide variety of pulp and paper and paperboard products. The pulp industry is dominated by two large companies, Asia Pulp & Paper and Asia Pacific Resources International Holdings; the paper and paperboard industry is dominated by Asia Pulp & Paper.<sup>94</sup> These two producers have accounted for much of the growth in pulp and paper capacity and output in Indonesia in recent years, spending billions of dollars on huge, world-class pulp and papermaking machinery incorporating all of the latest technological advances in the field.<sup>95</sup>

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<sup>90</sup> Michael J. Lyons, "Export Marketing of Plywood from Indonesia," FAO, 1995, p. 1.

<sup>91</sup> *Ibid.*, p. 20.

<sup>92</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, 1998.

<sup>93</sup> Pulp & Paper, *1999 North American Factbook*, p. 131.

<sup>94</sup> Mark Payne and Billie Payne, *Asia-Pacific Analysis & Forecast*, 2d ed. (Brussels: Miller Freeman, 1997), pp. 105-115.

<sup>95</sup> PricewaterhouseCoopers, *Global Forest & Paper Industry Survey, 1998 ed.*, p. 9.

The fiber to produce pulp and paper is not sourced solely from Indonesia's forests. The industry also relies heavily upon imported pulp and recycled wastepaper. Its use of domestically sourced wastepaper rose steadily from 630,000 metric tons in 1994 to 1.4 million metric tons in 1998, while its use of imported wastepaper averaged over 1.3 million metric tons a year during 1994-98 (tables F-9, F-12). With a national recovery rate for wastepaper of only 25 percent in 1995, considerable scope existed to increase the amount of wastepaper collected. In 1995, wastepaper accounted for almost 50 percent of all fiber consumed by the industry.<sup>96</sup> Pulpwood is harvested from Indonesia's production forests, conversion forests, and, to a much lesser extent, tree plantations. Over the next several years, however, tree plantations are intended to replace the production forests and conversion forests as the source of wood for the pulp mills, thus relieving pressure on Indonesia's forests.<sup>97</sup>

The effects of the Asian economic crisis on the pulp, paper, and paperboard industry in Indonesia have been mixed. The drop in domestic demand for paper and paperboard, high interest rates, the rapid devaluation of the rupiah, and the almost complete paralysis of the Indonesian banking system have created an extremely difficult business environment for Indonesian producers. Nonetheless, while many producers have been hurt, others have thrived. In general, firms with raw material and interest costs primarily in dollars and revenue mostly in rupiah have suffered, while firms with sales primarily in dollars and raw material costs mostly in rupiah have benefited.<sup>98</sup> For example, some Indonesian paper mills have been unable to obtain critical supplies of softwood pulp from the United States because of the weak rupiah and their inability to obtain credit from Indonesian banks.<sup>99</sup> Smaller Indonesian paper mills, heavily dependent on the domestic market, have attempted to offset falling domestic sales by expanding exports. Lack of marketing expertise and low product quality, however, have hindered the efforts of many of these firms. Many of them have taken downtime.<sup>100</sup> On the other hand, large export-oriented firms, with raw material costs primarily in rupiah, have enjoyed increased exports and lower costs. Asia Pulp & Paper and Asia Pacific Resources International Holdings have been able to run at full capacity by boosting exports to 80 percent or more of total production. The two firms have also benefited from a large drop in their pulp production costs.<sup>101</sup>

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<sup>96</sup> Payne and Payne, *Asia-Pacific Analysis & Forecast*, p. 111.

<sup>97</sup> There is disagreement as to whether these plantations will, in fact, be able to supply all of the pulpwood needs of the pulp industry in Indonesia. See, for example, Colin McKenzie, "Indonesian Pulpwood," in *Issues in Global Timber Supplies*, and Dennis Neilson, "Reaching the Bottom of the Asian Fiber Basket?" *Pulp & Paper International*, Feb. 1998.

<sup>98</sup> "Stormy Seas Lie Ahead for Much of the Industry," *Pulp & Paper International*, Feb. 1999, pp. 20-21.

<sup>99</sup> UNECE, *Forest Products Annual, 1997-1998*, p. 31.

<sup>100</sup> "Indonesia Demand Down, Exports Booming," *Asia Pacific Papermaker*, July 1998, pp. 21-22.

<sup>101</sup> *Ibid.*

## *Production, Products, and Capacity*

### **Wood and Wood Products**

Industrial wood production in Indonesia grew steadily from 42.6 million m<sup>3</sup> in 1994 to 47.3 million m<sup>3</sup> in 1997 (table F-9).<sup>102</sup> Almost all of this growth was accounted for by a large increase in the production of pulpwood to satisfy growing pulp output. Industrial wood production in 1998 was probably flat or down. Most of the industrial wood produced was tropical hardwood. Industrial wood was used primarily in the production of lumber and plywood and pulp, with 69 percent of total production in 1997 destined for lumber and plywood and 24 percent destined for pulp.<sup>103</sup>

Indonesia is a large producer of lumber, with most of the output consumed in the domestic market. Production of lumber (virtually all tropical hardwood) increased from 6.8 million m<sup>3</sup> in 1994 to 7.3 million m<sup>3</sup> in 1996 (table F-9). Production declined slightly in 1997 as the economy turned downward in the second half of the year and the industry encountered difficulty in securing sufficient supplies of large-diameter logs. Lumber production probably decreased further in 1998. With capacity in the lumber industry totaling approximately 19 million m<sup>3</sup> in 1995,<sup>104</sup> the industry appeared to have had substantial excess capacity throughout the period.

Indonesia is one of the world's largest producers of plywood and the world's largest producer of tropical hardwood plywood. Production of plywood, more than 80 percent of which is exported, declined by 2.4 percent during 1994-97 as increases in exports were offset by decreases in shipments to the domestic market (table F-9). Production (virtually all tropical hardwood plywood) was also constrained somewhat by a shortage of large-diameter logs. Plywood output fell further in 1998. In 1996-97, plywood capacity totaled 10.2 million m<sup>3</sup>.<sup>105</sup> With production during the period well over 8 million m<sup>3</sup> a year, the industry operated at a very high rate of capacity utilization.<sup>106</sup> Foreign investment to tap the country's forest resources has also occurred. In late 1998, a South Korean joint venture in Indonesia announced that it would construct a \$100 million plywood plant in Irian Jaya, with 80 percent of its output to be exported to Japan.<sup>107</sup>

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<sup>102</sup> Indonesia also produces a large volume of residual wood, which is wood gathered by individuals, primarily in rural areas, and used for cooking and heating.

<sup>103</sup> Some Indonesian firms have ventured overseas and are logging in the Amazon basin of Brazil. FAO, *Asia-Pacific Forestry Towards 2010*, p. 133.

<sup>104</sup> Republic of Indonesia, Ministry of Forestry, *Country Report-Indonesia*, 1998, p. 19.

<sup>105</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, 1998.

<sup>106</sup> Indonesia is also a producer, albeit a relatively small one, of other wood panels, including particleboard, medium-density fiberboard, and laminated veneer lumber. Some plywood mills have begun production of these items in an attempt to diversify their output and to use their wood raw materials more efficiently. USDOC, ITA, *Indonesia Forestry & Woodworking Machinery Market*, Market Research Report, Feb. 1996.

<sup>107</sup> Bruce Gilley, "Sticker Shock," found at Internet address [http://www.feer.com/Restricted/99jan\\_14/enviro.htm](http://www.feer.com/Restricted/99jan_14/enviro.htm), retrieved on Feb. 18, 1999.

## Pulp, Paper, and Paper Products

Driven by increased domestic consumption and exports, production of paper and paperboard in Indonesia grew by 57.8 percent between 1994 and 1997, from 3.1 million metric tons to 4.8 million metric tons (table F-9). Production rose by 13.8 percent in 1998 as a large increase in exports offset a decline in demand in the domestic market. Printing and writing paper, corrugating materials, and board are the largest segments of paper and paperboard production, accounting for 34 percent, 29 percent, and 22 percent, respectively, of total production in 1998. Output of each of these products rose steadily during 1994-98.

Production of pulp also expanded rapidly during the period to meet growing domestic and export demand. Production more than doubled between 1994 and 1998, from 1.3 million metric tons to 3.4 million metric tons (table F-9). Bleached sulfate pulp accounted for 85 percent of total pulp production in 1997. By virtue of its vast forest resources, low labor costs, and relatively new pulping facilities, Indonesia has become one of the lowest cost producers of pulp in the world. The significant devaluation of the rupiah against the dollar caused by the Asian economic crisis has reduced its pulp production costs even more. Indonesian market pulp is thus very competitive in world markets.<sup>108</sup> Over the past few years, however, some of the market pulp production has been utilized by new paper machines constructed by Indonesian producers and thus is no longer available for sale in the open market.<sup>109</sup>

Capacity to produce paper and paperboard in Indonesia almost tripled between 1994 and 1998, from 3.8 million metric tons to 10.7 million metric tons as producers brought on huge, new paper machines (table F-8). The effect of the Asian economic crisis on the industry's capacity has been mixed. New machines have been brought on stream while other projects have been canceled or postponed. Five new paper machines, with a total annual capacity of 1.5 million metric tons of printing and writing paper, commenced operations during late 1997 and 1998. The start up of another large paper machine, however, was reported delayed for lack of financing.<sup>110</sup> Many of the smaller producers have put any expansion plans on hold until the economic situation improves.<sup>111</sup> There was also a feeling within the industry that some of the smaller producers would merge or shut down during 1999.<sup>112</sup> Capacity utilization in the paper and paperboard industry fell from 81 percent in 1994 to 51 percent in 1998 as the increase in capacity outstripped the increase in production.

Capacity to produce pulp rose from 2.8 million metric tons in 1994 to 4.3 million metric tons in 1998, an increase of 52 percent over the period (table F-8). With production of pulp increasing much faster than capacity, capacity utilization rose from 47 percent in

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<sup>108</sup> UNECE, *Forest Products Annual, 1997-1998*, p. 36.

<sup>109</sup> Pulp & Paper, *1999 North American Factbook*, p. 210.

<sup>110</sup> "Exports to Rise 30% This Year but Domestic Markets Collapse," *Asia Pacific Papermaker*, Sept. 1998, p. 6.

<sup>111</sup> "Stormy Seas Lie Ahead for Much of the Industry," *Pulp & Paper International*, Feb. 1999, p. 21.

<sup>112</sup> "Review 98, Preview 99," *Asia Pacific Papermaker*, Dec. 1998, p. 24.

1994 to 80 percent in 1998. Ongoing projects to increase pulp capacity in Indonesia have encountered some delays because of the economic crisis but appear to be moving forward.<sup>113</sup>

Indonesian producers have made major investments in production facilities in other Asian countries to participate in the growth in demand for paper products in these markets. Asia Pacific Resources International Holdings has invested over \$500 million to build a large paper mill in China, which began commercial production in March 1999. The firm had earlier built a stationery-converting plant in Suzhou.<sup>114</sup> Asia Pulp & Paper has three mills in China producing boxboard and printing and writing paper and a mill in India producing printing and writing paper. The company has entered into a joint venture to construct a \$1.3 billion pulp mill in Malaysia.<sup>115</sup>

Foreign investment in the pulp and paper industry in Indonesia has also occurred. Two Taiwan pulp and paper companies have part ownership of Indah Kiat, a large Indonesian pulp and paper producer. Finnish, Australian, and Japanese firms have made investments in the industry.<sup>116</sup> Two Japanese firms, Nippon Paper Industries and Marubeni, have invested in a large pulp mill currently under construction in Sumatra.<sup>117</sup> Asia Pacific Resources and UPM-Kymmene, a large Finnish paper producer, have formed an alliance involving a swap of shares (ownership) in their papermaking operations as well as agreements on marketing, technology cooperation, and environmental affairs.<sup>118</sup>

## *Markets and Marketing Practices*

### **Consumption**

#### *Wood and wood products*

Consumption of industrial wood rose gradually from 42.2 million m<sup>3</sup> in 1994 to 46.8 million m<sup>3</sup> in 1997 (table F-10). A large increase in the consumption of pulpwood accounted for most of this growth. Consumption of industrial wood probably declined in 1998. Consumption of lumber increased from 6.2 million m<sup>3</sup> in 1994 to 6.9 million m<sup>3</sup> in 1996 (table F-10). Demand for lumber fell by 1.3 percent in 1997 (from 1996) and probably contracted further in 1998. Demand for plywood also weakened during 1997 and 1998.

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<sup>113</sup> Martin Bayliss, "Indonesia Fragile Handle With Care," *Asia Pacific Papermaker*, Sept. 1998.

<sup>114</sup> Asia Pacific Resources, "April Fine Paper Changshu Mill Successfully Starts Production on Paper Machine," press release, Mar. 25, 1999.

<sup>115</sup> Asia Pulp & Paper Co. profile found at Internet address <http://www.asiapulppaper.com>, retrieved on Jan. 20, 1999.

<sup>116</sup> Payne and Payne, *Asia-Pacific Analysis & Forecast*, pp. 105, 118.

<sup>117</sup> Bayliss, "Indonesia Fragile Handle With Care."

<sup>118</sup> "UPM-Kymmene and APRIL Set Timing for Share Swap," *PIMA'S Papermaker*, Feb. 1998, p. 8.

## *Pulp, paper, and paper products*

Indonesia's rapid economic growth in recent years has led to large increases in consumption of paper and paperboard. A more affluent and well-educated population has demanded more books, magazines, and newspapers, and increased industrial production has required more packaging material. The severe economic contraction that began in Indonesia in the second half of 1997, however, led to a drop in the consumption of paper and paperboard during 1998, as newspapers and magazines experienced a loss of circulation and advertising revenue, people cut back on purchases of household tissue products, and falling industrial output reduced demand for packaging.<sup>119</sup> In 1998, Indonesia's per capita consumption of paper and paperboard was 13.5 kilograms; worldwide per capita consumption was almost four times greater.<sup>120</sup>

Apparent consumption of paper and paperboard in Indonesia increased by 36.8 percent between 1994 and 1997, from 2.4 million metric tons to 3.3 million metric tons (table F-10). Consumption then declined by 15.2 percent in 1998, to 2.8 million metric tons. Printing and writing paper, corrugating materials, and board were the largest segments of paper and paperboard consumption in Indonesia, accounting for 13 percent, 39 percent, and 30 percent, respectively, of the total during 1998. Increased production of paper and paperboard caused apparent consumption of pulp in Indonesia to grow from 1.8 million metric tons in 1994 to 2.6 million metric tons in 1998 (table F-10).

## **Imports**

Indonesian imports of forest products amounted to \$954 million in 1998, an increase of only 1 percent over imports in 1994 (table F-11). Pulp, paper, and paper products made up 91 percent of the value. The United States, the EU, and Canada were the major suppliers.<sup>121</sup>

Indonesia is not a large importer of paper and paperboard, although imports did rise irregularly from 171,000 metric tons in 1994 to 261,000 metric tons in 1997 (table F-12). Imports declined by 50 percent in 1998 because of the downturn in paper and paperboard demand and the significant depreciation of the rupiah. Import penetration in the paper and paperboard market was 4.7 percent in 1998 compared to 7.1 percent in 1994. Suppliers of paper and paperboard to Indonesia included the United States, Japan, Finland, Taiwan, France, and Germany.

Indonesia is a large importer of pulp, bringing in grades of pulp that complement the grades produced domestically. Imports of pulp rose from 687,000 metric tons in 1994 to 840,000 metric tons in 1998 because increased production of paper and paperboard increased the demand for pulp (table F-12). Imports were a significant factor in the pulp market, accounting for 32.1 percent of consumption in 1998, but down from 39.1 percent in 1994. The United States, Canada, Brazil, South Africa, and New Zealand were large

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<sup>119</sup> Bayliss, "Indonesia Fragile Handle With Care."

<sup>120</sup> James, Matussek, Janssens, and Kenny, "P & B Breaks the 300 Million Ton Barrier."

<sup>121</sup> Indonesia's imports of industrial wood, lumber, and plywood were minimal during the period and accounted for less than 1 percent of apparent consumption (table F-12).

suppliers of pulp to Indonesia.

## Exports

During 1994-97, Indonesian exports of forest products increased irregularly by 3.3 percent, from \$6.0 billion to \$6.2 billion (table F-11). In 1998, however, exports declined 18.1 percent to \$5.0 billion. Wood and wood products made up 58.2 percent of 1998 exports, paper and paper products made up 28.1 percent of 1998 exports, and pulp, 13.7 percent of exports. Japan, the EU, and China were major markets.

### *Wood and wood products*

Indonesia's exports of industrial wood during the period were very small and consisted principally of wood chips and particles (table F-13). Log exports were minimal because of the high export tax placed upon them. Although the export tax was reduced during 1998 as part of the Government's agreement with the IMF (discussed above), log exports continued to be constrained not only by the tax, but also by Government bureaucratic delays.<sup>122</sup> Exports of lumber were also quite small during 1994-97; in 1997, exports accounted for only 6 percent of total lumber production. Like logs, lumber exports were constrained by a high export tax. Under the agreement with the IMF, the tax on lumber was also reduced during 1998. Unlike logs, however, there were indications that during 1998 lumber producers significantly increased lumber exports in response to the drop in domestic demand.<sup>123</sup>

Indonesia is the largest exporter of tropical hardwood plywood in the world. Its plywood industry is export based, with exports accounting for 87 percent of total production during 1994-97. Plywood exports increased from 8.2 million m<sup>3</sup> in 1994 to 8.5 million m<sup>3</sup> in 1997 (table F-13). The principal export markets were Asian, particularly Japan, Korea, and China; exports to Asian countries accounted for 70 percent of total exports (by volume) in 1996. During 1998, recessions in two important export markets, Japan and Korea, caused the volume of total plywood exports to decline by an estimated 16 percent from the 1997 level.<sup>124</sup>

Indonesia is facing pressure to ensure that its wood exports are from forests that have been certified to be sustainably managed. In recent years, environmental groups, believing that logging in tropical forests has caused severe environmental damage and deforestation, have attempted to change forestry practices in Indonesia (and other wood-producing countries) by changing purchasing attitudes in consuming countries. Campaigns against retailers selling noncertified wood products, attempts to pass city purchasing laws that favor or mandate purchases of certified wood products, and consumer educational campaigns have had some limited success in North America and Europe. Some retailers and consumers in these regions now purchase only wood products

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<sup>122</sup> USDA, FAS, *Forest Products Annual Report Indonesia*, Jakarta, 1998.

<sup>123</sup> Ibid.

<sup>124</sup> Ibid.

that have been certified by the Forest Stewardship Council, an international environmental organization that ensures that forest products bearing its certification come from sustainably managed forests. Although most of Indonesia's wood exports are to Asian countries, where there is much less concern about this issue, Indonesia, nonetheless, is taking steps to alleviate international concerns about its forestry practices. The Indonesian Ecolabelling Institute, founded in 1994, has been developing a certification system for Indonesia. The Institute is also cooperating with the Forest Stewardship Council in an attempt to achieve mutual recognition of the two certification systems. Twenty-two concession holders in Indonesia have sought certification of their forestry activities by the Indonesian Ecolabelling Institute.<sup>125</sup>

### *Pulp, paper, and paper products*

As the Indonesian paper and paperboard industry has grown, it has increasingly looked to export markets as an outlet for its production. With big, modern paper machines, better product quality, and low costs, the industry has become an important player in international markets, particularly Asia, but increasingly in Europe and the United States.<sup>126</sup> Total exports of paper and paperboard more than doubled between 1994 and 1997, from 826,000 metric tons to 1.8 million metric tons (table F-13). In 1998, exports jumped by 57.4 percent to 2.8 million metric tons, as Indonesian producers brought new paper machines on line and increased exports in the face of a drop in domestic demand. Exports as a percent of production were significant and increased during the period, from 27 percent in 1994 to 51.6 percent in 1998.

Exports of printing and writing paper, the largest category of Indonesia's paper and paperboard exports, grew from 414,000 metric tons in 1994 to 1.5 million metric tons in 1998 (table F-13). These accounted for 53.5 percent of total exports in 1998. Exports of newsprint, corrugating materials, and board also enjoyed large gains during the period. Large export markets included China, Malaysia, and Taiwan; during 1998, Japan, Europe, and the United States became important export markets. Indonesian producers have entered into marketing and distribution agreements with other firms in order to penetrate markets in Japan, Europe, and the United States. Asia Pulp & Paper entered into an alliance with Itochu, a large Japanese trading firm, to export uncoated free sheet paper to Japan.<sup>127</sup> To market and distribute worldwide the production from a new paper machine started up in April 1998, Asia Pacific Resources entered into partnership agreements with international distributors covering all major markets, UPM-Kymmene (Europe, Australia, New Zealand, and South Africa), Champion International (North and South America), DaiEi (Japan), and CyPap (Middle East). Asia Pacific Resources would market and distribute the paper within Asia. To further

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<sup>125</sup> Gilley, "Sticker Shock."

<sup>126</sup> Bayliss, "Indonesia Fragile Handle With Care."

<sup>127</sup> Presentation by George Harad, chairman of the board and chief executive officer of Boise Cascade, at a security analyst meeting in New York on October 22, 1997, found at Internet address [http://www.reportgallery.com/Boise96/fact297/report\\_of\\_security\\_2.htm](http://www.reportgallery.com/Boise96/fact297/report_of_security_2.htm), retrieved on Feb. 2, 1998.

enhance marketing efforts, the firm announced that the paper would be sold under a brand name, PaperOne.<sup>128</sup>

With increased pulp capacity and low production costs, Indonesia rapidly expanded pulp exports during the period, from 243,000 metric tons in 1994 to 1.7 million metric tons in 1998 (table F-13). Exports as a percent of production rose from 18.5 percent to 48.3 percent. All of the exports consisted of bleached sulfate pulp. Some of the pulp exports are consumed by Indonesian producers' overseas paper mills. Asia Pacific Resources' new paper mill in China will obtain much of its pulp from a related pulp mill in Indonesia.<sup>129</sup> China, Korea, and European countries were the major markets for pulp exports. During 1998, Japan became a more important market for Indonesian pulp; exports more than doubled from 1997 to over 100,000 metric tons.

## Malaysia

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Malaysia has significant forest resources that have been developed to stimulate economic growth and development. The country has not been content with simply exporting raw forest products, however; instead, it has actively and successfully developed downstream wood processing industries to capture more of the value-added manufacturing within its borders. Malaysia has become a major producer and exporter, not only of logs, but also of lumber, plywood, moldings, and furniture. Through trade and domestic policies, the Malaysian Government has exerted considerable influence upon the development of wood processing industries within the country.

The forest products industry in Malaysia is an important sector of the economy, accounting for 10 percent of the country's gross domestic product<sup>130</sup> and employing almost a quarter of a million people.<sup>131</sup> Notwithstanding the industry's past success, it has been hit hard by the Asian economic crisis, which has reduced demand and prices for forest products both domestically and in key export markets. Compounding this crisis, the wood processing industry is facing constraints on its supply of logs. Log production has declined and is forecast to continue to decline as the Government attempts to compensate for years of overharvesting by gradually reducing the annual harvest to a more sustainable level. The industry has also experienced greater pressure in the marketplace to ensure that its products have been sourced from sustainably managed forests.

### *Structure*

Malaysia is a federation consisting of the 11 States of Peninsular Malaysia (on the Asian mainland and bordered on the north by Thailand) and the States of Sabah and Sarawak

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<sup>128</sup> Asia Pacific Resources, "PaperOne Launched," press release, May 6, 1998.

<sup>129</sup> Bayliss, "Indonesia Fragile Handle With Care."

<sup>130</sup> FAO, *Asia-Pacific Forestry Towards 2010*, p. 17.

<sup>131</sup> ITTO, Malaysia, found at Internet address [http://www.itto.or.jp/other/timber\\_certification/10.html](http://www.itto.or.jp/other/timber_certification/10.html), retrieved on Feb. 18, 1999.

(across the South China Sea from Peninsular Malaysia on the northern part of the island of Borneo).<sup>132</sup> Most of Malaysia's people live in Peninsular Malaysia. In 1995, the total forested area in Malaysia was an estimated 18.91 million ha, 57.5 percent of the total land area. Of the total forested area, 31 percent was in Peninsular Malaysia, 24 percent was in Sabah, and 46 percent was in Sarawak.<sup>133</sup>

Malaysia has designated 14.29 million ha of its forested area as Permanent Forest Estate, an area intended to be managed and harvested in a sustainable manner. This area has been further subdivided into production forests (10.85 million ha) and protection forests (3.43 million ha). An additional 2.84 million ha of the total forest area have been designated as conversion forests, land to be gradually cleared and used for agricultural and industrial purposes and for housing. To protect and preserve animal and plant life, another 2.12 million ha of the total forest area have been designated as national parks and wildlife and bird sanctuaries.<sup>134, 135</sup>

In an attempt to supplement log output from its natural forests, Malaysia has developed forest plantations, which have a variety of fast-growing species. The total area devoted to tree plantations is quite small, however, only 0.07 million ha in Peninsular Malaysia, 0.11 million ha in Sabah, and 0.01 million ha in Sarawak. The development of tree plantations has been hindered by lack of available land and uncertainties with respect to land tenure rights.<sup>136</sup> Malaysia has large areas (4.82 million ha) devoted to agricultural tree crops, primarily rubber, oil palm, coconut, and cocoa. These tree crops, particularly rubberwood, have become an important source of wood in the country.<sup>137</sup> Rubberwood is used extensively by the Malaysian furniture industry.<sup>138</sup>

Under the Malaysian Constitution, land is considered a State matter and thus forest ownership, forest legislation, and forest policy fall under the purview of the States, not the Federal Government. Although Peninsular Malaysia, Sabah, and Sarawak pursue their own forest policies, there is a measure of cooperation between them and the Federal Government on forestry issues.<sup>139</sup> The States control harvesting of the forests by giving concessions (logging rights) to private or State-owned firms. In Peninsular Malaysia, there have been two types of concessions—long-term agreements covering large forest areas to a few partly or wholly State-owned integrated firms, and short-term agreements covering small areas. In Sabah, most of the forestland has been awarded under concessions (of varying time periods) to a number of private firms. The remaining land has been awarded, under long-term agreements, to several State agencies and two State-

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<sup>132</sup> Malaysia's total land area is 32.9 million ha—Peninsular Malaysia, 13.2 million ha; Sarawak, 12.3 million ha; and Sabah, 7.4 million ha.

<sup>133</sup> Forestry Department Headquarters, Peninsular Malaysia, *Country Report-Malaysia*, June 1997, appendix 1.

<sup>134</sup> The 2.12 million ha consist of 1.80 million ha outside the Permanent Forest Estate and 0.33 million ha within it.

<sup>135</sup> Forestry Department, Peninsular Malaysia, *Country Report-Malaysia*, 1997, pp. 13-14 and appendix 1.

<sup>136</sup> Blanchet, "Forest Resources and Roundwood Supply in the Asia Pacific Countries: to the Year 2010," p. 90.

<sup>137</sup> Forestry Department, Peninsular Malaysia, *Country Report-Malaysia*, 1997, p. 13.

<sup>138</sup> FAO, *Asia-Pacific Forestry Towards 2010*, 1998, p. 106.

<sup>139</sup> Forestry Department, Peninsular Malaysia, *Country Report-Malaysia*, 1997, pp. 20-23.

owned corporations. In Sarawak, 12 firms have been given concessions, many for periods ranging from 5 to 25 years.<sup>140</sup> The States collect considerable revenue from these concessions in the form of royalties and other fees.<sup>141</sup>

To obtain more value from its forest resources, Malaysia, in recent years, has rapidly developed downstream wood processing industries. The Malaysian Governments' (Federal and State) role in this development has been important.<sup>142</sup> Under Malaysia's Second Industrial Master Plan (1996-2005), the forest industry has been identified as one of the country's industries to be further developed and expanded by increased production and exportation of higher-value-added items. The Plan calls for more rapid development of the furniture and moldings/joinery sectors by (1) "establishing furniture complexes to encourage furniture production for export markets, (2) establishing integrated rubberwood processing plants to maximize the utilization of different sizes and quality of rubberwood, and (3) establishing timber processing zones in Sabah and Sarawak to encourage local processing."<sup>143</sup> The Government has implemented a number of policy measures to facilitate this objective.<sup>144</sup>

The development of downstream wood-processing industries has also been stimulated by Government bans, restrictions, and levies on the exports of logs and lumber. In 1995, Peninsular Malaysia imposed a ban on log exports. Sarawak and Sabah have imposed restrictions on log exports in the past few years. Peninsular Malaysia has announced that it will ban lumber exports by the year 2000 in order to develop further its wood-processing industries.<sup>145</sup> Peninsular Malaysia, Sarawak, and Sabah impose export levies on lumber, while Sabah also imposes an export levy on logs.<sup>146</sup>

Malaysia's success in developing wood-processing industries is shown in table 5-1.

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<sup>140</sup> ITTO, *Forest Industry Structure Scenarios to 2010*, p. 25.

<sup>141</sup> Forestry Department, Peninsular Malaysia, *Country Report-Malaysia*, 1997, p. 7.

<sup>142</sup> *Ibid.*, p. 16.

<sup>143</sup> *Ibid.*, p. 16; FAO, *Asia-Pacific Forestry Towards 2010*, 1998, p. 106.

<sup>144</sup> Forestry Department, Peninsular Malaysia, *Country Report-Malaysia*, 1997, p. 16. In an attempt to develop the paper industry in Malaysia, the Malaysian Government has designated the industry as "pioneer status." With this designation, domestic and foreign companies investing in the industry are given certain investment tax allowances. USDOC, ITA, *Malaysia-Paper/Paperboard Import Opportunities*, Market Research Report, July 1997.

<sup>145</sup> ITTO, *Forest Industry Structure Scenarios to 2010*, pp. 29, 31.

<sup>146</sup> ITTO, "1997, Country Notes Malaysia," *Annual Review and Assessment of the World Tropical Timber Situation 1997*, and I. J. Bourke and Jeanette Leitch, *Trade Restrictions and Their Impact on International Trade in Forest Products*, (Rome: FAO, 1998), p. 20.

**Table 5-1**  
**Composition of the value of Malaysia's wood products exports**

(Percentage)						
Year	Logs	Lumber	Plywood/Veneer	Moldings	Furniture	
1985 .....	65	24	6	5	0	
1990 .....	45	34	12	6	3	
1993 .....	24	36	27	5	8	
1995 .....	19	30	33	5	13	

Source: Malaysian Timber Council

In 1985, Malaysia's exports of logs accounted for 65 percent of the total value of wood products exports; exports of plywood/veneer, moldings, and furniture accounted for only 6 percent, 5 percent, and 0 percent, respectively, of the total value of exports. By 1995, the composition of Malaysia's exports had changed dramatically. Logs accounted for only 19 percent of the total value of wood products exports, while plywood/veneer exports had jumped to 33 percent of total exports and furniture exports had increased to 13 percent. The shift in exports to value-added wood products continued during 1996-98.

Malaysia's development of its wood-processing industries has come at a cost with respect to its forest resources. Years of overharvesting, concessionaires' failure to follow harvesting regulations, illegal logging, clearing of forestland for agricultural or industrial purposes, and slash-and-burning of forests have led to deforestation and constraints on the ability of the forests to supply the raw material needs of the country's wood industries. In recent years, the Malaysian Government has attempted to strike a balance between development and conservation of the forests. It has passed legislation increasing the criminal penalties for illegal logging and providing for surveillance of the forests by the police and the military. The Government has also undertaken greater efforts to enforce harvesting regulations and has reduced the annual log production quota to more sustainable levels.<sup>147</sup>

## Wood and Wood Products

The industrial wood industry in Malaysia consists of over 1,000 logging firms employing thousands and harvesting in Peninsular Malaysia, Sabah, and Sarawak.<sup>148</sup> The firms have been granted concessions by the State Governments to harvest trees in a given area for varying lengths of time. Most of the firms are private; the remainder are partially or wholly owned by the Government. Some of the firms are integrated, with both logging and wood processing operations. The logging industry is facing pressure from stricter Government enforcement of harvesting regulations and the gradual reduction in annual log production.<sup>149</sup>

Malaysia has a large lumber industry. In 1995, the industry consisted of 1,157 sawmills

<sup>147</sup> Forestry Department, Peninsular Malaysia, *Country Report-Malaysia*, 1997, pp. 14-15.

<sup>148</sup> ITTO, *Forest Industry Structure Scenarios to 2010*, p. 24.

<sup>149</sup> USDA, FAS, *Forest Products Annual Report Malaysia*, Kuala Lumpur, AGR No. MY9049, June 30, 1999.

employing 66,329 workers.<sup>150</sup> By 1997, the number of sawmills had risen to 1,194.<sup>151</sup> Approximately 60 percent of the sawmills is in Peninsular Malaysia, and the remainder are split about evenly between Sabah and Sarawak. The industry produces for both the domestic market and for export, with 43 percent of its output exported in 1997. However, the industry has been experiencing problems in a number of areas. The reduction in the country's annual log production and the diversion of logs to the country's plywood mills have reduced the supply of logs for sawmills. The Asian economic crisis has caused declines in the volume and price of lumber exports because key export markets have cut back on purchases.<sup>152</sup> Finally, the ban on lumber exports from Peninsular Malaysia by the year 2000 portends a reduction in output as lumber producers there lose access to export markets.<sup>153</sup>

Although not as large as the lumber industry, the plywood industry in Malaysia has grown rapidly in recent years as part of the country's attempt to develop downstream wood processing industries. The number of plywood/veneer mills more than doubled between 1990 and 1997, from 74 mills to 172 mills.<sup>154</sup> These mills are dispersed throughout the country, with roughly half of them in Sabah and the remainder in Peninsular Malaysia and Sarawak. Employment in the plywood industry is sizeable, totaling 60,861 in 1995.<sup>155</sup> With a relatively small domestic market for plywood, the industry is heavily dependent upon exports. This dependence hurt the industry in late 1997 and 1998 as the Asian economic crisis led to a drop in demand and prices in important export markets. The industry also faced increased costs for glue and other imported inputs caused by the significant depreciation of the Malaysian ringgit against the United States dollar as well as much higher interest rates for short-term borrowing.<sup>156</sup>

## **Pulp, Paper, and Paper Products**

Despite large forest resources, the pulp, paper, and paperboard industry in Malaysia is relatively small and oriented toward the domestic market. Although production of paper and paperboard increased during 1994-98, the country remained heavily dependent upon imports of these products to satisfy rising demand. A contraction in Malaysia's economy caused by the Asian economic crisis reduced demand for paper and paperboard in 1998. The industry cut production and capacity expansion plans were delayed or canceled.

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<sup>150</sup> ITTO, *Forest Industry Structure Scenarios to 2010*, p. 24.

<sup>151</sup> Malaysian Timber Council.

<sup>152</sup> USDA, FAS, *Forest Products Annual Report Malaysia*, Kuala Lumpur, AGR No. MY8040, July 14, 1998.

<sup>153</sup> ITTO, *Forest Industry Structure Scenarios to 2010*, p. 26.

<sup>154</sup> Malaysia Timber Industry Board, "Timber Processing Mills in Malaysia," found at Internet address <http://www.jaring.my/mtib/exports.html>, retrieved on Apr. 15, 1999.

<sup>155</sup> ITTO, *Forest Industry Structure Scenarios to 2010*, p. 24.

<sup>156</sup> UNECE, *Forest Products, 1997-1998*, p. 72.

The pulp, paper, and paperboard industry in Malaysia consists of 18 paper and paperboard mills located throughout the country and one pulp mill located in Sabah (table F-14). Most of the paper and paperboard mills are quite small; 12 of them have an annual capacity of less than 50,000 metric tons and only 2 mills have an annual capacity of more than 100,000 metric tons. The largest mill in the country has an annual capacity of 250,000 metric tons.<sup>157</sup> The total capacity of these 18 mills is substantially less than the country's consumption of paper and paperboard. Employment in the industry totaled only 3,400 in 1998.

To meet its fiber needs, the paper and paperboard industry depends on wastepaper, imported pulp, and domestically produced pulp. Wastepaper is critical to the industry, with many of the mills heavily dependent on it for paper and paperboard production. Wastepaper is obtained principally through domestic recycling programs; imports comprise a relatively small portion of total wastepaper consumption. Consumption of wastepaper in Malaysia rose irregularly, from 400,000 metric tons in 1994 to 561,000 metric tons in 1998 (table F-16). In 1995, wastepaper accounted for 63.2 percent of all the fiber consumed by the Malaysian paper and paperboard industry.<sup>158</sup> Malaysia's one pulp mill sources its pulpwood domestically.<sup>159</sup>

## ***Production, Products, and Capacity***

### **Wood and Wood Products**

Malaysian production of industrial wood declined from 37.2 million m<sup>3</sup> in 1994 to 31.9 million m<sup>3</sup> in 1997 (table F-15).<sup>160</sup> The Seventh Malaysia Plan anticipates log production of only 27 million m<sup>3</sup> by the year 2000.<sup>161</sup> Virtually all industrial wood production consisted of logs; Malaysia's annual production of pulpwood was less than 1 million m<sup>3</sup>.

Malaysian logging firms have operations in Africa, Latin America, and Asia. One firm, Innovest Bhd, has logging operations in the Republic of Congo and in late 1997 was negotiating with the Government of Cameroon for large, long-term forest concessions. Logs from the operation in the Republic of Congo are exported to the United States and Europe. Other Malaysian firms are active in Gabon and Liberia.<sup>162</sup> In Latin America, Malaysian firms are logging in the Amazon basin.<sup>163</sup>

Malaysia is a large producer of lumber, selling significant output in both domestic and export markets. Production grew by 6.7 percent between 1994 and 1995, and then fell

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<sup>157</sup> Payne and Payne, *Asia-Pacific Analysis & Forecast*, p. 206.

<sup>158</sup> *Ibid.*, p. 200.

<sup>159</sup> *Ibid.*, p. 198.

<sup>160</sup> Malaysia also produces some residual wood, which is wood gathered by individuals, primarily in rural areas, and used for cooking and heating.

<sup>161</sup> USDA, FAS, *Forest Products Annual Report Malaysia*, Kuala Lumpur, 1998.

<sup>162</sup> ITTO, "1997, Country Notes Africa and Asia-Pacific," *Annual Review and Assessment of the World Tropical Timber Situation 1997*.

<sup>163</sup> FAO, *Asia-Pacific Forestry Towards 2010*, 1998, p. 133.

by 19.3 percent in 1996 and a further 4.2 percent in 1997 (table F-15). It is estimated from trade sources that production was down further in 1998. In 1995, the industry's installed capacity was 24 million m<sup>3</sup>.<sup>164</sup> With annual lumber production ranging between 7 million m<sup>3</sup> and 9.3 million m<sup>3</sup>, the industry appears to have had significant excess capacity during the period. It is anticipated that this excess capacity, combined with the Malaysian Government's emphasis on the production of more value-added wood products and the declining log supply, will lead to significant restructuring of the lumber industry and a reduction in its capacity.<sup>165</sup>

Malaysia's production of plywood has steadily increased in recent years, and the country's plywood industry is now one of the world's largest. Plywood production rose from 3.5 million m<sup>3</sup> in 1994 to 4.4 million m<sup>3</sup> in 1997, with increased exports accounting for most of this production growth (table F-15).<sup>166</sup> The plywood industry's total installed capacity in 1995 was 13 million m<sup>3</sup>.<sup>167</sup> With production much lower than this reported capacity, the industry appears to have operated with significant excess capacity during 1994-98. Thus despite the plywood industry's successful growth and development, there is a recognition that this industry, too, must undergo some restructuring and reduction in capacity to remain competitive.<sup>168</sup>

## **Pulp, Paper, and Paper Products**

Malaysian producers steadily increased output of paper and paperboard during 1994-97, from 595,000 metric tons to 848,000 metric tons (table F-15). Producers cut output in 1998 in response to lower demand. Corrugating materials, printing and writing paper, and tissue comprised the largest segments of paper and paperboard production, accounting for 63 percent, 21 percent, and 14 percent, respectively, of total production in 1998. Production of pulp rose from 145,000 metric tons in 1994 to 170,000 metric tons in 1997, and then declined to 145,000 metric tons in 1998 (table F-15). Malaysia's one pulp mill produces only bleached sulfate pulp, and all production is consumed on site to make paper.

Capacity to produce paper and paperboard in Malaysia rose from 731,000 metric tons in 1994 to 1.2 million metric tons in 1998 (table F-14). The industry's capacity utilization increased from 81 percent in 1994 to 100 percent in 1996 and 1997. In 1998, capacity utilization fell to 68 percent. Pulp capacity was relatively stable throughout the period; capacity utilization was 100 percent in every year but 1995. Capital investment in the pulp and paper industry in Malaysia totaled \$71.1 million in 1997.<sup>169</sup>

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<sup>164</sup> Forestry Department, Peninsular Malaysia, *Country Report-Malaysia*, 1997, p. 16.

<sup>165</sup> *Ibid.*, pp. 12, 13, and 16.

<sup>166</sup> Malaysia is also a producer of other wood panels, including particleboard and fiberboard. Production of these items has increased in recent years as mills have attempted to use wood raw materials more efficiently.

<sup>167</sup> Forestry Department, Peninsular Malaysia, *Country Report-Malaysia*, 1997, p. 16.

<sup>168</sup> *Ibid.*, pp. 12, 13, and 16.

<sup>169</sup> Heide Matussek and Virginia Stefan, eds., *International Fact & Price Book 1999* (San Francisco: Miller Freeman, 1998), p. 324.

There has been some foreign investment in Malaysia to take advantage of growing domestic paper and paperboard demand and to utilize the country's forest resources. Korean and Japanese firms hold minority shares of a Malaysian paperboard producer.<sup>170</sup> A joint venture between a large Indonesian pulp and paper producer and the Sarawak Timber Industry Development Corporation to construct an 800,000 metric ton per year bleached kraft pulp mill in Sarawak was reportedly close to going ahead after experiencing delays caused by the Asian economic crisis.<sup>171</sup> A large greenfield newsprint mill in Malaysia, partially owned by a New Zealand pulp and paper producer, commenced operations in March 1999.<sup>172</sup> This project had also experienced delays caused by the economic crisis in the region.

## *Markets and Marketing Practices*

### **Consumption**

#### *Wood and wood products*

Consumption of industrial wood declined from 28.8 million m<sup>3</sup> in 1994 to 25.4 million m<sup>3</sup> in 1997 (table F-16). An active construction sector in Malaysia<sup>173</sup> led to healthy demand for lumber and plywood during 1994-97. Consumption of lumber totaled 4.4 million m<sup>3</sup> in 1994, 5.4 million m<sup>3</sup> in 1995, 4.1 million m<sup>3</sup> in 1996, and 4.4 million m<sup>3</sup> in 1997. Consumption of plywood increased from 525,000 m<sup>3</sup> in 1994 to 636,000 m<sup>3</sup> in 1997 (table F-16). Trade sources report that consumption of both products declined in 1998 as poor economic conditions curtailed construction activity.

#### *Pulp, paper, and paper products*

The Malaysian economy has grown rapidly in recent years and with it consumption of paper and paperboard. Rising affluence has created more demand for newspapers, books, and magazines; increased production of goods for both the domestic market and export markets has created more demand for packaging materials.<sup>174</sup> Apparent consumption of paper and paperboard in Malaysia increased by 28.1 percent between 1994 and 1997, from 1.5 million metric tons to 1.9 million metric tons (table F-16). In 1998, consumption declined by 5.6 percent to 1.8 million metric tons. Malaysia's per capita consumption of paper and paperboard was 85.1 kilograms in 1998 compared with

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<sup>170</sup> Gary Thomson, "Set course for the bourse," *Pulp & Paper International*, Oct. 1996, p. 54.

<sup>171</sup> "Malaysia market declines, project delays," *Asia Pacific Papermaker*, July 1998, pp. 22-23. Another large pulp project in Malaysia, which involved foreign investment, was canceled because of economic instability in the region.

<sup>172</sup> "Malaysia enjoys strong capacity growth," *Pulp & Paper International*, July 1999, pp. 46-48.

<sup>173</sup> USDA, FAS, *Forest Products Annual Report Malaysia*, Kuala Lumpur, 1998.

<sup>174</sup> USDOC, ITA, *Malaysia-Paper/Paperboard Import Opportunities*, Market Research Report, July 1997.

worldwide per capita consumption of 50.4 kilograms.<sup>175</sup> Corrugating materials, printing and writing paper, and newsprint were the largest segments of paper and paperboard consumption, accounting for 49 percent, 27 percent, and 18 percent, respectively, of the total in 1998. Consumption of each of these products increased between 1994 and 1998. Apparent consumption of pulp fluctuated irregularly during 1994-98, with 1998 consumption slightly above that in 1994 (table F-16). Virtually all of the pulp consumed during the period was bleached sulfate pulp.

## **Imports**

Malaysian imports of forest products amounted to \$937 million in 1998 (table F-17). Paper and paper products accounted for 78 percent of the total value. Major suppliers included the United States, the EU, and Indonesia.

### *Wood and wood products*

Malaysia has not been a large importer of industrial wood, lumber, and plywood. Imports of industrial wood totaled 312,000 m<sup>3</sup> in 1997 and accounted for only 1.2 percent of apparent consumption. In 1997, lumber imports and plywood imports totaled 329,000 m<sup>3</sup> and 36,000 m<sup>3</sup>, respectively. Import market share was 7.5 percent for lumber and 5.7 percent for plywood (table F-18). Indonesia was the principal supplier of all three products to Malaysia.

### *Pulp, paper, and paper products*

Imports of paper and paperboard increased from 944,000 metric tons in 1994 to 1.5 million metric tons in 1995 (table F-18). Imports then declined to 1.1 million metric tons in 1996 and remained at this level for the next two years. Import penetration of the paper and paperboard market grew from 62.4 percent in 1994 to 63.9 percent in 1998. Malaysia's imports consisted primarily of printing and writing paper, corrugating materials, and newsprint. Imports came from a number of countries including Japan, Finland, Thailand, Indonesia, and the United States. Malaysian imports of pulp were small, only 58,000 metric tons in 1998.

## **Exports**

Malaysian exports of forest products reached \$5.2 billion in 1996, up by 3.7 percent from 1994. Exports declined to \$4.7 billion in 1997 and to only \$3.1 billion in 1998 (table F-17). Wood and wood products made up over 90 percent of the value of exports. Japan, China, Hong Kong, and the EU were the major markets.

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<sup>175</sup> James, Matussek, Janssens, and Kenny, "P & B Breaks the 300 Million Ton Barrier."

Malaysia's exports of industrial wood, consisting almost entirely of logs, declined steadily, from 8.7 million m<sup>3</sup> in 1994 to 6.8 million m<sup>3</sup> in 1997 (table F-19). Lower log production, Peninsular Malaysia's ban on log exports, and the log export restrictions imposed by Sarawak and Sabah reduced the volume of logs available for export. In 1998, these factors, combined with the Asian economic crisis, reduced log exports even more. Log exports to Japan, Malaysia's largest export market for logs, fell significantly in both volume and price during 1998.<sup>176</sup> In addition to Japan, other large export markets for Malaysian logs included Taiwan, India, Hong Kong, China, and Korea.

Although Malaysia remains a large lumber exporter, these exports have fallen sharply in recent years as the country has increasingly moved into the production of higher-value-added wood products. Falling lumber production, export levies on lumber, and Peninsular Malaysia's intention to ban lumber exports by the year 2000 caused lumber exports to fall by 33 percent between 1994 and 1997, from 4.6 million m<sup>3</sup> to 3.1 million m<sup>3</sup> (table F-19). With most of its export markets located in Asia, the Malaysian lumber industry was hit hard by the Asian economic crisis. The volume and prices of its lumber exports tumbled during 1998.<sup>177</sup> Malaysia's major export markets for lumber during the period were Thailand, Japan, Singapore, Korea, Taiwan, the Philippines, and the Netherlands.

Malaysia's plywood exports have grown rapidly over the past decade and now compete strongly against Indonesian plywood in Asian markets. Malaysian plywood has taken market share from Indonesia in Japan and Korea.<sup>178</sup> Exports of plywood increased by 27.3 percent between 1994 and 1997, from 3.0 million m<sup>3</sup> to 3.8 million m<sup>3</sup> (table F-19). In 1997, these exports accounted for 86.4 percent of Malaysia's total plywood production. Major export markets included Japan, China, Hong Kong, Singapore, and Korea. In 1998, the volume and prices of Malaysia's plywood exports to key Asian markets declined as these markets remained mired in recession.<sup>179</sup>

In recent years, increased concern by environmental groups and some consumers in Western Europe and North America about forestry practices in tropical-wood-producing countries has put pressure on these countries to practice sustainable forest management and to ensure that their wood product exports are certified as coming from sustainably managed forests. Although Malaysia's major export markets for its logs, lumber, and plywood are located in Asia, where there is less concern about sustainable forest management, the country, nevertheless, has become more sensitive about the issue and its effects on exports. The country has lost markets for its wood products in Europe because they lacked certification as having been sourced from sustainably managed forests. Los Angeles and New York City have considered passing purchasing laws that would give preference to certified wood for city construction projects.<sup>180</sup> To allay concerns in the

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<sup>176</sup> UNECE, *Forest Products Annual Market Review, 1997-1998*, p. 33.

<sup>177</sup> USDA, FAS, *Forest Products Annual Report Malaysia*, Kuala Lumpur, 1998. In an attempt to boost exports of lumber, Peninsular Malaysia suspended the export levy on certain species of lumber in May 1998.

<sup>178</sup> UNECE, *Forest Products Annual Market Review, 1997-1998*, pp. 34-35. ITTO, "1997, Markets, Trade and Prices, Plywood," *Annual Review and Assessment of the World Tropical Timber Situation 1997*.

<sup>179</sup> UNECE, *Forest Products Annual Market Review, 1997-1998*, p. 72.

<sup>180</sup> Gilley, "Sticker Shock."

market about its wood products, Malaysia has committed to the International Tropical Timber Organization's Year 2000 Objective that all wood traded in international markets be sourced from sustainably managed forests. The National Timber Certification Council began operation on January 1, 1999 in Malaysia. Its goal is to establish and administer a Malaysian timber certification program that will issue certificates to wood products sourced from sustainably managed forests. To enhance the credibility of the certification program, the National Timber Certification Council recently announced that it would cooperate and collaborate with the Forest Stewardship Council in the development of its program.<sup>181, 182</sup>

## China

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China is a major producer, consumer, and importer of forest products. In recent years, the Chinese economy has grown rapidly and the forest products industry in China has participated in this growth, expanding output to satisfy increased demand for wood, paper, and paperboard products. Demand has risen faster than production, however, and China has turned to imports to fill the gap.

Thus far, China has been relatively unscathed by the Asian economic crisis. Economic growth has remained strong, although at a slightly slower pace. Although China's forest products industry has also managed to weather the crisis, it has experienced problems with obtaining sufficient wood raw materials and adjusting to the requirements of operating in a more open economy. China faces serious constraints on its supply of logs as many years of overharvesting have depleted its forests. At the same time, the expanding economy is increasing the demand for wood products. China's pulp, paper, and paperboard industry is under pressure to restructure, increase product quality, and reduce harmful emissions from its production operations. As the industry attempts to increase its production of wood pulp, it too must contend with insufficient wood raw material.

### *Structure*

Although China's forest area is quite large, China's forest cover (forest area as a percent of total land area) is small relative to other countries. China's forest cover is 14 percent compared with 32 percent in the United States, 67 percent in Japan, 28 percent in Canada, 59 percent in Sweden, and 61 percent in Brazil. China's forest area totals 128.5 million ha, of which 34.3 million ha are plantations. Forest area is classified as timber forest, protection forest, fuelwood forest, special purpose forest, economic forest, and bamboo

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<sup>181</sup> Malaysian Timber Council, "Discussions Between Malaysian Forestry and Timber Organizations and Forest Stewardship Council (FSC) Regarding Timber Certification," press release, found at Internet address [http://www.mtc.com.my/ntcc/ntcc\\_press.html](http://www.mtc.com.my/ntcc/ntcc_press.html), retrieved on Apr. 1, 1999. The FSC is an international environmental organization that ensures that forest products bearing its certification come from sustainably managed forests.

<sup>182</sup> Malaysia did not export pulp during the period and its exports of paper and paperboard were minimal (table F-19).

forest. Timber forest (for timber harvesting) accounts for 66 percent of the total forest area; protection forest (for such purposes as soil and water conservation and wind-breaks) accounts for 13 percent; fuelwood forest (for fuelwood gathering), 3 percent; special purpose forest (national parks, conservation forests, etc.), 3 percent; economic forest (area devoted to production of resources other than timber), 13 percent; and bamboo forest, 3 percent. Forty-five percent of the forest area is State owned and 55 percent is collectively owned.<sup>183</sup>

China's forests are principally in the northeastern, southwestern, and southern regions of the country. Many of the forests are in remote or mountainous areas. Years of overharvesting and conversion of forestland to agricultural land have seriously depleted the country's forest resources. As forests have disappeared, the country has been plagued by water and soil erosion, floods, and sandstorms. China's burgeoning population and rapid economic growth have led to increased demand for wood, which has put additional pressure on the country's forests. The Chinese Government has undertaken a number of steps over the years to reforest the country and to relieve the pressure on its natural forests. The Government has conducted large tree-planting campaigns not only to increase the supply of harvestable timber but also to reclaim desert land, to halt water and soil erosion, and to shelter farmland and pastureland. The Government has implemented measures to increase the use of cement, steel, and other materials in place of wood in construction and to increase the use of coal in place of wood for heating. It has also established annual log harvest quotas.<sup>184</sup>

Despite all these measures, the pressure on China's forests has continued. Some of the areas planted with trees have not been as productive as planned because of fire, drought, and insects. The forest sector has suffered from an insufficient number of trained personnel and a lack of technical knowledge.<sup>185</sup> Demand for wood in China has remained strong as the economy has continued to expand. The volume of wood harvested illegally each year has been greater than that harvested under the annual quota.<sup>186</sup>

In mid-1998, massive flooding along the Yangtze and Songhua rivers in China, caused in part by deforestation, led the Government to curtail harvesting further. Certain provinces banned logging completely in their natural forests. China's National Bureau of Forestry has proposed a two-phase plan to restore the forests and increase China's wood supply. In phase 1, annual harvesting in the natural forests would decline significantly to only 12.25 million m<sup>3</sup> in 1999 and 2000, a 47 percent drop from the 1997 log quota of 23 million m<sup>3</sup>. Under phase 2, between 2001 and 2010 the Government would intensify its efforts to reforest the land, with a goal of achieving self-sufficiency in wood by 2010. China thus faces a number of years of reduced supplies of domestic wood until the reforested areas reach maturity and can be harvested. In 2000, China's wood

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<sup>183</sup> Shi Kunshan, Li Zhiyong, Lin Fenming, and Zheng Rui, "China's Country Report on Forestry," *Asia-Pacific Forestry Sector Outlook Study*, FAO, Aug. 1997, pp. 25-33.

<sup>184</sup> Blanchez, "Forest Resources and Roundwood Supply in the Asia Pacific Countries: to the Year 2010," pp. 37-38.

<sup>185</sup> Ibid.

<sup>186</sup> World Forest Institute, *China Forestry and the Wood Products Industry*, Sept. 1998, p. 26.

shortfall is estimated at 55 million m<sup>3</sup>.<sup>187</sup> To fill this large supply gap, China intends to increase wood imports. The State Forestry Administration is collaborating with other Government agencies to develop plans for importing additional wood.<sup>188</sup>

## Wood and Wood Products

The Chinese Government exercises extensive control over the wood products industry, owning much of the forestland and many of the wood-processing facilities. Although the industry is one of the largest in the world, it is plagued by outdated equipment, low productivity, poor quality, and low wood yields. Many of the production facilities are small and thus unable to achieve the economies of scale of production common in industrialized countries.<sup>189</sup> The industry faces the challenge of adopting to the more market-oriented economic policies being implemented by the Government as well as adjusting to the country's dwindling forest resources.

The industrial wood industry is very large, with over 1 million workers involved in logging operations all over the country. There are also extensive illegal logging operations throughout the country. Recent Government actions to reduce the log harvest significantly have had a severe impact on the industry, forcing many of the logging enterprises to shut down and putting thousands of loggers out of work.<sup>190</sup>

The lumber industry consists of an estimated 300 sawmills with an average annual capacity of 25,000 to 30,000 m<sup>3</sup>, 21,000 sawmills with an average annual capacity of 10,000 to 20,000 m<sup>3</sup>, and many more sawmills with even smaller capacity. Many of the large sawmills are in large cities in the eastern and northeastern regions of the country; other mills are near forest areas. China's plywood industry also consists of relatively few large producers and numerous small producers. Of the country's approximately 2,000 producers, only 7 produce more than 100,000 m<sup>3</sup> a year, 118 producers manufacture over 10,000 m<sup>3</sup> a year, and the remainder produce less than 10,000 m<sup>3</sup> annually.<sup>191</sup>

The lumber industry and the plywood industry produce primarily for the domestic market and generally source their logs from domestic forests. The recent Government cutbacks on harvesting in the natural forests have forced the two industries to turn to imports and plantation forests in China as alternative sources of logs. In certain regions of China, the industry may experience shortages of logs.<sup>192</sup> In an attempt to modernize

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<sup>187</sup> "China-Floods behind forestry cutbacks," *PIMA'S Papermaker*, Feb. 1999, p. 12.

<sup>188</sup> USDA, FAS, *China, Logging Ban Update*, Beijing, AGR No. CH8050, Oct. 22, 1998.

<sup>189</sup> USDA, FAS, *Forest Products Annual Report China*, Beijing, AGR No. CH8038, Aug. 28, 1998.

<sup>190</sup> *Ibid.*

<sup>191</sup> World Forest Institute, *China Forestry*, 1998, pp. 30 and 37.

<sup>192</sup> USDA, FAS, *China, Logging Ban Update*, Beijing, 1998.

and reform the lumber and plywood industries, the Government has created a Division of Commercial and Industrial Forestry, which has been tasked with helping these industries to compete in a more competitive environment as well as to move increasingly into the production of higher-valued wood products.<sup>193</sup>

## **Pulp, Paper, and Paper Products**

The pulp, paper, and paperboard industry in China consists of thousands of mills, most of which are very small, inefficient operations using outdated equipment. Most of the paper mills are integrated with pulp production or rely upon recycled fibers. Of these thousands of mills, only 130 have an annual capacity of more than 30,000 metric tons and only a few have an annual capacity of more than 200,000 metric tons; many have an annual capacity of less than 5,000 metric tons.<sup>194</sup> Many of the mills lack wastewater treatment facilities and are a significant source of pollution of the country's rivers and bays. The industry employs approximately 1.5 million people.

The paper and paperboard industry in China relies upon wastepaper, imported pulp, and domestically produced pulp to meet its fiber needs. The collection of wastepaper in China and imports of wastepaper have expanded rapidly to supply the growing paper production. Collection of wastepaper grew from 7.3 million metric tons in 1994 to 8.9 million metric tons in 1998; imports more than doubled, from 711,000 metric tons to 1.9 million metric tons (tables F-21, F-24). In 1995, wastepaper accounted for 38.5 percent of all fiber consumed by the industry.<sup>195</sup> Unlike most other countries that produce pulp almost entirely from wood, China relies heavily upon agricultural residues such as straw, reed, cotton linter, and bagasse to produce pulp. With most of the country's wood used for heating and cooking and the production of lumber, plywood, and other wood panels, the paper industry has traditionally looked to other sources of fiber to make pulp. Agricultural residues from the country's vast agricultural production provided an abundant fiber source. In 1994, China's paper and paperboard industry consumed 12.6 million metric tons of nonwood pulp compared to only 1.8 million metric tons of domestically produced wood pulp. Straw pulp accounted for 78 percent of total nonwood pulp consumed.<sup>196</sup>

Because of the serious pollution problems associated with the production of straw pulp and the lower quality of the paper made from it compared with paper made from wood pulp, China has made plans to moderately increase wood pulp's share of total pulp production over the next several years. Plans exist to build a number of wood pulp mills.<sup>197</sup> To ensure sufficient wood resources for these pulp mills, the Government has

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<sup>193</sup> USDA, FAS, *Forest Products Annual Report China*, Beijing, 1998.

<sup>194</sup> Robert Ryan, "Asia 97 Hungry for Growth," *Asia Pacific Papermaker*, Jan. 1997.

<sup>195</sup> Payne and Payne, eds., *Asia-Pacific Analysis & Forecast*, p. 60.

<sup>196</sup> Jay T. Jeyasingam, "Straw Forms the Staple Diet For China's Pulp Mills," in *Issues in Global Timber Supplies* (San Francisco: Miller Freeman, 1999).

<sup>197</sup> Xiang-Ju Zhong, "Challenges and Opportunities in China," *Pulp & Paper International*, Aug. 1998.

planted large areas with fast-growing trees.<sup>198</sup> Thai and Indonesian paper companies have also developed plantations in China as a first step toward their eventual production of pulp and paper in the country. Ironically, despite the apparent need for additional pulpwood, China is a large exporter of wood chips to Japan for use by its pulp mills.<sup>199</sup>

The Chinese Government exercises control over the pulp, paper, and paperboard industry, but this control has lessened in recent years. The industry is controlled through various Government departments: some pulp and paper mills formerly under the Ministry of Forestry are now under the control of a Government forest products company, small to medium-size mills at the county level are overseen by the Ministry of Agriculture, large State-owned mills are under the control of the National Light Industry Bureau's Department of Industry Administration. The Department of Strategic Planning and Development is tasked with creating and implementing policies to ensure the continued growth of the industry.<sup>200</sup> Nevertheless, Central Government reforms begun in March 1998 called for these Government departments to provide only general guidelines to the mills under their control. The day-to-day management of each mill was to be the responsibility of its managers, who had to adjust to operating in a more open economy. To obtain capital, mills would no longer be able to turn to the Government; instead, they would have to rely on domestic bank loans or sell shares of their company to the public.<sup>201</sup> Within the past 2 years, 13 paper companies have raised capital by selling shares to the public.<sup>202</sup>

In the past few years, the pulp, paper, and paperboard industry has undergone rapid structural change as environmental and competitive pressures have forced the closure of many mills, particularly the small ones. In an attempt to reduce pollution caused by the industry, the Government has closed hundreds of small pulp mills (with annual capacity of less than 5,000 metric tons) that lacked wastewater treatment facilities. Larger pulp mills faced a Government deadline to reduce pollution or close.<sup>203</sup> Increased imports and high quality paper from new foreign-owned mills that have commenced operations in China have also increased the pressure on the industry. The reduction in mills has been dramatic. The number of paper and paperboard mills fell by more than 50 percent, from 10,000 in 1994 to 4,748 in 1998, while the number of pulp mills declined from 8,000 to 5,000 (table F-20). The industry has responded to these closures, however, by beginning to build new mills with larger, more-productive paper machines.<sup>204</sup>

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<sup>198</sup> USDA, FAS, *Forest Products Annual Report China*, Beijing, 1998. The extent of plantation development by the Government is a matter of dispute. Some believe that the area of plantations as well as the survival and growth rates of the trees within them are overstated. See, for example, Neilson, "Reaching the Bottom of the Asian Fiber Basket?"

<sup>199</sup> Lu Guoming, "Guangdong Province Packaging Directed Industry," *Asia Pacific Papermaker*, Oct. 1998.

<sup>200</sup> Zhong Xiang-Ju, "Weathering the Years...and Still Going Strong: China's Paper Industry," *Asia Pacific Papermaker*, Oct. 1998.

<sup>201</sup> *Ibid.*

<sup>202</sup> "China Global Trends Emerging," *Asia Pacific Papermaker*, July 1998, p. 16.

<sup>203</sup> Zhong Xiang-Ju, "Weathering the Years: China's Paper Industry."

<sup>204</sup> Jay Jeyasingam, "Where Old Meets New in an Expanding China," *Pulp & Paper International*, Dec. 1997.

## *Production, Products, and Capacity*

### **Wood and Wood Products**

Production of industrial wood increased steadily from 99.4 million m<sup>3</sup> in 1994 to 110.1 million m<sup>3</sup> in 1997 but, according to trade sources, probably declined in 1998 (table F-21).<sup>205</sup> Most industrial wood went into the production of lumber and plywood; smaller volumes went into the production of pulp or were used to produce such items as poles, pilings, and posts. Some Chinese firms have ventured abroad and have logging operations in the Amazon basin of Brazil and in Vietnam.<sup>206</sup>

China is a large producer of lumber, with virtually all production consumed in the domestic market. Lumber production increased by 9.3 percent between 1994 and 1997 but may have been constrained somewhat during 1998 (table F-21). China produced large volumes of both softwood lumber and temperate hardwood lumber; in 1997, 63.5 percent of total lumber output was softwood, 34.6 percent was temperate hardwood, and only 1.9 percent was tropical hardwood. The lumber industry in China has attracted some foreign investment in the form of joint venture operations with firms from Europe, Hong Kong, and Taiwan.<sup>207</sup> China is also a major producer of plywood, with more than 90 percent of output used in the domestic market. Plywood production was strong during the period; output totaled 8.1 million m<sup>3</sup> in 1997 (table F-21).<sup>208</sup> Excess capacity existed, however, as the plywood industry operated at only 60 percent of capacity.<sup>209</sup>

### **Pulp, Paper, and Paper Products**

China is the world's third-largest producer of paper and paperboard, trailing only the United States and Japan. Production of paper and paperboard steadily increased between 1994 and 1998, from 21.4 million metric tons to 27.8 million metric tons (table F-21). Corrugating materials, printing and writing paper, and board comprised the largest segments of paper and paperboard production, accounting for 28.3 percent, 19 percent, and 16.7 percent, respectively, in 1998. Output of corrugating materials and printing and writing paper rose at a faster pace than that of total paper and paperboard.

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<sup>205</sup> China also produces a large volume of residual wood, which is wood gathered by individuals, living primarily in rural areas, and used for cooking and heating.

<sup>206</sup> FAO, *Asia-Pacific Forestry Towards 2010*, p. 133. USDA, FAS, *Forest Products Annual Report China*, Beijing, 1998.

<sup>207</sup> USDA, FAS, *Ibid.*

<sup>208</sup> China is also a large producer of other wood panels, including particleboard and fiberboard. Production of these items has risen in recent years as mills have turned increasingly toward the use of small-diameter plantation-grown trees as raw material. USDA, FAS, *Forest Products Annual Report China*, Beijing, AGR No. CH7038, Aug. 25, 1997.

<sup>209</sup> USDA, FAS, *Forest Products Annual Report China*, Beijing, 1998.

China is the world's third-largest producer of pulp, behind only the United States and Canada. Pulp output expanded irregularly during the period in response to rising paper and paperboard production. Production increased from 12.5 million metric tons in 1994 to 21.8 million metric tons in 1995, and then fell to 19.0 million metric tons in 1996 and 17.4 million metric tons in 1997 (table F-21). The closure of hundreds of small pulp mills discussed above caused the decline in production in 1996 and 1997. In 1998, pulp production fell further to 16.5 million metric tons. Almost all pulp production is consumed internally; in 1997, only 205,000 metric tons of pulp were sold into the open market.<sup>210</sup> In 1998, 69 percent of total pulp production was nonwood pulp.

Capacity to produce paper and paperboard rose from 25.0 million metric tons in 1994 to 31.2 million metric tons in 1998 (table F-20). As part of the Government's effort to reduce pollution, certain production facilities were closed; however, this was offset by new capacity brought on stream during the period. Capacity utilization in the industry rose from 86 percent in 1994 to 89 percent in 1998 because production grew faster than capacity. As paper capacity was increasing, capacity to produce pulp fell, from 24.5 million metric tons in 1995 to 19.8 million metric tons in 1998 (table F-20). Capacity utilization in the industry increased from 63 percent to 84 percent during the period.

The opening of the Chinese economy and growing Chinese demand for paper and paperboard has made China a magnet for foreign investment in recent years. An estimated 100 joint ventures and foreign-owned mills have commenced operations.<sup>211</sup> The Chinese Government has offered incentives to attract foreign investment, including exemption from customs duty and the value-added tax for imported machinery and favorable tax treatment of profits.<sup>212</sup> Investment has come from many foreign paper companies and involved many different types of products, and much of the production machinery installed has been state of the art. Output from the new production facilities has been for the Chinese market and, to a lesser extent, for export markets.<sup>213</sup> Investment has been more focused in the paper and paperboard sector than the pulp sector because of the difficulties in obtaining sufficient pulpwood.

Asia Pulp & Paper, an Indonesian paper and pulp producer, has made significant investments in China in the past few years. It has constructed paper machines to produce coated white board and printing and writing paper and has plans for further investment to build additional paperboard capacity.<sup>214</sup> Stora Enso, a European producer, has purchased an interest in Suzhou Papyrus Paper, a Chinese producer of printing and writing paper.<sup>215</sup> Hansol, a Korean paper company, has formed a joint venture in China

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<sup>210</sup> "Growth Prospects Look Generally Flat for 1999," *Pulp & Paper International*, Jan. 1999, p. 27.

<sup>211</sup> World Forest Institute, *China Forestry*, 1998, p. 43.

<sup>212</sup> Xiang-Ju Zhong, "Challenges and Opportunities in China." These incentives apply to any foreign direct investment, not solely to investments in the pulp, paper, and paperboard industry.

<sup>213</sup> See, for example, Nippon Paper Industries Co., Ltd., "Announcement of Joint Venture Agreement Between Nippon Paper Industries Co., Ltd., and Japan Pulp & Paper Co., Ltd., in People's Republic of China," news release, Dec. 1, 1995.

<sup>214</sup> "China Global Trends Emerging," *Asia Pacific Papermaker*, pp. 15-16.

<sup>215</sup> "Stora in Control at Suzhou," *PIMA'S Papermaker*, July 1998, p. 25.

to produce newsprint.<sup>216</sup> Swedish producer SCA and United States producer Weyerhaeuser have formed a joint venture with a Chinese partner to build a box plant in China.<sup>217</sup>

The Chinese Government has been pursuing investments in new pulp mills in Malaysia and Thailand. A planned venture with Malaysian partners to build a pulp mill in Malaysia has been delayed indefinitely because of the economic turmoil in the region. A large pulp mill project in Thailand, however, will apparently go forward. The project is a joint venture between the Chinese Government, the Thai company Advance Agro, and a Japanese producer, Oji Paper Co.<sup>218</sup>

## *Markets and Marketing Practices*

### **Consumption**

#### *Wood and wood products*

During 1994-97, consumption of industrial wood in China increased from 104.2 million m<sup>3</sup> to 114.9 million m<sup>3</sup> (table F-22). An increase in the demand for lumber and plywood accounted for most of this growth. Rapid growth in the Chinese economy has fueled demand for residential and commercial building. The Chinese Government's Ninth Five-Year Plan (1996-2000) called for significant Government resources to be directed toward construction projects, including 1.2 billion m<sup>2</sup> of urban housing; 2.79 billion m<sup>2</sup> of rural housing; 2.55 billion m<sup>2</sup> of existing urban housing to be repaired; and the construction of 230 new cities and 5,000 new towns. Although much of this construction involved the use of steel, concrete, and brick, it, nevertheless, also stimulated demand for lumber and plywood. Increased construction activity stimulated demand for furniture, an important market for plywood.<sup>219</sup> Consumption of lumber in China grew from 27.1 million m<sup>3</sup> in 1994 to 30.0 million m<sup>3</sup> in 1997 (table F-22). Consumption of plywood totaled 9.7 million m<sup>3</sup> in 1997, an increase of 27.3 percent over 1996. Consumption of lumber and plywood remained firm during 1998, as strong economic growth sustained the construction sector.

#### *Pulp, paper, and paper products*

China's strong economy has led to rapid growth in the country's consumption of paper and paperboard. Rising levels of literacy and affluence have increased demand for books, magazines, and newspapers, while growth in industrial production for domestic and export markets has increased demand for packaging materials. In 1998, China was the world's second-largest consumer of paper and paperboard, trailing only the United

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<sup>216</sup> Payne and Payne, *Asia-Pacific Analysis & Forecast*, p. 68.

<sup>217</sup> "News Lines China," *Pulp & Paper International*, Nov. 1998, p. 17.

<sup>218</sup> "Mixed News on China's Plans Abroad," *PIMA'S Papermaker*, July 1998, p. 25.

<sup>219</sup> World Forest Institute, *China Forestry*, 1998, p. 48. USDOC, ITA, *China-Building Materials*, Market Research Report, Dec. 1997.

States. The magnitude of China's potential paper and paperboard consumption during the next decade can be gauged by per capita consumption figures: per capita consumption of paper and paperboard in the United States in 1998 was 336.5 kilograms, in China, it was only 26.2 kilograms.<sup>220</sup> Given the size of the Chinese population, even small increases in per capita consumption will lead to very large increases in consumption of paper and paperboard.

Apparent consumption of paper and paperboard in China rose by 34.6 percent between 1994 and 1997, from 24.3 million metric tons to 32.7 million metric tons (table F-22). Consumption rose further in 1998 to 32.9 million metric tons. Corrugating materials, printing and writing paper, and board were the largest segments of paper and paperboard consumption, accounting for 30.1 percent, 19.1 percent, and 17.4 percent, respectively, in 1997. Consumption of printing and writing paper and corrugating materials grew at a faster rate than that of total paper and paperboard. Apparent consumption of pulp in China rose irregularly from 13.3 million metric tons in 1994 to 18.7 million metric tons in 1998 (table F-22). Nonwood pulp accounted for 66.6 percent of total pulp consumption in 1997; sulfate pulp and semichemical pulp accounted for 18.9 percent.

## Imports

Chinese imports of forest products increased steadily during 1994-97, from \$4.2 billion to \$6.4 billion (table F-23). Paper and paper products accounted for 54 percent of total imports in 1997, and wood and wood products accounted for 31 percent. Major suppliers included the United States, Indonesia, Korea, and Malaysia.

### *Wood and wood products*

China imports large volumes of wood to supplement domestic production. Because of strong demand for wood during 1998, China was able to absorb additional imports from some of its traditional suppliers. Imports of industrial wood rose from 7.4 million m<sup>3</sup> in 1994 to 7.9 million m<sup>3</sup> in 1997 (table F-24). Import penetration fell slightly from 7.1 percent in 1994 to 6.9 percent in 1997. Logs for the production of lumber and plywood accounted for the bulk of industrial wood imports. In 1997, the principal suppliers of these logs included Gabon, Russia, North Korea, Malaysia, and Equatorial Guinea. Log imports increased strongly during 1998 as restrictions on logging in China reduced the availability of domestic logs. In Shanghai, a major Chinese wood-importing port, log imports during 1998 were 77 percent greater than imports in 1997.<sup>221</sup>

Imports of lumber grew from 2.4 million m<sup>3</sup> in 1994 to 3.0 million m<sup>3</sup> in 1997; import penetration rose slightly from 8.8 percent to 9.9 percent (table F-24). Principal suppliers of lumber during 1997 included Malaysia, Indonesia, Mongolia, Taiwan, Myanmar, the United States, and Canada. Trade sources report imports increased further in 1998 to satisfy brisk demand in the construction sector. Plywood imports were also large during

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<sup>220</sup> James, Matussek, Janssens, and Kenny, "P & B Breaks the 300 Million Ton Barrier."

<sup>221</sup> World Bank, *Global Commodity Markets*, Jan. 1999, p. 52.

the period and captured a sizeable share of the Chinese plywood market. In 1997, plywood imports totaled 2.4 million m<sup>3</sup> and had a market share of 24.7 percent. Restrictions on logging in China and the Government's antimuggling campaign against illegal wood imports led to an increase in plywood imports during 1998.<sup>222</sup> In Shanghai, plywood imports were 15 percent greater in 1998 than in 1997.<sup>223</sup> The major suppliers of plywood to China were Malaysia and Indonesia, with Malaysia having taken some market share away from Indonesia in the past few years.

### *Pulp, paper, and paper products*

China has become a major importer of paper and paperboard to satisfy demand that has outstripped domestic production. Imports have also been able to penetrate the Chinese market because Chinese mills have at times been unable to compete with them on the basis of quality and price.<sup>224</sup> Imports of paper and paperboard jumped by 70.3 percent between 1994 and 1998, from 3.2 million metric tons to 5.4 million metric tons (table F-24). Import penetration also grew, from 13.1 percent in 1994 to 16.5 percent in 1998. Printing and writing paper, corrugating materials, and board were the largest categories of imports. Major suppliers of paper and paperboard to China included the United States, Korea, and Taiwan.

China has become a large importer of pulp to supplement domestic production as well as to meet the raw material requirements of some of the new paper machines that have recently come on stream in China. These new machines are designed to run on wood pulp, not on the nonwood pulp that is so prevalent in China. As paper and paperboard production expanded, imports of pulp more than doubled between 1994 and 1998, from 809,000 metric tons to 2.2 million metric tons (table F-24). Import penetration rose from 6.1 percent to 11.8 percent. Most of the imports consisted of sulfate pulp. Principal suppliers of pulp included the United States, Canada, Indonesia, and Russia. Indonesia and Russia have increased their share of the pulp market in the past few years.<sup>225</sup>

## **Exports**

Chinese exports of forest products rose irregularly from \$1.7 billion in 1994 to \$2.6 billion in 1997 (table F-23). Wood and wood products accounted for 62 percent

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<sup>222</sup> Large volumes of wood are smuggled into China every year, particularly from Myanmar and Laos but also from Vietnam, Malaysia, Thailand, Mongolia, and Russia. The Chinese Government has recently stepped up its campaign against smuggling and has enjoyed some success in limiting illegal wood imports. USDA, FAS, *Forest Products Annual Report China*, Beijing, 1998.

<sup>223</sup> World Bank, *Global Commodity Markets*, 1999, p. 52.

<sup>224</sup> Alan Rooks, "Global Outlook: More Misery or Muddling Through?" *PIMA'S Papermaker*, Dec. 1998.

<sup>225</sup> Zhong Xiang-Ju, "Weathering the Years: China's Paper Industry."

of total exports in 1997. Major export markets included Hong Kong, Japan, the United States, the EU, and Korea.

### *Wood and wood products*

China's exports of industrial wood, lumber, and plywood are not large relative to domestic production and are concentrated primarily within Asia. Exports of industrial wood totaled 3.2 million m<sup>3</sup> in 1997 and consisted primarily of wood chip exports to Japan (table F-25). Industrial wood exports accounted for only 2.9 percent of total production of industrial wood in 1997. Lumber exports rose irregularly from 443,000 m<sup>3</sup> in 1994 to 502,000 m<sup>3</sup> in 1997. Lumber exports in 1997 accounted for only 1.8 percent of total lumber production. Principal export markets were Japan, Korea, Taiwan, and Hong Kong. Plywood exports more than doubled between 1994 and 1997, from 308,000 m<sup>3</sup> to 761,000 m<sup>3</sup>. In 1997, plywood exports as a percent of plywood production totaled 9.4 percent. Major export markets were Hong Kong, Taiwan, Singapore, and Japan.

### *Pulp, paper, and paper products*

China is not a large exporter of paper and paperboard; in 1998, exports accounted for only 1.2 percent of total paper and paperboard production. Exports grew from 270,000 metric tons in 1994 to 330,000 metric tons in 1998. China's exports of pulp were negligible (table F-25).

## **Korea**<sup>226</sup>

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The wood products sector in Korea has grown as a result of strong domestic demand for construction, furniture, and containers. This has stimulated domestic production of lumber, plywood, and particleboard, even as the wood industry has been rationalizing the number of mills and employees. The paper industry has also witnessed significant growth over the past decade. Strong GDP growth, increased political freedom, and rising incomes have fueled domestic demand for paper products, leading to a rapid expansion of paper capacity in Korea. Over the past few years, however, capacity growth has outstripped the growth in domestic demand, leading to an aggressive pursuit of export markets as an outlet for excess capacity.

The financial crisis in Asia reversed trends in the industry. Demand was depressed in all sectors of the economy, including construction, furniture, interiors, publishing, and advertising. In some cases, demand for wood and paper products contracted by 20 to 30 percent. This led to reductions in both production and imports of most wood and paper products. A number of paper companies were forced into bankruptcy and subsequently had a number of their mills bought by foreign companies. Other Korean paper companies merged with foreign paper companies to improve their competitiveness. Although there

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<sup>226</sup> Except where noted, this section refers to the Republic of Korea, or South Korea.

has been a significant increase in exports of newsprint and plywood, this has not offset the negative effects of the large drop in domestic demand.

## *Structure*

Approximately 65 percent (6.5 million ha) of Korea's land area is classified as forest. The area of forested land grew rapidly after 1960, as a result of a massive reforestation effort. During 1961-95, the land area devoted to forests increased from 4 million ha to 6.3 million ha. Of this, 21 percent is national forest, managed for conservation, research, and timber production. An additional 8 percent is managed by local communities. The remainder is privately owned. Of the approximately 2 million private forest owners, the overwhelming majority (96 percent) are smallholders who own less than 10 ha.<sup>227</sup> The main use of private forestland is for non-timber-related activities, such as nut cultivation or family burials.<sup>228</sup>

The Government provides a significant amount of support for forest owners in the form of tax exemptions, extension services, and technical assistance.<sup>229</sup> In addition, the Government contributes substantially towards tree planting expenses by providing long-term loans at below-market interest rates.<sup>230</sup>

Currently, the productivity of domestic forests is relatively low, constrained by the relative youth of the Korean forests and fragmented land holdings. Moreover, while the Government allows just 11 percent of total supply to be harvested, up to 50 percent of the harvest is damaged by pests. Most domestic timber is of small diameter (less than 30 cm), low quality, and mainly used for pulp production, crates, and pitprops.<sup>231</sup>

## **Wood and Wood Products**

The wood and wood products industry in Korea is relatively small. Roughly 10 percent of the logs consumed in Korea is from domestic sources. The lumber industry has increased its imports of softwood logs in response to higher tropical hardwood log costs. In 1995, 1,402 mills were in operation, with a capacity utilization of 72 percent and employment of 12,592 people. In 1998, capacity utilization for lumber fell to under 70 percent as a result of the recession in Korea.<sup>232</sup> The largest number of sawmills are located in Incheon, a major port city near Seoul, and are supplied almost exclusively by

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<sup>227</sup> Byoung Il Yoo, *In-Depth Country Study in the Republic of Korea -- Status, Trends, and Prospects to 2010*. Asia-Pacific Forestry Sector Outlook Study, Working Paper No. APFSOS/WP/06 (Rome and Bangkok: FAO, 1997).

<sup>228</sup> USDOC, ITA. *The South Korean Solid Wood Products Market: Profile and Outlook*, 1993, p. 15.

<sup>229</sup> Yoo, *Korea*, p. 14.

<sup>230</sup> *Ibid.*, and U.S. Department of State, telegram No. 002058, "USITC Investigation on the Conditions of Competition in U.S. Forest Products Trade," prepared by U.S. Embassy, Seoul, Apr. 12, 1999.

<sup>231</sup> *Ibid.*

<sup>232</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, AGR No. KS9060, July 1999.

imported logs. These mills represent 31 percent of total lumber output.<sup>233</sup> Sawmills that use on domestic logs tend to be near forested areas. The number of mills and employees in the lumber industry is down considerably from 1990 as a result of increased wages and imported log costs.<sup>234</sup> The domestic lumber industry has also faced increased competition from imported lumber. Most of the products of the domestic lumber industry are geared toward the construction industry.<sup>235</sup>

The plywood industry has been in decline since the early 1980s. In the 1970s, Korea was the world's second-largest producer of hardwood plywood. The industry was supplied by imported hardwood logs from Indonesia. As Indonesia developed its own plywood industry (partially through export bans on tropical logs), the plywood industry in Korea became increasingly less competitive in international markets relative to Indonesia. This coincided with higher labor costs in the Korean industry. As a result of these developments, the plywood industry in Korea moved towards production for the domestic market.<sup>236</sup> There has also been a shift towards the use of imported plywood, particularly from overseas joint ventures, and veneer obtained from abroad.<sup>237</sup>

In 1994, there were 4,259 workers and 18 plants in the plywood industry; by contrast, in 1990, there were 72 plants. Capacity utilization increased in the plywood industry in the mid-1990s. In 1995, capacity utilization was 94 percent, up from just 50 percent in 1985 and 83 percent in 1994.<sup>238</sup> Capacity utilization fell to 63 percent in 1998 due to the economic crisis.<sup>239</sup>

The particleboard and fiberboard industries in Korea built up capacity in the 1990s in response to high domestic and export demand for furniture products.<sup>240</sup> In 1995, there were 5 particleboard factories with a total production capacity of 577,000 m<sup>3</sup> and total wood consumption of about 931,000 m<sup>3</sup> per year. There were 10 fiberboard factories in 1995, with a capacity of just over 1 million m<sup>3</sup> and consumption of 1.8 million m<sup>3</sup> of wood per year. Most inputs to the particleboard and fiberboard industries come from the waste products of the domestic sawmill industry, though log use is rising rapidly. It was expected that 37 percent of raw materials for these industries would come from logs in 1996, up from just 5 percent in 1992.<sup>241</sup>

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<sup>233</sup> Yoo, *Korea*, p. 24.

<sup>234</sup> USDOC, ITA, *South Korean Solid Wood Products*, 1993, p. 24.

<sup>235</sup> Yoo, *Korea*, p. 25.

<sup>236</sup> USDOC, ITA, *South Korean Solid Wood Products*, p. 28.

<sup>237</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, AGR No. KS8062, July 1998.

<sup>238</sup> Yoo, *Korea*, p. 33.

<sup>239</sup> USDA, FAS, *Korea Forest products Annual*, Seoul, 1999.

<sup>240</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, 1998.

<sup>241</sup> Yoo, *Korea*, pp. 30-31.

## Pulp, Paper, and Paper Products

The pulp and paper industries of Korea have witnessed an enormous amount of growth over the past decade, fueled by rapid GDP growth and increased consumer demand for paper products. In 1998, there were 109 paper and paperboard mills and 4 pulp mills that employed a total of 48,000 people (table F-26). Employment in the paper industry hovered between 60,000 and 66,000 during 1994-97 before falling sharply in 1998 due to the recession. While the number of paper mills has been declining since 1994, production capacity has increased substantially, exceeding 10 million metric tons in 1998 (table F-26). Capacity utilization in the paper industry declined from 94 percent in 1994 to 73 percent in 1998, due to faster growth of capacity than production. During 1994-97, capacity utilization in the pulp industry ranged between 71 percent and 75 percent (table F-26), with the exception of 1996, when the rate was 85 percent. In 1998, capacity utilization in the pulp industry fell to 50 percent. Capital investment in the paper and pulp industry was valued at \$103 million in 1998, an 85 percent decline from the level in 1997.

Of the pulp mills in Korea, all but one are relatively small mills that produce groundwood pulp. The largest mill, owned by Donghae, is the country's only chemical pulp mill and specializes in bleached kraft pulp.<sup>242</sup> A major constraint to pulp production in Korea is the lack of domestic virgin fiber. Only about 15 percent of the wood used in Korean pulp production comes from domestic chips, with the remainder imported from the United States or China.<sup>243</sup> A push is underway to increase domestic capacity for pulp as a means to reduce Korea's reliance on imports of pulp. Several companies have begun to develop plantations in countries such as Australia, New Zealand, Viet Nam, Indonesia, Mongolia, Paraguay, and Russia as a means to obtain fiber for Korean pulp and paper mills.<sup>244</sup> Some paper companies have attempted to replenish domestic fiber supplies through afforestation.<sup>245</sup>

Despite efforts to increase domestic pulp supply, Korean pulp remains uncompetitive in price with imported pulp. A study in *Asia-Pacific Papermaker* revealed that the production costs for Indonesian pulp mills were 25 to 40 percent of Donghae's costs.<sup>246</sup> The financial crisis of 1997-98 forced Donghae to declare bankruptcy and, for a time, shut down operations because its debt level was twice that of sales.<sup>247</sup>

The thrust of the domestic paper industry has been to expand production capacity to meet growing demand for paper products. As domestic fiber is scarce, there has been an increasing utilization of wastepaper as a raw material. The Government has set a goal

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<sup>242</sup> "South Korea" in *Asia-Pacific Analysis & Forecast*, Payne and Payne, eds.

<sup>243</sup> Ibid.

<sup>244</sup> "Korea: Towards 10 million tonnes," *Asia Pacific Papermaker*, July 1995, p. 16; "South Korea," *Asia-Pacific Analysis & Forecast*; and "Korea: Expands despite slowdown," *Asia Pacific Papermaker*, July 1997, p. 19.

<sup>245</sup> "South Korea", *Asia-Pacific Analysis & Forecast*.

<sup>246</sup> Dennis Neilson, "Korea: Changed its ways -- but still being punished?" *Asia Pacific Papermaker*, Dec. 1998.

<sup>247</sup> "Dong Hae bankrupt after two years in the red," *Asia Pacific Papermaker*, June 1998, p. 9.

of a 55 percent (from about 50 percent in 1995) recovery rate by 1998.<sup>248</sup> The utilization rate of wastepaper is 70 percent, of which corrugated cartons comprise 50 percent, newspapers 22 percent, and other paper 28 percent.<sup>249</sup>

There is substantial concentration in several paper markets. Three major companies controlled 72 percent of newsprint capacity, while four companies held 58 percent of printing and writing capacity. By contrast, the corrugated box industry was dominated by a number of small companies.<sup>250</sup>

The financial crisis brought substantial restructuring to the Korean paper industry. A number of major companies filed for bankruptcy during 1997-98. As part of the IMF restructuring package, regulations that restricted foreign investment and ownership in Korea were eased, which paved the way for foreign firms to purchase mills from several Korean companies, often at below-market cost.<sup>251</sup> The largest paper company, Hansol, formed a joint-venture with two foreign paper companies, Abitibi-Consolidated and Norske Skog, to create Pan-Asian Paper Company (PAPCO), which currently has a 15 percent share of the Asian newsprint market.<sup>252</sup> The financial crisis also delayed a number of capital investment projects. Despite these events, a number of firms have started up new paper machines, though according to *Pulp and Paper International*, "it is possible that older, less-efficient paper machines . . . [would be] shut down" over the course of 1998.<sup>253</sup> Shinmoorin, a subsidiary of the larger Moorin Paper Company, obtained \$90 million from several sources to finish the construction of a new paper machine.<sup>254</sup>

## *Production, Products, and Capacity*

### **Wood and Wood Products**

Industrial wood production fell 10 percent over 1994-97 (table F-27). The greatest decrease occurred in log production, which contracted 46 percent during 1994-97. By contrast, lumber and wood panel production increased significantly over 1994-97. Lumber production rose 23 percent as a result of increased demand from the construction industry (table F-27). This occurred despite reductions in the number of sawmills in

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<sup>248</sup> "Korea: Aggressive Investors," *Asia Pacific Papermaker*, July 1996, p. 16.

<sup>249</sup> "South Korea," *Asia-Pacific Analysis & Forecast*.

<sup>250</sup> John Chang, "Introduction of the Korean paper industry," Hanil Securities Co., Ltd., found at Internet address <http://www.hanilsecurities.co.kr/english/analyst/KoreanPaperIndustry.htm>, retrieved Jan. 26, 1999.

<sup>251</sup> "Bowater seals Halla, Avenor deals," *Pulp & Paper*, Sept. 1998, p. 19 and "Norske Skog to pick up two Korean-owned mills," *PIMA's Papermaker*, May 1998, p. 16.

<sup>252</sup> "Companies approve creation of Pan-Asia newsprint giant," *PIMA's Papermaker*, Oct. 1998, p. 16.

<sup>253</sup> C.B. Lee, "Korea: The Asian crisis bites deep," *Pulp & Paper International Annual Review*, 1998.

<sup>254</sup> "Moorim moves ahead with Chinju PM," *Pulp & Paper International*, Dec. 1998, p. 15.

Korea. In the early 1990s, significant capital investments were made by plywood manufacturers to utilize softwood logs in production, whereby softwood layers are combined with tropical hardwood layers.<sup>255</sup> Plywood production remained steady during 1994-96, but increased by 13 percent in 1997.

The production of particleboard and fiberboard increased by 38 percent and 48 percent, respectively, over 1994-97 (see table F-27). The rise in domestic production came at the expense of imports and is due to greater demand over 1994-1997 from domestic end-users, such as furniture and container manufacturers and the musical instruments industry.<sup>256</sup>

Wood production rose 34 percent in 1998, as the forest products sector gained from government efforts to create jobs.<sup>257</sup> Lumber production, however, fell 41 percent in 1998. Various reports from the International Tropical Timber Organization (ITTO) Market Information Service indicate that the financial crisis has also had a major impact on plywood and particleboard production. Production of plywood in 1998 was 640,967 m<sup>3</sup> (63 percent of 1997 production) while particleboard production was 507,157 m<sup>3</sup> (70 percent of 1997 production). The ITTO reports that most producers were generally operating only 3 days per week as a result of lower domestic demand, with capacity utilization rates of around 60 percent. For much of 1998, producers were beset with large inventories as a result of poor domestic sales. Plywood manufacturers were successful in utilizing export markets to reduce some excess capacity in 1998, however, with export totals of 141,080 m<sup>3</sup>.<sup>258</sup>

## **Pulp, Paper, and Paper Products**

The production of pulp in Korea rose steadily prior to the financial crisis (table F-27). Bleached sulfate pulp production rose over 1994-96 before declining in 1997 and 1998. Mechanical pulp production peaked in 1996 at 222,000 metric tons but dropped off to 169,000 metric tons in 1998. Total pulp production dropped sharply by 29 percent in 1998 from the 1997 level. Part of this decline was the result of the temporary closure of the Donghae mill.

Over 1994-98, total paper and paperboard production rose 21 percent, fueled mainly by large gains in newsprint production (95 percent) and smaller gains in corrugating materials (16 percent) and printing/writing paper (12 percent) (table F-27). Newsprint production increased rapidly, due in large part to a massive influx of newsprint capacity to the market and the anticipation of strong domestic and export demand.<sup>259</sup> Despite the financial crisis, production of newsprint actually increased in 1998 as a result of strong

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<sup>255</sup> Yoo, *Korea*, pp. 33-34.

<sup>256</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, 1998.

<sup>257</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, 1999.

<sup>258</sup> ITTO, *Tropical Timber Market Report*, various reports, 1998.

<sup>259</sup> Jim Kenny, "Korea: the Asian tiger feasts on new capacity," *Asia Pacific Papermaker*, Feb. 1996, p. 30 and "Newsprint Investment Boom," *Asia Pacific Papermaker*, Jan. 1997, p. 29.

export sales and a competitive currency.<sup>260</sup> Production of all other grades of paper declined in 1998 as a result of weak domestic demand. Increases in the production of corrugated materials in 1995-96 were helped by the addition of 200,000 metric tons of new capacity, while an additional 800,000 metric tons of linerboard capacity were due online by 1998.<sup>261</sup> Growth in tissue production rose slowly in 1994-97, before falling in 1998. Throughout the 1990s, the tissue paper market has been wrought with overcapacity and low prices as a result of strong competition among manufacturers.<sup>262</sup>

## *Markets and Marketing Practices*

### **Consumption**

#### *Wood and wood products*

Most domestic logs are sold, processed, and used locally. Forest owners sell their products to distributors, who deliver wood products to sawmills, wholesalers, or end-users. Traded volumes of domestic wood are generally small.<sup>263</sup> Logs are imported by processors, with the largest sawmills located in Inchon and Pusan. Processors sell the finished product to wholesalers or end-users. Finished products are imported and sold directly to end-users.<sup>264</sup> The *chaebol* (large, industrial conglomerates) often own trading companies that import a variety of wood products. The trading companies are typically integrated with processing and end-use facilities for wood products.<sup>265</sup>

In the 1990s, as part of a drive to increase the quantity of available housing, construction companies built an average of 600,000 housing units per year. By 1997, there was an oversupply of approximately 90,000 housing units, which led to numerous bankruptcies among construction companies.<sup>266</sup> The financial crisis exacerbated these problems by delaying proposed new construction activity and, more importantly, restricting or ceasing credit access to construction companies already facing weak demand for housing. The ITTO reports that in the first quarter of 1998 construction permits for commercial construction were down 70 percent relative to the first quarter of 1997, while housing permits were down 53 percent over the same period.<sup>267</sup>

Industrial wood consumption remained relatively steady, with 6 percent growth over the period 1994-97 (table F-28). Lumber consumption increased in 1994-97 in response to growing demand from the construction industry. Lumber consumption fell 42 percent in

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<sup>260</sup> "Hopes pinned on export boom as domestic market continues to slow," *PIMA's Papermaker*, Dec. 1998, p. 21.

<sup>261</sup> Kenny, "Korea: the Asian tiger feasts on new capacity," p. 30 and "Korea: Aggressive Investors," *Asia Pacific Papermaker*, p. 15.

<sup>262</sup> Kenny, "Korea: the Asian tiger feasts on new capacity," p. 31.

<sup>263</sup> USDOC, ITA, *South Korean Solid Wood Products*, p. 37-38.

<sup>264</sup> U.S. Department of State, "USITC Investigation on the Conditions of Competition" and USDOC, ITA, *South Korean Solid Wood Products*, p. 38.

<sup>265</sup> USDOC, ITA, *South Korean Solid Wood Products*, p. 38.

<sup>266</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, 1998.

<sup>267</sup> UNECE, *Forest Products Annual Market Review, 1997-1998*, 1998, p. 63.

1998.<sup>268</sup> Although housing and commercial permits declined over 1996-98, the value of public infrastructure projects rose considerably over 1994-97. Plywood consumption remained relatively stable during 1994-97, though it peaked in 1995. Plywood demand declined by 45 percent in 1998.<sup>269</sup> Consumption of particleboard and fiberboard increased 15 percent and 20 percent, respectively, over 1994-96, but declined in 1997 due to a slowdown in the housing market (thus reducing demand for furniture) and a decrease in the competitiveness of the musical instruments sector.<sup>270</sup>

### *Pulp, paper, and paper products*

Pulp consumption in Korea fell irregularly over 1994-98. Pulp consumption peaked at 2.9 million metric tons in 1996 and then declined steadily, registering a 15 percent decline over 1997-98 (table F-28). Consumption of wastepaper, on the other hand, rose 24 percent during 1994-98. Per capita consumption of paper and paperboard in 1998 was 114 kg, significantly greater than the world per capita average of 50 kg and the Asian per capita average of 26 kg.<sup>271</sup>

Paper consumption showed strong growth over 1994-96, a small decrease in 1997, and a 25 percent decline in 1998 (table F-28). The poor economic conditions in Korea in 1997-98 greatly impacted paper consumption. Newsprint consumption increased over 1994-96, before leveling off in 1997 and falling in 1998 (table F-28). Over the past decade, demand for newsprint has risen as a result of the proliferation of popular media, such as newspapers and advertising, that came about after the political liberalization of the late 1980s.<sup>272</sup> Printing and writing paper consumption increased over 1994-97 as a result of increased demand for magazines, books, and office paper, such as computer and fax paper.<sup>273</sup> Printing and writing paper consumption, however, fell 37 percent over 1997-98. Consumption of corrugating materials fell 1 percent during 1994-98. Previous to 1998, demand had been strong from the agricultural sector, food producers, and exporters, but fell significantly in 1998.<sup>274</sup>

The marketing channels for paper distribution are relatively straightforward. Paper manufacturers sell their products to agents and wholesalers, or directly to end-users. Agents and wholesalers market paper to end-users and retailers.<sup>275</sup>

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<sup>268</sup> Derived from statistics in USDA, FAS, *Korea Forest Products Annual*, Seoul, 1998 and 1999.

<sup>269</sup> Ibid.

<sup>270</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, 1998.

<sup>271</sup> Pulp & Paper International, *International Fact & Price Book*, 1999.

<sup>272</sup> Jim Kenny, "Paper and politics make for a growing partnership," *Pulp & Paper International*, Feb. 1996, p. 33.

<sup>273</sup> "South Korea" in *Asia-Pacific Analysis & Forecast*.

<sup>274</sup> Ibid.

<sup>275</sup> Memorandum from Korea Paper Manufacturers Assn., Apr. 23, 1999.

## Imports

Korean imports of forest products were valued at \$2.3 billion in 1998, a decrease of 44 percent from 1994 (table F-29). Imports peaked in 1995 at \$5.4 billion, steadily declined in 1996 and 1997, and plunged in 1998. The United States is the largest supplier of Korea's forest products imports, supplying 29 percent (\$657 million) in 1998. Indonesia, Canada, New Zealand, and the EU are also important suppliers. In 1998, 43 percent, or \$974 million, of imports was pulp and wastepaper. The United States supplied 41 percent (\$403 million) of Korea's pulp and wastepaper imports, with Canada and Indonesia other important suppliers. Indonesia, in particular, has grown in importance as a source of pulp and wastepaper for Korea. In 1994, only \$15 million was imported from Indonesia, but by 1998, imports from Indonesia totaled \$147 million, a 880-percent increase. Forty percent of forest products imports consists of wood and wood products, primarily from Indonesia, New Zealand, Malaysia, and the United States. Imports of wood and wood products, valued at \$912 million in 1998, fell 62 percent from the 1997 level of \$2.4 billion. Imports of paper and paper products, most of which are from the United States, Japan, or the EU, comprise almost 17 percent of total imports. These imports have been declining since 1995, though this trend was exacerbated in 1998 by the recession in Korea.

### *Wood and wood products*

Industrial wood imports increased irregularly by about 7 percent in volume terms over 1994-97 (table F-30). Imports of all wood products fell 62 percent in 1998 as a result of the economic crisis.<sup>276</sup> The composition of imported logs has shifted away from tropical logs and toward softwood and temperate hardwood logs. Papua New Guinea is the largest supplier of tropical logs, followed by Malaysia and the Solomon Islands; the latter has become increasingly important in the past few years.<sup>277</sup> Over one-half of the softwood logs that enters Korea is from New Zealand, with an additional 20 percent to 25 percent from Chile.<sup>278</sup>

Hardwood log imports in 1998 were just 786,900 m<sup>3</sup> (61 percent of the volume in 1997), while 1998 softwood log imports were down to 3.3 million m<sup>3</sup>, or 46 percent of the volume in 1997. While New Zealand remained the main supplier of softwood logs to Korea in 1998, Russian imports increased significantly because of their low prices.<sup>279</sup>

Lumber imports increased by 11 percent over 1994-97, in spite of a 15-percent reduction over 1996-97 (table F-30).<sup>280</sup> There was a shift towards the import of softwood and temperate hardwood lumber and away from tropical hardwood lumber. Chile, New Zealand, and Canada are the main suppliers of softwood lumber. All tropical hardwood lumber comes from either Malaysia (75 percent) or Indonesia (25 percent). Over one-half

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<sup>276</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, 1999.

<sup>277</sup> ITTO. *Annual Review and Assessment of the World Tropical Timber Situation 1997* (Yokohama, Japan: ITTO, 1998).

<sup>278</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, 1998.

<sup>279</sup> ITTO, *Tropical Timber Market Report*, various reports, 1998.

<sup>280</sup> USDA, FAS, *Korea Forest Products Annual*, Seoul, 1998.

of the temperate hardwood lumber arrives from the United States, while China is a secondary supplier.<sup>281</sup> Lumber imports registered a 47 percent decline in 1998.<sup>282</sup>

In 1997, imported plywood made up 50 percent of Korean plywood consumption. Plywood imports, almost all of which are tropical plywood, declined by 3 percent during 1994-97 (table F-30). Plywood imports fell 48 percent in 1998.<sup>283</sup> Imports of particleboard and fiberboard fell considerably over 1994-1997 as a result of greater domestic production of these products.

### *Pulp, paper, and paper products*

Imports of pulp represent about three-quarters of total pulp consumption (table F-30). Pulp imports fell 6 percent over 1994-98. Paper imports, at less than 10 percent of consumption, declined significantly by 54 percent over 1994-98. Newsprint imports fell because of the increase in domestic production capacity. Printing and writing paper imports doubled over 1994-96, but fell 84 percent in 1996-98 (table F-30). Imports of corrugating materials rose steadily over 1994-96 before stabilizing in 1997 and falling substantially in 1998. Wastepaper imports rose 41 percent over 1994-98.

## **Exports**

Korean exports of forest products were valued at \$1.9 billion in 1998, an increase of 84 percent over 1994 (table F-29). The predominant export markets were China, Hong Kong, and the United States, with markets such as Japan and the EU having secondary importance. The overwhelming majority (93 percent) of all forest products exports were paper and paper products. In 1998, exports of paper and paper products increased by 100 percent from their 1994 value to \$1.7 billion. China and Hong Kong were the most important markets for Korean paper products, though exports to the United States grew considerably in 1997 and 1998. Exports of wood and pulp are relatively small. Korea exported \$126 million of wood products in 1998, a 2 percent increase over 1994. Most exports were plywood and fiberboard destined for the EU, China, and Japan. Total pulp exports were valued at under \$1 million in 1998.

The export market remains a major outlet for Korean paper manufacturers' excess supply of paper products. In particular, the combination of a glut of production capacity and the depreciation of the Korean Won boosted paper exports in 1998. The volume of paper exports rose by 191 percent during 1994-98, from 952,000 metric tons to 2.8 million metric tons (table F-31). Newsprint exports surged during this period, with much of the increase occurring during 1997-98. Printing and writing paper exports increased significantly in 1997 and 1998, after steady gains during 1994-96. Corrugating materials exports rose irregularly from 68,000 metric tons in 1994 to 324,000 metric tons in 1998.

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<sup>281</sup> Ibid.

<sup>282</sup> Derived from statistics in USDA, FAS, *Korea Forest Products Annual*, Seoul, 1998 and 1999.

<sup>283</sup> Ibid.

# Taiwan

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The wood products sector in Taiwan has been in decline over the past 5 years as a result of a sharp decline in its competitiveness. Increasing costs for logs and labor have driven the production of many wood products to other countries in Asia. Prior to 1998, paper production grew steadily. Demand came largely from Taiwan's export-oriented, high-technology sector in the form of packaging products and from increased demand for office paper, printing and writing paper, and newsprint. Paper production and consumption dropped moderately in 1998 due to the regional slowdown. A lack of virgin fiber has forced a significant utilization of wastepaper in production. Cost-cutting efforts have seen the departure of some low-value paper and board production to China. The forest products sector of Taiwan has not been directly affected by the financial crisis that has gripped much of Asia, but there is some overcapacity in the paper sector. The main effect of the crisis has been an increase in competition from other Asian countries in export markets.

## *Structure*

Approximately 2.1 million ha, or 58 percent, of Taiwan's total land area is forested. About 450,000 ha is available for commercial timber production. Currently, only 200,000 m<sup>3</sup> of all types of wood may be harvested in a given year. Actual cut volumes tend to be much lower -- in 1997, the total domestic harvest was 52,220 m<sup>3</sup>.<sup>284</sup> The Government of Taiwan imposes numerous regulations regarding commercial forests that govern the areas that can be utilized for timber production and the ages of the trees that can be cut. Forest concessions are allocated by government auction.<sup>285</sup>

The Government of Taiwan provides support to private loggers in the form of payments for planting costs.<sup>286</sup> In return for these payments, loggers must plant commercial species of trees on land designated for logging and ensure the survival of at least 70 percent of the trees planted. Despite the attention the Government places on the forest sector in Taiwan, almost all of the wood consumed by the domestic wood products industry is imported.<sup>287</sup>

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<sup>284</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, AGR No. TW8314, July 1998.

<sup>285</sup> U.S. Department of State telegram No. 000937, "USITC Investigation on the Conditions of Competition in U.S. Forest Products Trade," prepared by American Institute in Taiwan, Apr. 2, 1999.

<sup>286</sup> *Ibid.*

<sup>287</sup> *Ibid.*

## Wood and Wood Products

In 1996, there were 347 lumber mills in Taiwan. However, as a result of rising labor costs, there has been a move towards the use of imported lumber.<sup>288</sup> Roughly 50 percent of lumber is utilized by the furniture industry.<sup>289</sup> The plywood industry in Taiwan consisted of 69 plywood mills in 1995, down from 84 in 1992.<sup>290</sup> Plywood is typically used in the furniture and interiors market.<sup>291</sup> In 1994, there were 100 veneer-processing plants, most of which were small and capital-intensive, and 3 particleboard plants in Taiwan.<sup>292</sup>

## Pulp, Paper, and Paper Products

The pulp and paper industry of Taiwan has expanded over the past couple of decades as a result of strong, consistent GDP growth and rising demand for paper and paperboard products. Production capacity in the paper industry rose from 4.7 million metric tons in 1994 to 5.2 million metric tons in 1998, while employment in the pulp and paper industry rose from 18,000 in 1994 and 1995 to 21,000 in 1996-98 (table F-32). The number of paper mills, however, has declined. In 1998, there were 2 pulp mills and 129 paper and paperboard mills, while in 1994, there were 156 paper mills (table F-32). This has resulted from increased consolidation in the paper industry.<sup>293</sup> The number of pulp mills remained unchanged over this period.

The domestic pulp industry provides roughly 26 percent of the pulp consumed in Taiwan. Virgin fiber is scarce in Taiwan, which has fueled efforts by the major pulp producers to obtain chips and pulp from overseas plantations. The largest pulp producer obtains all of its wood from overseas. Moreover, it has proposed expanding its chips plantation in Thailand and collaborating with Indonesian firms. The other major pulp plant obtains some of its pulp from a mill it constructed in Australia.<sup>294</sup>

The paucity of virgin fiber has fueled the use of wastepaper in Taiwan. Wastepaper utilization and recovery rates, at 73.4 percent and 55 percent, respectively, in 1997, are among the highest in the world. Roughly one-third of wastepaper consumption comes from imports, mainly of corrugated materials or newsprint from the United States.<sup>295</sup>

The paper industry in Taiwan is under pressure to cut costs to remain competitive. The industry has taken several steps to achieve this, including improvements in the level of

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<sup>288</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, AGR No. TW7031, July 1997.

<sup>289</sup> Keith McKellar, *Taiwan Market Study for Softwood Lumber*, Forest Industries & Building Products Branch, Industry Canada, Mar. 1998, p. 6.

<sup>290</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, AGR No. TW6034, July 1996.

<sup>291</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, 1997.

<sup>292</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, AGR No. TW5317, July 1995.

<sup>293</sup> Hsin-Tai Chen and Shen-Yu Chang, "Taiwan: Fiber-hungry paper industry is a recycling leader," *PIMA's Papermaker*, Feb. 1998, p. 26.

<sup>294</sup> "Taiwan" in *Asia-Pacific Analysis & Forecast*, Payne and Payne, eds., (Brussels: Miller Freeman, 1997).

<sup>295</sup> "Taiwan," *Asia-Pacific Analysis & Forecast*.

efficiency and automation in paper mills, reducing overtime, operating machines at night (when electricity rates are less), and relocating some low-value production to China (major investment from Taiwan in paper mills in China has not yet materialized, however, due to political tension with China, high fixed costs, and low profits).<sup>296</sup> The Government of Taiwan has helped the industry with low-interest loans for more efficient machinery.<sup>297</sup> The industry may face further cost increases as a result of new environmental regulations instituted by the Government in 1998.<sup>298</sup>

## ***Production, Products, and Capacity***

### **Wood and Wood Products**

The production of wood products in Taiwan declined over 1994-98. Log production contracted by 5 percent over 1994-97, from 38,000 m<sup>3</sup> to 36,000 m<sup>3</sup> (table F-33). The decline can be attributed to a lack of profitability in the industry.<sup>299</sup> Lumber production fell by 5 percent over 1997-98 (table F-33). Higher labor costs have started to force some substitution of domestic lumber by imported lumber.<sup>300</sup> There has also been a decline in panel production. Plywood production decreased by 6 percent over 1994-98, though most of the decline occurred over 1994-95 (table F-33), as several fires in Taiwan in 1995 caused a shift away from plywood and towards the use of fireproof materials.<sup>301</sup> High labor costs and a movement of plywood mills from Taiwan to other parts of Southeast Asia have also contributed to the decline.<sup>302</sup> Veneer production fell 82 percent during 1994-98.

### **Pulp, Paper, and Paper Products**

Pulp production in Taiwan grew irregularly over 1994-98, from 306,000 metric tons to 339,000 metric tons (table F-33). All pulp production consisted of bleached sulfate pulp. In 1996, capacity utilization for pulp fell to 78 percent (from a high of 86 percent in 1994-95), before rebounding to 81 percent in 1998 (table F-32).

Taiwan was largely spared from the financial crisis that has ravaged much of Asia, registering strong GDP growth (over 5 percent) during 1998. Nevertheless, the drop in demand throughout Asia has affected paper production in Taiwan. The combination of competitive devaluations by other paper producers (such as Indonesia and Korea) and

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<sup>296</sup> Jonathan Roberts, "Trade is tough over the Taiwan Strait," *Asia Pacific Papermaker*, Dec. 1998 and "Taiwan: The Struggle to Compete," *Asia Pacific papermaker*, July 1998, p. 19.

<sup>297</sup> U.S. Department of State, "USITC Investigation on the Conditions of Competition," 1999.

<sup>298</sup> *Ibid.*

<sup>299</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, 1998.

<sup>300</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, 1997.

<sup>301</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, 1995.

<sup>302</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, 1996.

overcapacity in the paper market has made it difficult for Taiwan paper producers to remain competitive in markets that continue to remain strong, such as China.<sup>303</sup>

During 1994-97, total paper and paperboard production rose by 7 percent (table F-33), but fell by 6 percent over 1997-98 as a result of overcapacity, weak domestic demand, and a decline in exports to China.<sup>304</sup> Production capacity increased from 4.7 million metric tons in 1994 to 5.2 million metric tons in 1998 to meet expected increases in domestic and export demand, particularly from China (table F-32).<sup>305</sup> Capacity utilization in the paper industry fell from 89 percent in 1994 to 80 percent in 1998. More than 70 percent of paper production consists of corrugated materials and board, which are used in the packaging industry as containers for the export of high-technology items and domestic goods. Board production declined by 10 percent over 1994-98; corrugating materials output was flat over the period. Printing and writing paper production increased by 6 percent over 1994-98 (table F-33).

## *Marketing and Marketing Practices*

### **Consumption**

#### *Wood and wood products*

Log consumption in Taiwan declined by 12 percent over 1994-97 (table F-34). In particular, a drop in log consumption occurred during 1994-95, primarily reflecting a decline in imported logs. Since 1995, the consumption of logs has remained relatively flat. The consumption of softwood logs, though only about 8 percent of total log consumption, rose steadily over 1994-97, while tropical hardwood log consumption declined.

Softwood lumber consumption in Taiwan increased by 12 percent over 1994-98 (table F-34). Consumption of temperate hardwood lumber fell 21 percent between 1997 and 1998, due in part to a decline in demand from the furniture industry, which is becoming less competitive with other Asian countries.<sup>306</sup> Plywood consumption fell by 34 percent over 1994-98.

#### *Pulp, paper, and paper products*

Total consumption of pulp fell by 2 percent over 1994-98 (table F-34). Total consumption of paper and paperboard rose irregularly by 2 percent over the same period. Paper consumption picked up strongly in 1997 before falling in 1998. Per capita

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<sup>303</sup> "Taiwan's Overcapacity," *Asia Pacific Papermaker*, Dec. 1998, p. 25.

<sup>304</sup> Larry Lai, "Taiwan: Growth slows, but 1999 looking better," *Pulp & Paper International*, July 1999, p. 52.

<sup>305</sup> John Westbrook, "Taiwan: What's there to smile about?," *Asia Pacific Papermaker*, Jan. 1995, p. 26.

<sup>306</sup> McKellar, *Taiwan Market Study for Softwood Lumber*, p. 6.

consumption of paper and paperboard in 1998 was 222 kg, which was the second-highest level in Asia after Japan.<sup>307</sup>

Consumption of most grades of paper and paperboard rose over 1994-98. Printing and writing paper demand increased by 5 percent in the wake of strong demand for office and computer paper. The consumption of corrugated materials increased by 2 percent, owing to increased demand for high-quality corrugated boxes used in the export of high-technology items, such as computers. Consumption of high-value corrugated materials has increased, while lower-value board consumption has declined.<sup>308</sup> Newsprint consumption increased by 12 percent over 1994-98 owing to greater numbers of pages in newspapers and higher demand for advertising.<sup>309</sup>

## Imports

In 1997, Taiwan imported \$2.7 billion worth of forest products, which was 12 percent less than the value of imports in 1994 (table F-35). The United States was the leading source of forest products, accounting for \$541 million in imports, and was the top-ranked supplier of pulp, paper, and paper products. Indonesia and Malaysia are the second and third-leading suppliers of forest products, most of which are wood and wood products.

### *Wood and wood products*

Imports of most wood products declined over 1994-98 (table F-36). Plywood imports dropped precipitously, by 64 percent over this period (table F-36). Log imports contracted by 12 percent during 1994-97, though most of the drop occurred during 1994-95 as a result of large inventories of logs in 1993-94.<sup>310</sup> Veneer imports fell by 9 percent between 1994 and 1998.

### *Pulp, paper, and paper products*

Imports of pulp fell by 4 percent over 1994-98. Imports of paper and paperboard products rose irregularly by 9 percent during 1994-97, from 1.2 million metric tons to 1.4 million metric tons (table F-36). In 1998, imports declined by 5 percent to 1.3 million metric tons. Newsprint and printing and writing paper imports increased by 14 percent during 1994-98, but board imports fell by 12 percent.

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<sup>307</sup> Pulp & Paper International, *International Fact & Price Book*, 1999.

<sup>308</sup> "Taiwan: The Struggle to Compete," *Asia Pacific Papermaker*, p. 19.

<sup>309</sup> "Taiwan," *Asia-Pacific Analysis & Forecast*.

<sup>310</sup> USDA, FAS, *Taiwan Forest Products Annual*, Taipei, 1995.

## Exports

Taiwan exports of forest products were valued at \$1.6 billion in 1997, a 3 percent decline from 1994 (table F-35). The value of exports rose during 1994-96, before dropping by 11 percent in 1997. China and Hong Kong accounted for one-half of forest product exports, the majority of which were paper and paper products. The United States and Japan were also important markets for forest products, most of which were wood and wood products. Pulp and wastepaper exports totaled only \$5 million in 1997.

Taiwan is not a large exporter of logs, lumber, and plywood. The volume of plywood exports totaled only 14,000 m<sup>3</sup> in 1998 (table F-37). Paper exports fell by 5 percent during 1994-1998 (table F-37). Much of the decline over 1997-98 can be attributed to increased competition with other Asian countries. Although the Taiwan currency declined as a result of the financial crisis, it did not depreciate to the extent of those in Korea or Indonesia. The majority (79 percent) of exports are of corrugated materials and board. Board exports contracted by 18 percent during 1994-98 due to the transfer of some low-value board production to China. At the same time, Taiwan has stepped up its exports of higher-value corrugated products.<sup>311</sup> Over 1994-1997, exports of corrugated materials increased by 24 percent, though in 1998 these exports fell markedly. Exports of printing and writing paper rose by 30 percent during 1994-1998.

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<sup>311</sup> "Taiwan: The struggle to compete," *Asia Pacific Papermaker*, p. 19.

# CHAPTER 6

## MAJOR PRODUCERS IN EUROPE

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### Overview

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#### *Structure, Production, and Consumption*

Europe is a major producing region for forest products. Approximately 35 percent of Europe's land area is forested and it accounts for about 4.3 percent of world forest area.<sup>1</sup> European forests are very diverse, ranging from Alpine forests to temperate region hardwoods to Mediterranean scrub forests. In addition, in relation to total land area, European forestland varies greatly by country from about 8 percent in Ireland<sup>2</sup> to about 86 percent in Finland.<sup>3</sup> Almost two-thirds of exploitable European forests consists of softwood trees with hardwoods making up the remainder.<sup>4</sup> In most countries, the exploitable forest reserve is expanding, since fellings are about 70 percent of the net annual increment. Forest management practices vary by country; but in general, European forests are managed intensively. Nearly all European countries have comprehensive forestry laws that regulate harvesting and reforestation. In addition, various local and regional laws and regulations affect forest production. Management objectives often differ by country and are often related to ownership;<sup>5</sup> however, most countries' laws require that forests serve several functions, including recreation, wildlife habitat, and wood production. More than 50 percent of European forests<sup>6</sup> are privately owned by farmers, small-scale forest owners, traditional large estates, and the forest industries. There are over 12 million forest owners<sup>7</sup> in Europe. Public ownership of the remainder includes state, municipal, and regional entities.<sup>8</sup> Major producers of wood in 1998 included Sweden, Finland, Russia, Germany, France, and Poland (appendix table G-1). In 1997, Europe was the location of 330 pulp mills and 1,423 paper and paperboard mills.<sup>9</sup> The structure of the European pulp and paper and panel production sectors can

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<sup>1</sup> United Nations, *European Timber Trends and Prospects: Into the 21st Century*, ECE/TIM/SP/11 (New York and Geneva UN 1996), pp. 49-50.

<sup>2</sup> Confederation of European Paper Industries (CEPI), *European Paper Base-Country Information*, p. 1, found at Internet address <http://www.paperonline.org/countryinfo/default.html>, retrieved on Jan. 20, 1999.

<sup>3</sup> USDA, FAS, *Forest Products Annual Report, Finland*, 1998, GAIN Report#FI8003, p. 4, found at Internet address [http://fas.usda.gov/scripts/gain\\_display\\_report.exe?Rep\\_ID=25351772.0](http://fas.usda.gov/scripts/gain_display_report.exe?Rep_ID=25351772.0), retrieved on Jan. 21, 1999.

<sup>4</sup> UN, *European Timber Trends and Prospects: Into the 21st Century*, p. 15.

<sup>5</sup> Many private owners emphasize recreation, conservation, and investment objectives, as well as financial returns.

<sup>6</sup> Does not include Belarus, Russia, or the Ukraine.

<sup>7</sup> *MTK - Newsletter*, Central Union of Agricultural Producers and Forest Owners, Helsinki, Finland, Oct. 1998, p. 1.

<sup>8</sup> UN, *European Timber Trends and Prospects: Into the 21st Century*, p. 16.

<sup>9</sup> *Pulp & Paper International Annual Review, July 1998* (Brussels: Miller-Freeman), p. 18.

generally be characterized as capital-intensive, technologically advanced, and global.<sup>10</sup> In general, the sawmilling sector in most European countries is characterized as a traditional, small-scale industry; which differs considerably, especially in terms of size, from the other sectors. UN data indicate that in recent years European wood and fiber supplies have come from European removals (about 70 percent), wastepaper and industrial residues (20 percent), and imports (10 percent).<sup>11</sup>

In 1998, Europe accounted for about 25 percent of total world industrial wood production; 24 percent of world pulp production; and 30 percent of world paper and paperboard production (table G-1 and figure 6-1). European production of industrial wood amounted to about 472 million m<sup>3</sup> in 1997, up 2.6 percent from 1994; while lumber production in 1997 was down slightly to 115 million m<sup>3</sup> (table G-2). Wood panel production increased 13 percent over 1994-97 to 48 million m<sup>3</sup>. During 1994-98, pulp production was up 4.5 percent to about 42 million metric tons, and paper and paperboard production rose 12.5 percent to about 90 million metric tons. Wastepaper production (recovery) was up about 8 percent. Much of the increase in pulp production since the early 1990s resulted from new capacity undertaken to satisfy increased fiber demand from regional paper and paperboard producers and a sharp rise in recovered paper utilization by European papermakers.<sup>12</sup> The growth was a reflection of rapidly increasing demand within national markets, as well as greater demand for exports.

Europe is also a major consumer of forest products, annually consuming more than a quarter of the world's pulp production and about 27 percent of global paperboard production.<sup>13</sup> The average European per capita consumption of paper and paperboard in 1998 was 102.4 kilograms, about twice the world level.<sup>14</sup> During 1994-97, European industrial wood consumption rose about 1 percent; lumber declined about 6 percent, wood panel consumption increased by about 9 percent and wastepaper increased almost 4 percent (table G-3). Pulp consumption rose about 3 percent while paper and paperboard increased about 12 percent during 1994-98. In recent years overall European consumption has been negatively affected by the significant decline in the consumption of forest products in Russia (reflecting the depressed state of the Russian economy).

In recent years, a number of important economic factors and trends have affected the European forest products industry, including (1) corporate restructuring (especially mergers) - as firms attempt to become more efficient and take advantage of economies of scale through the acquisition of forest resources and manufacturing facilities; (2) automation and modernization - essential to maintain profitability in certain forest product sectors especially when product prices are constrained by competing products (e.g., plastics) and/or increasing raw material costs; (3) new markets for certified wood products - buyers' groups have pressured suppliers to provide certified forest products that they can offer their customers; (4) increasing use of engineered wood products

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<sup>10</sup> Ibid., p. 34.

<sup>11</sup> UN, *European Timber Trends and Prospects: Into the 21st Century*, table 11.3.2, p. 77.

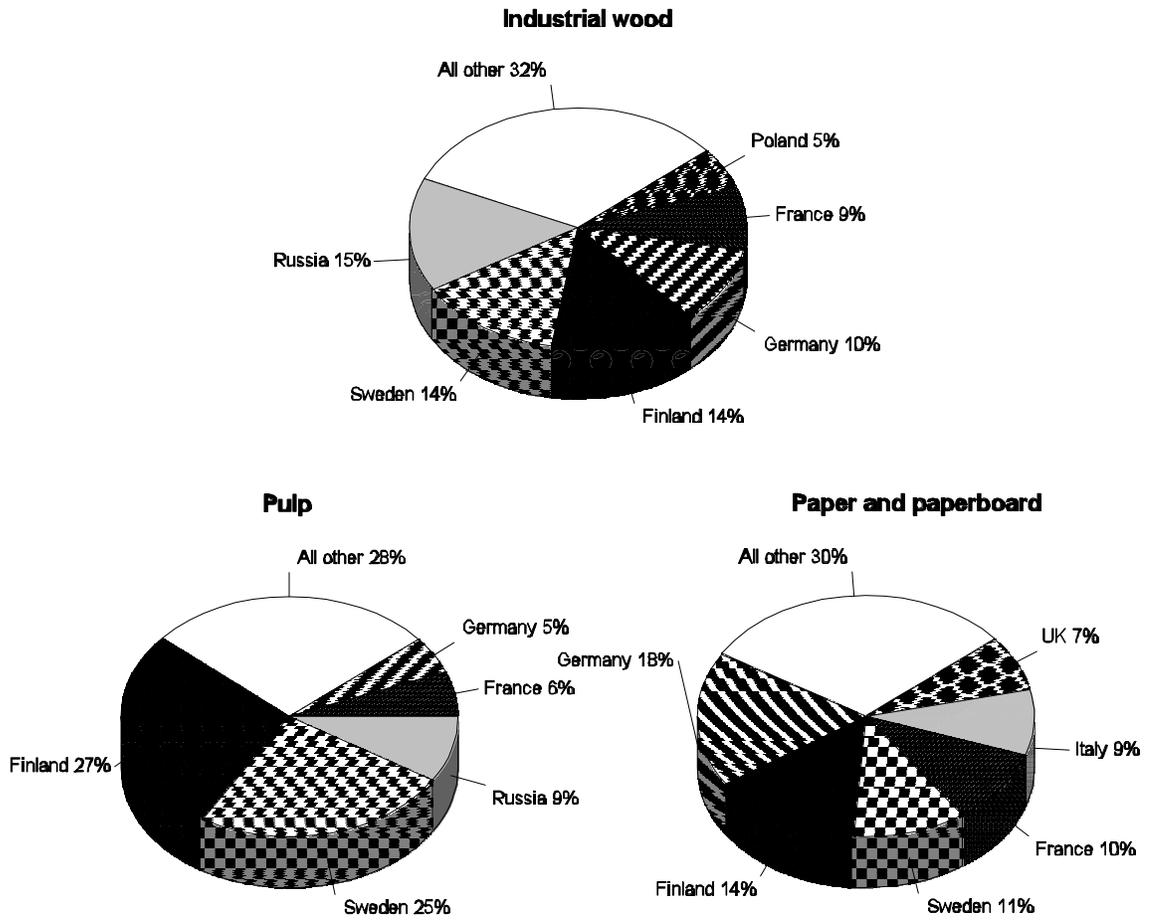
<sup>12</sup> Mark Payne, *European Analysis and Forecast*, (Brussels: Miller-Freeman 1998), p.

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<sup>13</sup> Ibid.

<sup>14</sup> *Pulp & Paper International Annual Review, 1999*, p. 18.

**Figure 6-1**  
**European forest product production: Industrial wood, pulp, and paper and paperboard, 1998**



Source: UNFAO forest product database; *Pulp & Paper International, Annual Review*, July 1999.

(e.g., plywood, wooden I-beams, composite panel products like OSB, etc.) instead of solid wood products, reflecting performance and cost; (5) European exports of lumber have become increasingly competitive in Asian markets, especially Japan, primarily as a result of competitive pricing and aggressive marketing; and (6) European imports of U.S. forest products (especially softwood lumber and plywood) have declined in recent years generally reflecting high U.S. demand for these products as a result of the strong U.S. economy and competitive prices in the European market from European and other suppliers (e.g., Indonesia, Brazil, etc.).<sup>15</sup>

## *Trade*

Although most European production is consumed in Europe, significant amounts are also traded. In 1997, European exports of forest products amounted to almost \$14 billion, while imports were valued at \$13.2 billion (table G-4). Complete European trade data for 1998 are not yet available, but trade is believed to have been at similar levels. Significant export markets included the United States and Japan. In 1997, the United States accounted for 17 percent (by value) of European forest product exports; Japan accounted for 11 percent. Other important markets included Hong Kong, Turkey, and Australia. Major export items included paper and paper products (68 percent by value) and wood and wood products (28 percent) (table G-4). Europe has historically been an exporter of paper and paper products. However in recent years, European suppliers have significantly increased wood exports (up 92 percent during 1994-97); and lumber (lumber) exports, especially to Japan, rose significantly (tables G-4 and G-5). By 1997, European exports supplied about 17 percent of the Japanese lumber market.<sup>16</sup> However, demand declined in mid-1998 as a result of the Asian financial crisis and European lumber exports to Japan have stalled. Export quantities for all general-forest-product categories were higher over the 1994-97 period and are reported in table G-5. The most significant increases were registered in the categories of wood panels (32 percent), wastepaper (20 percent), paper and paperboard (18 percent), and industrial wood (16 percent).

European imports of forest products were valued at \$13.2 billion in 1997, up about 5 percent from 1994 (table G-4). The United States is the most important European supplier, accounting for about one-third (by value) of European forest product imports in 1997 (table G-4). Other important suppliers included Canada (19 percent), Brazil (8 percent), and Indonesia and Malaysia (each 7 percent). Almost one-half, by value, of the 1997 imports consisted of wood and wood products; pulp and wastepaper accounted for 28 percent; and paper and paper products made up about 24 percent (table G-4). The quantities of European forest product imports for 1994-97 are reported in appendix table G-6. These data indicate significant increases in European imports of wood panels (up about 18 percent) and paper and paperboard (up about 12 percent) over the period. Industrial wood imports rose about 5 percent and pulp was up over

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<sup>15</sup> UN Economic Commission for Europe, *Timber Committee Yearbook 1999*, ECE/TIM/INF/6 (New York and Geneva: UNECE 1999), pp. 4-5.

<sup>16</sup> UN, *Forest Products Annual Market Review, 1997-1998*, ECE/TIM/Bull/51/3 (Geneva: UN Publications ISSN), p. 1.

8 percent. Lumber imports declined almost 2 percent and wastepaper imports were stable.

Although total 1998 European trade data is not yet available, trade and industry sources have indicated that in 1998-99 increased quantities of forest products, especially pulp, certain papers, and hardwood plywood, have been entering Europe from Indonesia and Malaysia.<sup>17</sup> These sources generally attributed the increase in imports to the Asian financial crisis and the resulting decline in Asian demand as product that would normally have been sold in Asia (especially Japan) was instead sent to Europe. Industry contacts further reported that, in general, these products were competing on price and in many cases took market share from European, U.S., and Canadian product.<sup>18</sup> An official of Georgia-Pacific indicated that pulp pricing in Europe is under severe pressure as a result of increased imports of low-priced Indonesian pulp. He further indicated that primarily because of competition from Indonesian pulp Georgia-Pacific had reduced its pulp capacity in the United States in 1998 by closing pulp mills that normally produced pulp for the European market.<sup>19</sup> Officials of The Engineered Wood Association in Europe indicated to Commission staff that especially over the last year, imports of Indonesia hardwood plywood were increasing into Europe and affecting sales of U.S. softwood plywood sales.<sup>20</sup> An International Paper official reported a diversion of uncoated papers from Indonesia that would normally go to Asian markets to Europe in recent months, primarily as a result of the decline in Asian demand.<sup>21</sup> European trade data for 1999 are not yet available; however, table F-11 indicates that EU imports of paper and paper products from Indonesia increased from \$43 million in 1997 to \$239 million in 1998, or by 456 percent.

## *Marketing Practices and Forest Certification*

Marketing and distribution systems for forest products are generally similar throughout Europe,<sup>22</sup> but may differ somewhat by product and country.<sup>23</sup> Wood is harvested by large

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<sup>17</sup> Discussions with officials of The Engineered Wood Assn., London, Mar. 23, 1999; Swedish Forest Industries Assn., Stockholm, Mar. 25, 1999; the Swedish Wood Exporters' Assn., Bromma, Sweden, Mar. 26, 1999, International Paper Europe, Brussels, Mar. 29, 1999, Weyerhaeuser S.A., Brussels, Mar. 30, 1999, and Georgia-Pacific, Zurich, Apr. 1, 1999.

<sup>18</sup> Discussions with officials of The Engineered Wood Association, London, Mar. 23, 1999, Swedish Forest Industries Association, Stockholm, Mar. 25, 1999, The Swedish Wood Exporters' Association, Bromma, Sweden, Mar. 26, 1999, International Paper Europe, Brussels, Mar. 29, 1999, Weyerhaeuser S.A., Brussels, Mar. 30, 1999, and Georgia-Pacific, Zurich, Apr. 1, 1999.

<sup>19</sup> M. Anthony Paul, Director of Georgia-Pacific Pulp Sales Europe, Zurich, Apr. 1, 1999.

<sup>20</sup> Discussions with officials of The Engineered Wood Association, London, Mar. 23, 1999, and Brussels, Mar. 30, 1999.

<sup>21</sup> Robert Amen, president, International Paper Europe, Mar. 29, 1999.

<sup>22</sup> Russian forest product exports are primarily marketed through large exporting corporations like Rusexportles and Exportles.

<sup>23</sup> The following description of European forest product marketing and distribution systems is from discussions with officials of the American Hardwood Export Council and the

forest companies, individual forest owners, and independent contractors. Larger tracts, in general, but especially in the Nordic countries, are usually offered for bid before harvest. Smaller tracts, especially in Central Europe, are usually harvested by the forest owner or a contractor and stacked alongside forest roads for sale. Sales are then accomplished through written bids for described timber lots, verbal bidding (usually only for high-quality logs), open-market sales through contracts, and direct sales of auction leftovers.<sup>24</sup> Independent sawmills traditionally work through wholesale agencies and/or agents with direct customer contacts in their markets, mainly the European Union. Softwood lumber, hardwood lumber, and wood panel sales are relatively straightforward; a buyer (furniture manufacturer, builder, retailer, etc.) contacts an agent. The agent compiles an order or a combination of orders, then places the order with a domestic lumber wholesaler or with a wholesaler in a supplying country, like the United States or Canada. The wholesaler purchases the product from different mills (or the same mill) and ships the product to the agent. The agent then distributes the order to his buyers, and at times functions as both the importer and the exporter. In recent years, some larger importers have been dealing directly with U.S. mills and bypassing the wholesaler. Some European softwood lumber importers act as lumber distributors, especially to the many small window and door manufacturers in Germany, Italy, and Spain. Many of the larger European furniture and wood floor manufacturers that use hardwoods in their manufacturing operations buy direct from foreign mills with no agent involved; and some of these companies own foreign mills (including U.S. mills) to better serve their needs. Often pulp producers and their customers (papermakers) have developed a long-term relationship that reflects the pulp producers providing a certain type and quality of pulp. Consequently, although some pulp producers use sales agents, many sales are directly to the paper manufacturer.<sup>25</sup> Prices are typically quoted as a delivered price that includes cost, insurance, and freight (CIF) and shipments are often delivered monthly to the port of entry. Sales are often done on open accounts with payment due in 60, 90, or 120 days; however, at least one firm indicated that it has extended its payment schedule to 220 days and attributes the extension to the Asian crisis (resulting in greater pulp supplies and lower prices in the European market). Forest products are generally shipped to Europe via container ships and off-loaded in major ports such as Amsterdam, Antwerp, Liverpool, Hamburg,

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American Softwoods Assn., London, Mar. 23, 1999; European Magazine Publishers' Assn., Weyerhaeuser, S.A., Brussels, Mar. 30, 1999, and Georgia-Pacific, Zurich, Apr. 1, 1999.

<sup>24</sup> U.S. Department of State telegram No. 001831, prepared by U.S. Embassy, Bonn, Apr. 1999, and discussions with officials of the Swedish Wood Exporters' Assn., Bromma, Sweden, and Ulf Didrik of the Swedish Forestry Department (Skogsvarvstyrelsen), Stockholm, Mar. 26, 1999.

<sup>25</sup> An official of the European Magazine Publishers Assn. reported to staff that they were concerned about supplies of quality papers in Europe, and the manner in which these papers were marketed. He indicated that his organization had filed a complaint with the EU Minister of Competition about supply and price-fixing by the major European producers. He reported that only three or four companies could supply the quality and quantity of paper his members demanded. Julius Waller, Director, European Magazine Publishers Assn., Brussels, Mar. 29, 1999. The EU's antitrust authority announced in the Spring of 1999 that after a 4-year investigation of EU paper manufacturers, approximately 25 manufacturers were receiving letters that set out allegations of price-fixing and market sharing in the market for newsprint and magazine paper. *Wall Street Journal Europe*, Apr. 1, 1999.

Rotterdam, and Livorno. Shipments are usually transported to their final destinations by truck or rail.

The certification of forests as being managed for sustainable use has been and continues to be an important issue in Europe. The industry is concerned about transparency and possible trade restricting effects, and forest owners are concerned about being forced to use a particular certification system with little input into its design or operation.<sup>26</sup> Demand for certified forest products is generally from buyers' groups, who wish to offer certified forest products to their customers. However, trade sources report that buyers are not offering premiums for certified products, nor are they charging higher prices to their customers, but are selling certified products to increase or protect market share and establish a positive corporate image.<sup>27</sup> The first shipments of certified lumber in Europe were in 1997; although shipments are still relatively small they have been increasing, especially to markets in the United Kingdom. In 1998-99, two third-party certification schemes were being used in certain European countries. They were the Forest Stewardship Council (FSC) system and the International Organization for Standardization (ISO) system. FSC certified forestland reached 10 million hectares (ha) by June 30, 1998.<sup>28</sup> As of June 1998, the majority of world FSC certified forestland was in Sweden (41 percent) and Poland (17 percent).<sup>29</sup> The UN has reported that the ISO system has only been incorporated by a few companies in Finland and Sweden. However, a general European framework for forest certification, led by the Finns, is also being developed.<sup>30</sup> The Pan-European Forest Certification (PEFC) system is designed to establish internationally credible forest certification for initiatives under way in different countries and for their mutual recognition. PEFC defines the basic requirements of forest certification and sets up the institutional arrangements at Pan-European and national/subnational levels. During the fall of 1998 the following European countries participated in discussions regarding this system: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Latvia, Luxembourg, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Forestland in these countries under nonindustrial private ownership cover about 100 million ha and the total annual cutting is about 270 million m<sup>3</sup>. As of June 1999, 16 European countries have declared participation in PEFC and 8 other countries (including the United States) have declared an interest.<sup>31</sup> Implementation of the PEFC system may begin in some countries in 1999.

## *Demand Forecasts*

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<sup>26</sup> Discussions with officials of The Engineered Wood Assn., American Hardwood Export Council, the Timber Trade Federation, and American Softwoods Assn., London, Mar. 23, 1999; and the Swedish Wood Exporters' Assn., Bromma, Sweden, Mar. 26, 1999; and the UN Timber Section, Geneva, Mar. 31, 1999.

<sup>27</sup> Discussions with officials of The Engineered Wood Assn., American Hardwood Export Council, the Timber Trade Federation, and American Softwoods Assn., London, Mar. 23, 1999; and the Swedish Wood Exporters' Assn., Bromma, Sweden, Mar. 26, 1999; and the UN Timber Section, Geneva, Mar. 31, 1999.

<sup>28</sup> UNECE, *Timber Committee Yearbook 1999*, p. 6.

<sup>29</sup> UN, *Forest Products Annual Market Review 1997-98*, vol. LI (1998), No. 3, pp. 17-22.

<sup>30</sup> The following description of this certification system is from various press releases of the MTK Forestry Group, Helsinki, Sept. 1998 - Jan. 1999.

<sup>31</sup> USDA, FAS, AGR No. GM9042, June 23, 1999, p. 3.

Long-term demand forecasts for all forest products in Europe<sup>32</sup> indicate continuing growth over the next 10 years. Demand is expected to increase by about 2 percent per year over the next decade.<sup>33</sup> Demand for printing and writing paper is expected to show the strongest growth at an average annual rate of 2.4 percent. Newsprint is expected to grow at 1.9 percent and lumber is forecast to grow at an average annual rate of 1.1 percent.

Members of the EU and the Russian Federation (Russia) have the most important European forest product economies. Although Russian production of forest products has declined significantly since the late 1980s (present levels are about 25 percent of peak levels), it is still a significant producer of forest products.<sup>34</sup>

## European Union

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Major forest product economies in the EU include those in Sweden, Finland, Germany, and France. The United Kingdom and Italy are significant producers and consumers of paper and paperboard, but are not large producers of wood. It is estimated that EU forest product industries employ about 7 million people and generate annual turnover of 300 billion ECUs (US \$272 billion).<sup>35</sup> In 1997, the member countries of the EU imported forest products valued at \$20.8 billion, up from \$19.4 billion in 1994 (table G-7). Important suppliers in 1997 included the United States, Canada, Norway, Switzerland, and Poland; and major products included wood and wood products (52 percent) and paper and paper products (29 percent). EU forest products exports in 1997 were valued at \$19.4 billion, up from \$16.1 billion in 1994 (table G-7). Major markets included the United States, Switzerland, Norway, Poland and Russia; and major products exported included paper and paper products (74 percent) and wood and wood products (23 percent) (table G-7). Trade data for 1998 are not yet available, but trade levels are estimated to be similar to 1997. Many large European forest product companies (especially Swedish and Finnish companies) own manufacturing facilities throughout Europe. In 1998, Swedish forest industry companies owned 21 percent of the 83 million metric tons of paper production capacity in the EU (13 percent in Sweden and 8 percent from Swedish-owned companies in other EU countries).<sup>36</sup>

EU policy issues relating to forestry matters are usually addressed within the broader frameworks of agricultural or environmental policy. In 1992, European forests became part of the Common Agricultural Policy (CAP) and as such, were limited to the financial

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<sup>32</sup> Does not include European countries that were part of the former Soviet Union.

<sup>33</sup> Finnish Forest Industry Assn., "The future," p. 1, found at Internet address <http://www.forestindustries.fi/en/markkinat/ftfuture.htm/>, retrieved on Jan. 21, 1999.

<sup>34</sup> Discussions with officials of UN Economic Commission for Europe, Timber Committee, Geneva, Mar. 31, 1999.

<sup>35</sup> Finnish Forest Industry Assn., "The Finnish Forestry Sector and Forest Products in the EU," p. 2, found at Internet address <http://www.forestindustries.fi/en/markkinat/tfinnis2.htm/>, retrieved on Jan. 21, 1999.

<sup>36</sup> Swedish Forestry Industry Association, Swedish Forest Industry - Facts and Figures, "Internationalisation", p. 1, found at Internet address <http://www.forestryindustries.se/eng/fakta97/intern.htm/>, retrieved on Jan. 20, 1999.

intervention of the European Agricultural Guidance and Guarantee Fund (EAGGF), instead of individual country programs. An important regulation affecting the forest products industry is EU regulation 2080/92. This essentially promotes the conversion of agricultural land into forests to reduce the output of surplus agricultural products.<sup>37</sup> The regulation provides for financial assistance for creation of new stands and their maintenance for the first 5 years; for the upgrading<sup>38</sup> of existing forests that are part of agricultural enterprises; and support for farmers' incomes for up to 20 years. The EU through the EAGGF contributes 50 percent of the actual support costs for these projects; and 75 percent for areas that are lagging in development (Objective One regions: Greece, Spain, Italy, and Ireland). The balance must be covered by national funds; no participation in meeting support costs is required from the beneficiaries. During the period 1993-97, the EU budget allocated 1.325 billion euros (US \$1.43 billion) for this purpose,<sup>39</sup> as of March 1999, the total aid granted to forestry under the CAP was 1.2 billion euros (US \$1.3 billion).<sup>40</sup> This EU program is expected to generate some 700,000 ha of forests and contribute to the rehabilitation of more than 200,000 ha. Actions of forest conservation by member states are eligible to benefit from co-financing by the EU under a conservation program called "Life." The EU budget for this program during the period 1996-99 was set at 450 million euros (US \$486 million) and various member states have participated. In 1995, Finland, Germany, Italy, and Denmark benefitted from EU cofinancing for conservation projects of 50 percent. EU regulation 867/90 supports the purchase of machinery for harvesting and initial processing of forest products. Although aggregate EU data for this program are not available, it is known that the EU, member states, and individual national regions co-finance up to 55 percent of the purchasing costs of this kind of machinery under this program.<sup>41</sup> In addition to EU financial support, in some cases country regions have developed their own regulations and programs to support forest activities. Total figures for these are not available, but sources in the forest sector indicate that the magnitude of such regional programs is much lower than that provided by EU regulation 2080/92.<sup>42</sup>

Forestry issues in the context of rural development have also been a topic of discussion during the recent EU Agenda 2000 negotiations (March 1999).<sup>43</sup>

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<sup>37</sup> The information relating to EU programs described in the following two paragraphs is from discussions with officials of the U.S. Mission To the European Union, March 29, 1999, and U.S. Department of State telegram No. 002288, prepared by U.S. Embassy, Rome, Apr., 1999, and telegram No. 002380, prepared by U.S. Embassy, Brussels, Apr., 1999.

<sup>38</sup> Upgrading of forests includes the opening of forest roads, fire protection, and water supply works.

<sup>39</sup> The maximum payment for new stands range from about \$2,600 per ha to \$5,100 per ha depending on the species; while the maximum contribution to forest maintenance in the first years range from \$191 per ha to \$637 per ha. The maximum compensation to farmers for gains lost while trees reached maturity is about \$764 per ha for 20 years, U.S. Department of State telegram No. 002288, Rome, Apr. 1999.

<sup>40</sup> U.S. Department of State telegram No. 002380, Brussels, Apr. 1999.

<sup>41</sup> In the Lombardy region of Italy funds spent to support this program totaled approximately \$2.5 million during the period 1997-99. U.S. Department of State, Rome, telegram No. 002288.

<sup>42</sup> Discussion with officials in the U.S. Mission, Brussels, Mar. 29, 1999 and U.S. Department of State telegram No. 002288, Rome.

<sup>43</sup> Discussions with staff of the U.S. Mission to the European Union, Brussels, Mar. 29, 1999.

The EU Forestry Strategy (Council resolution 1999/C 56/01, Dec.15, 1998) contributes to EU implementation of international commitments on the management, conservation, and sustainable development of forests.<sup>44</sup> The Strategy emphasizes forestry's contribution to overall economic and social development in rural areas, and the protection of the environment in relation to biodiversity and climate change. The guiding aims of the EU Forestry Strategy are as follows:<sup>45</sup>

- The avoidance of EU support based on agricultural or rural policies, or fiscal incentives, as those are viewed as distorting markets for wood and other forest products;
- The improvement, through forest certification, of the economic competitiveness of European forest products and forest-related industries, as well as the improvement of conditions for investment;
- The promotion of sustainable forest management and the recognition of European forest management;
- The principles of subsidiarity should be applied (i.e., forest policies should be drafted at regional or national levels whenever possible, before shifting to EU policy management);
- The Forestry Strategy should provide a political framework that supports the forest sector; as a dynamic and competitive partner in global trade; actions should be undertaken to secure a sufficient raw material supply.

The Permanent Forestry Committee functions as the main EU instrument of coordination of forestry policy between member states and the European Commission. The Committee is responsible for general forest management, as well as regulations relating to forest protection and development.<sup>46</sup>

## Sweden

### *Structure*

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Sweden has significant forest resources, with about 60 percent of its total land area covered by forests. ~~Virtually all forests in Sweden are regrowth and a substantial portion~~ is professionally managed. The Swedish forest industry is highly integrated. The largest companies own both forests and production facilities in Sweden and have large forestry industry holdings in other countries, especially in Europe. The Swedish forests are owned by private individuals (50 percent), companies (37 percent), and communities (8 percent);

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<sup>44</sup> Ibid.

<sup>45</sup> U.S. Department of State telegram No. 002380, Brussels, Apr. 1999.

<sup>46</sup> Ibid.

the remainder (5 percent) are state forests.<sup>47</sup> Private forest owners cooperate through associations, which either process timber themselves or sell timber to processing companies. The associations own sawmills covering about 10 percent of total capacity, and three pulp mills with a combined production accounting for about 10 percent of annual pulp production.<sup>48</sup> In 1997, Sweden had 50 paper mills (the 9 largest accounted for 53 percent of capacity), 46 pulp mills (the 3 largest mills accounted for 34 percent of capacity), 2,400 sawmills (the largest 300 account for 98 percent of production<sup>49</sup>), and 13 paperboard mills.<sup>50</sup> Mill numbers have been relatively stable during the 1990's, although average mill size has increased by about 13 percent.<sup>51</sup> Annual employment in the Swedish forest products industry and silviculture is estimated at 100,000 for 1997 and has also been relatively stable in recent years.<sup>52</sup>

In June 1998, a merger between Sweden's largest forest products company, Stora (annual sales of about US \$5.85 billion), and Finland's second-largest company, Enso (annual sales US \$5.62 billion), was announced. According to USDA, the new company, Stora Enso, will account for about 4 percent of world production of paper and paperboard. The Finnish Government owned 47 percent of Enso and retained its shares in the new company. In the fall of 1998, Scheweighofer, Austria's largest sawmilling company, merged with Enso Timber (the sawmilling part of Enso); and the resulting Enso Timber is now the world's second-largest lumber producer (behind Weyerhaeuser).<sup>53</sup> The other major Swedish forest product companies include Svenska Cellulosa (SCA), MoDo, and AssiDoman. The largest companies tend to concentrate on product areas within chosen sectors. For example, Stora Enso's core product areas are publication papers, fine papers, and packaging board. SCA's principal sectors include hygiene products, packaging paper, and graphic paper. MoDo's areas of strength include fine paper, wood-containing printing paper, and paperboard. AssiDoman concentrates on the production of pulp and packaging paper and paperboard. During 1994-98, Swedish forest products companies made substantial investments in plant modernization and expansion in order to increase capacity and efficiencies. Capital investments in the pulp, paper, and paperboard industry amounted to SKR 5 billion in 1994 (US \$648 million); SKR 11.5 billion (US \$1.6 billion) in 1995; and SKR 12.3 billion (US \$1.8 billion) in 1996.<sup>54</sup> In 1997, a total of SKR 13.5 billion (US \$1.8 billion) was invested in the forest products

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<sup>47</sup> Swedish Univ. of Agriculture Science, SkogsSverige, "Sweden's Forests", p. 1, found at Internet address <http://www-forest.slu.se/eng/indfakt/default.htm/>, retrieved on Feb. 10, 1999.

<sup>48</sup> USDA, FAS, *Sweden Annual Forest Products Report*, Stockholm, AGR No. SW8010, July 1998, p. 21.

<sup>49</sup> Discussion with officials of The Swedish Wood Exporters' Assn., Bromma, Sweden, Mar. 26, 1999.

<sup>50</sup> Swedish Forest Industry Assn., *Swedish Forest Industry -1997*, "Pulp, paper, and sawn timber industries", p. 1-2, found at Internet address <http://www.forestindustries.se/eng/fakta97/ekbetyd.htm/>, retrieved on Feb. 10, 1999.

<sup>51</sup> Payne and Payne, eds. *European Analysis and Forecast*, p. 79.

<sup>52</sup> Swedish Forest Industries Assn., *Swedish Forest Industry - 1997*, "Economic Importance", p. 2, found at Internet address <http://www.forestindustries.se/eng/fakta97/ekbetyd.htm.>, retrieved on Feb. 10, 1999.

<sup>53</sup> U.S. Department of State telegram No. 01053, prepared by U.S. Embassy, Vienna, Feb. 1999.

<sup>54</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 84.

industry, of which SKR 9.5 billion (US \$1.2 billion) was in the pulp and paper industry.<sup>55</sup> Examples of capital investments include plant environmental improvements and efficiency improvements resulting in increased capacity.<sup>56</sup> Investments for 1998 in the forest industry are estimated by *Statistics Sweden* at over SKR 9 billion (US \$1.1 billion) for pulp and paper plants, SKR 3 billion (US \$377 million) for sawmills and other wood producing industries, and about SKR 1 billion (US \$126 million) for paper converting mills.<sup>57</sup>

Selective acquisitions of and mergers with, companies with complementary domestic or foreign operations in terms of product range or geographical presence has been a popular growth strategy for many of the largest Swedish forest product companies.<sup>58</sup> As a result of this strategy, in early 1998 Stora operated 13 paper mills in Sweden, Belgium, Germany, France, and Denmark; 5 paperboard mills in Sweden, Germany, and the United Kingdom; and 4 market pulp mills in Sweden, Canada, and Portugal.<sup>59</sup> Stora also finalized a majority interest in a Chinese paper producer and agreed to a joint pulp mill venture in Brazil. In 1998, SCA announced that it was acquiring the tissue operations of Svetogorsk in Russia and a half-share in the Brazilian group, Melhoramentos Papeis. In 1997, AssiDoman gained control of the largest Czech pulp and paper maker, Sepap, and also acquired the Slovakian packaging materials producer JCP Sturovo. In 1997, the Swedish forestry industry was operating 174 forest product plants in European countries, outside Sweden.<sup>60</sup> During 1994-97, the Bank of Sweden reported direct foreign investments made by Swedish forest product companies annually averaged about SKR 3 billion (US \$377 million).<sup>61</sup>

The Swedish Government decided in the early 1990s that financial assistance would not be made available to the commercial side of the Swedish forest industry.<sup>62</sup> During the last 5 years owners of selected valuable broad-leaved deciduous forests have received silviculture assistance amounting to about SEK 18 million per year.<sup>63</sup> This assistance stems from the Swedish Forestry Act of January 1, 1995, which stipulates that after harvest, a new selected broad leafed forest should be established on the site.<sup>64</sup> The

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<sup>55</sup> Swedish Forest Industries Assn, "Swedish Forest Industry- 1997-Developments," p. 1, found at Internet address <http://www.forestindustries.se/eng/fakta97/utv.htm>, retrieved on Feb. 10, 1999.

<sup>56</sup> Ibid.

<sup>57</sup> Swedish Forest Industries Assn., *The Swedish Forest Industry* (Stockholm: Media Express Forlag och Information, 1998), p. 14.

<sup>58</sup> Discussion with officials of the Swedish Forest Industries Assn., Stockholm, Mar. 25, 1999.

<sup>59</sup> The following discussion of the Swedish forestry company structure was adapted from Payne and Payne, eds., *European Analysis and Forecast*, pp. 79-83.

<sup>60</sup> Swedish Forest Industries Assn, "Swedish Forest Industry - 1997", found at Internet address <http://www-forest.slu.se/eng/indfakt/default.htm>, retrieved on Feb. 10, 1999.

<sup>61</sup> Swedish Forest Industries Ass, "Swedish Forest Industry -1997-Internationalisation," found at Internet address <http://www.forestindustries.se/eng/fakta97/interm.htm>, retrieved on Feb. 10, 1999.

<sup>62</sup> U.S. Department of State, "USITC Investigation on the Conditions of Competition," telegram No. 002251, prepared by U.S. Embassy, Stockholm, Apr. 1999.

<sup>63</sup> U.S. Department of State, "USITC Investigation on the Conditions of Competition," telegram No. 002251, prepared by U.S. Embassy, Stockholm, Apr. 1999.

<sup>64</sup> Ibid.

Foreign Agricultural Service (FAS) of the USDA reports that the Swedish Government has established a Nature Conservation Agreement with forest owners, to protect and develop nature values in certain areas. The agreement is voluntary and usually covers a period of 30 to 50 years. The landowner is compensated by the Government. During 1994-97, 299 such agreements were established for which the landowners were compensated US \$1.6 million.<sup>65</sup> In addition, under the same agreement 690 protected forest habitats were established for which forest owners were compensated US \$7.6 million during 1994-97.<sup>66</sup> The USDA also reports that when Sweden joined the EU in 1995, it adopted Council Regulation (EEC) No. 867/90 on improving the processing and marketing conditions for forestry products. Enterprises in rural areas may qualify for assistance if they meet the criteria. During 1995-97, only two applications were received. The assistance is aimed at increasing earnings in the forestry sector for combined farm and forestry enterprises.<sup>67</sup>

### ***Production, Products, and Capacity***

Sweden is a significant European producer of forest products. Annual growth is about 100 million m<sup>3</sup> while annual fellings are about 70 million m<sup>3</sup>.<sup>68</sup> There is a potential for annual fellings to increase by at least 25 million m<sup>3</sup> per year. About 40 million m<sup>3</sup> of annual fellings are used in the Swedish pulp and paper industry. The sawmill and lumber industry consume some 17 million m<sup>3</sup>, and the remaining 13 million m<sup>3</sup> are consumed as fuelwood, etc.<sup>69</sup> Sweden's industrial wood production amounted to about 56 million m<sup>3</sup> in 1998 and was equivalent to about 4 percent of world production (table G-1). Sweden is also an important world producer of pulp, and paper and paperboard, and in 1998 accounted for about 6 percent of the total world production of pulp and about 3 percent of paper and paperboard (table G-1). Swedish pulp, paper, and paperboard capacity have increased steadily. During 1994-98, pulp capacity increased from 10.4 million metric tons to 11.5 million metric tons, or by 10 percent; while paper and paperboard capacity rose from 9.6 million metric tons to 10.7 million metric tons, or by 12 percent.<sup>70</sup> Pulp production capacity is not expected to increase in the near future.<sup>71</sup> Capacity utilization for pulp production has declined from 97 percent in 1994 to 92 percent in 1998, and for paper and paperboard from 97 percent in 1994 to 92 percent in 1998 (table G-8).<sup>72</sup> Swedish wastepaper production increased by 39 percent over 1994-98, from 989,000 metric tons to 1.4 million metric tons (table G-9). More than 60 percent of all paper consumed in Sweden is collected; about 15 percent is used for fuel and the remainder is used as raw material in the production of paper.<sup>73</sup>

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<sup>65</sup> USDA, FAS, *Sweden Annual Forest Products Report*, Stockholm, 1998, p. 7.

<sup>66</sup> Ibid.

<sup>67</sup> USDA, FAS, *Sweden Annual Forest Products Report*, Stockholm, 1998, p. 7.

<sup>68</sup> Discussion with officials of The Swedish Wood Exporters' Assn., Bromma, Sweden, Mar. 26, 1999.

<sup>69</sup> Found at Internet address

<http://www.paperonline.org/paperchain/forestry/sweden/html>, retrieved on Jan. 20, 1999.

<sup>70</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 84.

<sup>71</sup> USDA, FAS, *Sweden Annual Forest Products Report*, Stockholm, 1998, p. 3.

<sup>72</sup> *Pulp & Paper International Annual Review, 1999*, p. 24.

<sup>73</sup> Ibid.

## *Markets and Marketing Practices*

### **Consumption**

In recent years, Swedish forest product consumption increased in all product areas, generally reflecting strong domestic (and export) demand for paper and paperboard, and lumber, which in turn resulted in strong demand for pulp and industrial wood.

#### *Wood and wood products*

During 1994-97 domestic consumption of industrial wood in Sweden increased about 8 percent from 58.7 million m<sup>3</sup> to 63.3 million m<sup>3</sup> as the demand for pulp, paper and paperboard, and wood and wood products increased (table G-10). Annual lumber consumption increased irregularly over the same period, from 3.6 million m<sup>3</sup> to 4.9 million m<sup>3</sup>, while wood panel consumption was relatively stable, ranging from about 1.0 million m<sup>3</sup> in 1994 to 1.2 million m<sup>3</sup> in 1995 (table G-10).

#### *Pulp, paper, and paperboard*

Swedish per capita consumption of paper and paperboard in 1998 was one of the highest in the world at 267 kg (the EU average is 190 kg).<sup>74</sup> During 1994-98 Swedish consumption of pulp increased from about 7.5 million metric tons to 8.0 million metric tons or by about 7 percent (table G-10). Over the same period total paper and paperboard consumption increased from 1.6 million metric tons to 2.4 million metric tons or by 44 percent (table G-10). During 1994-98, wastepaper consumption increased by 25 percent, from 1.4 million metric tons to 1.8 million metric tons, reflecting continuing Swedish efficiencies at wastepaper collection and utilization.

### **Imports**

Swedish imports of forest products increased irregularly during 1994-97 from \$1.7 billion to \$2.0 billion (table G-11). Paper and paper products accounted for about 47 percent of the 1997 total import value, wood accounted for 45 percent, and pulp and wastepaper made up the remainder. Swedish forest product imports were equivalent to about 3 percent of total Swedish imports in 1997.<sup>75</sup> Major forest product suppliers include Finland, Germany, and Norway (table G-11). Imports for 1998 are estimated to be similar to levels registered in 1997.

#### *Wood and wood products*

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<sup>74</sup> Ibid, p. 12.

<sup>75</sup> USDA, FAS, *Sweden Annual Forest Products Report*, Stockholm, 1998, p. 1.

Swedish imports of wood reached \$875 million in 1997 (up from \$749 million in 1994), and Latvia, Estonia, and Finland were the major suppliers (table G-11). Swedish forest product imports consist primarily of industrial wood for use as raw material in Swedish pulp, paper, and lumber manufacturing operations. In recent years, Latvia, Estonia, Lithuania, and Russia together have accounted for over two-thirds of Swedish wood imports.<sup>76</sup> Other important suppliers include Norway and Germany. During 1994-97, total Swedish imports of industrial wood increased by 15 percent from 7.4 million m<sup>3</sup> to 8.6 million m<sup>3</sup>, lumber imports declined by 10 percent to 224,000 m<sup>3</sup>, and imports of wood panels increased by 36 percent to 603,000 m<sup>3</sup> (table G-12). Softwood products from North America, Japan, and China are not allowed into Sweden due to restrictions relating to the presence of the pinewood nematode (*Bursaphelenchus xylophilus*).<sup>77</sup>

### *Pulp, paper, and paperboard*

Swedish imports of pulp, paper and paperboard, and other manufactured forest products are generally small, reflecting the significant Swedish production of these items. In 1997, pulp and wastepaper imports amounted to \$168 million and paper and paper product imports were valued at \$910 million (table G-11). Finland, Norway, and Germany were the most important suppliers. During 1994-98, pulp imports increased by 8 percent to 249,000 metric tons, equivalent to about 3 percent of Swedish consumption (tables G-10 and G-12). Paper and paperboard imports also increased over the period, to 522,000 metric tons in 1998 from 447,000 metric tons in 1994 (table G-12). However, Sweden's demand for recycled fiber is high and Sweden is a major importer of wastepaper, especially from Germany.<sup>78</sup> In 1998 imports of wastepaper amounted to 549,000 metric tons, a decline of about 6 percent from the 1994 level (table G-12).

## **Exports**

Sweden is a major exporter of forest products. The total value of forestry exports in 1997 amounted to \$11.8 billion (table G-11), 15 percent of total Swedish exports.<sup>79</sup> Exports in 1998 are estimated to have been at a similar level. The most important Swedish export items are pulp, and paper and paperboard. The EU is the most important market for Sweden's forestry products annually receiving more than 80 percent of total Swedish exports. Germany is the major EU market for Swedish forest products. Major competitors of Sweden in the EU market include Finland, the United States, Canada, and Germany.

### *Wood and wood products*

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<sup>76</sup> Ibid., p. 9.

<sup>77</sup> Ibid., p. 1.

<sup>78</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 72.

<sup>79</sup> USDA, FAS, *Sweden Annual Forest Products Report*, Stockholm, 1998, p. 1.

Sweden's exports of wood and wood products are not as significant as its pulp and paper exports, however exports have been rising. Exports were valued at \$3.4 billion in 1997 (table G-11). During 1994-97, exports of industrial wood increased from 1.3 million m<sup>3</sup> to 1.7 million m<sup>3</sup> (29 percent increase) and were equivalent to about 3 percent of Swedish production (table G-13). Exports of lumber increased from 10.5 million m<sup>3</sup> to 10.9 million m<sup>3</sup> (4.3 percent increase), and were equivalent to about 70 percent of 1997 production (table G-13). Since domestic consumption of lumber only accounts for about 30 percent of production, export markets are extremely important. Swedish sawmills produce significant amounts of customer-oriented and further-processed lumber for export.<sup>80</sup> Over 1994-97, wood panel exports rose from 305,000 m<sup>3</sup> to 385,000 m<sup>3</sup> (26 percent increase), and were equivalent to about 41 percent of domestic production (tables G-9 and G-13). The major market is the EU. However, Sweden has developed a market for lumber and processed wood products in Japan. Competitors in this market include Canada, the United States, Russia, Finland, and New Zealand. USDA reports that Sodra Timber Corporation, the largest Swedish wood product manufacturing company with strong export interests in Japan, announced in May 1998 a major plant investment plan (an expansion of about 42 percent) dedicated to the Japanese market.<sup>81</sup> Sodra plans to expand production of products destined for Japan such as finger-jointed studs, prefabricated housing stock, and dimension lumber. USDA reports that product from the new plant is likely to begin arriving in Japan in the fall of 1999. Sodra is expected to be able to meet orders as small as one container and is expecting to sell at least 15 percent of its production to Japan.

### *Pulp, paper, and paperboard*

Swedish exports of pulp are substantial and amounted to 2.8 million metric tons, or about 26 percent of production, in 1998 (tables G-9 and G-13). Pulp and wastepaper exports were valued at \$1.5 billion in 1997 (table G-11). About 80 percent of Swedish pulp exports in 1997 were destined for EU markets, and Germany accounted for about one-third of this amount.<sup>82</sup> Exports of paper and paperboard are also significant and amounted to 8.0 million metric tons, or about 80 percent of production, in 1998 (tables G-9 and G-13). About 70 percent of paper and paperboard exports are shipped to EU member states.<sup>83</sup> Wastepaper exports, increasing about 2 percent over 1994-98,

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<sup>80</sup> Ibid., p. 21.

<sup>81</sup> USDA, FAS, telegram No. JA8039, "Forest Products," prepared by U.S. Embassy, Tokyo, June 1998, p. 3.

<sup>82</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 72.

<sup>83</sup> Ibid., p. 76.

are relatively small (169,000 metric tons in 1998). Paper and paper products exports were valued at \$7.0 billion in 1997 (table G-11).

## Certification<sup>84</sup>

Swedish forest companies use the Forest Stewardship Council (FSC) certification system. However, Swedish private forest owners and the Swedish Independent Sawmill Association are examining an acceptable certification system based on the International Organization for Standardization (ISO). In addition, a joint Nordic Forestry Certification project was begun in 1996 between Sweden, Norway, and Finland with the aim of achieving the same market status for certified forestry in all three countries. Discussions are ongoing.

AssiDoman reported that by the summer of 1998 its total certified forest area accounted for almost one-third of the 10 million ha endorsed by the Forest Stewardship Council.<sup>85</sup> AssiDoman has also begun to produce FSC-labeled pulp in a plant in northern Sweden and its shipments (to the United Kingdom and Germany) are about 6 percent of AssiDoman's total market pulp deliveries. In addition, SCA recently announced plans to have its 2 million ha certified by the FSC.

## Finland

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### *Structure*

Finland is in the boreal coniferous zone (taiga), in which coniferous trees naturally predominate. About 86 percent (26 million ha) of Finland's total land area is covered by forests, and of this amount, 20 million ha are considered to be commercial forest area.<sup>86</sup> Finnish timber reserves have increased since the early 1970s by over one-quarter.<sup>87</sup> Private forest owners own the major portion (62 percent) of Finnish forests, followed by the Finnish Government (24 percent), companies (9 percent), and local governments (5 percent).<sup>88</sup> Virtually all of the forest is regrowth; and reforestation after logging is compulsory, since Finnish laws require that forests may not be depleted. The annual timber growth is estimated at 77 million m<sup>3</sup> and annual fellings are estimated at 55 million m<sup>3</sup>.<sup>89</sup> The largest companies own both forest and production facilities in Finland, and

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<sup>84</sup> The following discussion of Swedish forest certification was adapted from USDA, FAS, *Sweden Annual Forest Products Report*, Stockholm, 1998, p. 21.

<sup>85</sup> The following discussion on the Forest Stewardship Council's certification system is from "World Watch - FSC Certification Gains Ground," *Pima's Papermaker*, vol. 80, Aug. 1998, p. 8.

<sup>86</sup> USDA, FAS, *Finland Annual Forest Products Report*, Helsinki, AGR No. FI8003, Aug. 8, 1998, p. 4.

<sup>87</sup> Finnish Forest Industries Federation, *Finland's Forest Reserves*, p. 2, Found at Internet address <http://www.forestindustries.fi/en/forest/forest.htm>, retrieved on Jan. 20, 1999.

<sup>88</sup> USDA, FAS, *Finland Annual Forest Products Report*, Helsinki, 1998, p. 7.

<sup>89</sup> *Ibid.*, p. 3.

have large forestry industry holdings in other countries. The trend has been for Finnish companies to increase in size through mergers and acquisitions and thus maintain competitiveness, increase economies of scale, and lower unit costs. In 1997, the four largest Finnish companies together accounted for over 95 percent of sales in the sector, and about 34 percent of Finnish forest product capacity was located abroad.<sup>90</sup> Finnish forest product companies owned 22 paper and paperboard mills in Western Europe, 3 in North America, 1 in South America, and 1 in Asia.<sup>91</sup> The three largest Finnish forest groups are Stora-Enso (merged with Swedish Stora in 1998),<sup>92</sup> UPM-Kymmene, and Metsaliitto/Myllykoski.<sup>93</sup> In July of 1998, it was announced that the Finnish forestry group Metsa-Serla and Sodra of Sweden were selected to build a \$960 million wood pulp mill in Latvia.<sup>94</sup> The new plant is expected to be one of the largest in Europe with an annual capacity of 600,000 metric tons; production is expected to begin in late 2001.<sup>95</sup>

During 1994-98, the number of pulp, paper, and paperboard mills have remained relatively constant with pulp mills increasing from 43 to 45 and paper and paperboard mills declining from 44 to 43 (table G-14).<sup>96</sup> However, over the same period substantial capital investments were made to increase plant efficiencies; and Finnish pulp production capacity grew over 17 percent, while paper and paperboard production capacity grew 18 percent. There were 58 sawmills operating in 1998 with capacities ranging from 12,000 m<sup>3</sup> to 600,000 m<sup>3</sup>.<sup>97</sup> Capital investment in the pulp, and paper and paperboard industry amounted to over FIM 26 billion during 1994-97, and annual investments were FIM 4.4 billion (US \$842 million) in 1994, FIM 7.1 billion (US \$1.6 billion) in 1995, FIM 9.4 billion (US \$2.0 billion) in 1996, and FIM 5.1 billion (US \$982 million) in 1997.<sup>98</sup> Although Finnish production has increased in recent years, increased productivity and increasing competitiveness has allowed employment to be relatively stable over 1994-98. Total employment is estimated at 55,000,<sup>99</sup> and pulp and paper sector employment amounted to 37,000 in 1998 (table G-14).

The Ministry of Agriculture and Forestry holds the statutory responsibility for the overall direction of forest policy. The legislation on forestry and forest products was revised in 1997. The purpose of the Forest Act of 1997 is to promote the management and use of forests in a manner that is economically, ecologically and socially sustainable, ensuring continuity of good yields at the same time preserving the biodiversity of the

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<sup>90</sup> Finnish Forestry Industry Assn., "Structure of the sector," found at Internet address <http://www.forestindustries.fi/en/markkinat/softhese.htm>, retrieved on Jan. 21, 1999.

<sup>91</sup> Finnish Forest Industry Assn., "Internationalism," p. 1, found at Internet address <http://www.forestindustries.fi/en/markkinat/internat.htm>, retrieved on Jan. 21, 1999.

<sup>92</sup> See previous country writeup on Sweden for additional information.

<sup>93</sup> Finnish Forest Industry Assn., "Structure of the Sector," p. 1, found at Internet address <http://www.forestindustries.fi/en/markkinat/softhese.htm>, retrieved on Jan. 21, 1999.

<sup>94</sup> USDA, FAS, "Swedish-Finnish companies build new pulp mill in Latvia," AGR No. SW8014, July 29, 1998, p. 2.

<sup>95</sup> Ibid.

<sup>96</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 68.

<sup>97</sup> Finnish Forest Industry Assn., "Mills," pp. 1-2, found at Internet address <http://www.forestindustries.fi/en/member/sawmills.htm>, retrieved on Feb. 10, 1999.

<sup>98</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 68.

<sup>99</sup> Finnish Forest Industry Assn., "Employment," p. 1, found at Internet address <http://www.forestindustries.fi/en/markkinat/employe.htm>, retrieved on Feb. 10, 1999.

environment.<sup>100</sup> The Act on Financing of Sustainable Forestry of 1997 provides for funding to assist measures that the Forest Act promotes.<sup>101</sup>

The Finnish Government provides funds for silviculture and forest improvement works. It also matches EU funds under certain EU programs (i.e., the LIFE conservation program). In 1997, funds for these projects totaled FIM 286 million (US \$57 million).<sup>102</sup> In a recently published long-term plan, Government payments to private forest owners under these various programs were estimated at FIM 290 million in 1999 and FIM 350 million in 2000.<sup>103</sup> In addition, the Government provides about FIM 200 million (US \$40 million) annually to promotional and supervisory domestic forestry organizations, which is projected to increase to about FIM 250 million in year 2000.<sup>104</sup> USDA also reports that when Finland joined the EU in 1995, it adopted Council Regulation (EEC) No. 867/790 on improving the processing and marketing conditions for forestry products. Finland was eligible for subsidizing its most northern enterprises, and several forest owners applied for the available assistance.<sup>105</sup> In general, Finnish forestry policy is closely linked to overall Finnish economic policy, since the forests are the main Finnish natural resource (one-third of Finland's total export revenues result from exports of forest products) and development of the forestry sector forms the basis for the development of the economy as a whole.<sup>106</sup>

## ***Production, Products, and Capacity***

Finland is a major European producer of forest products. Annual growth is about 77 million m<sup>3</sup> and annual fellings average about 55 million m<sup>3</sup>.<sup>107</sup> Fellings of industrial wood amounted to 54 million m<sup>3</sup> in 1998, which was the third-largest in Europe, behind Russia and Sweden (table G-1). Finland is a major producer of pine and spruce wood (exporting mainly to the EU), but its production centers on pulp, and paper and paperboard (table G-15). The country is known as one of the world's most technically advanced producers of quality papers.

## **Wood and Wood Products**

Over 1994-97, Finnish production of industrial wood increased irregularly from 44.6 million m<sup>3</sup> to 47.2 million m<sup>3</sup>, or by 6 percent (table G-15). Lumber production increased by 10 percent over the same period, rising from 9.7 million m<sup>3</sup> to 10.7 million m<sup>3</sup>. The Finnish sawmill industry has been described as one of the most efficient in the

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<sup>100</sup> U.S. Department of State telegram No. 002609, prepared by U.S. Embassy, Stockholm, Apr. 1999.

<sup>101</sup> Ibid.

<sup>102</sup> Ibid.

<sup>103</sup> Ibid.

<sup>104</sup> Ibid.

<sup>105</sup> USDA, FAS, *Finland Annual Forest Products Report*, Helsinki, 1998, p. 6.

<sup>106</sup> Ibid., p. 3.

<sup>107</sup> USDA, FAS, *Finland Annual Forest Products Report*, Helsinki, 1998, p. 1.

world.<sup>108</sup> Three very large Finnish producers, Enzo-Gutzeit, UPM-Kymmene, and Metssaliito, together account for about 70 percent of Finnish lumber production.<sup>109</sup> Production of wood panels increased by 30 percent during 1994-97, steadily rising from 1.4 million m<sup>3</sup> to 1.8 million m<sup>3</sup>. In 1997, plywood accounted for about 55 percent of total panel production, and about 90 percent of plywood production was exported.<sup>110</sup>

## **Pulp, Paper, and Paperboard**

Finnish production of pulp amounted to 11.4 million metric tons in 1998, an increase of 14 percent from the production level of 1994, generally reflecting higher prices and increased export demand (table G-15). Paper and paperboard production increased from 10.9 million metric tons to 12.7 million metric tons over 1994-98, or by 16 percent, again reflecting increased export demand. Paper annually accounted for about three-quarters of this production over the period. Finnish wastepaper production also increased significantly in recent years, reaching 665,000 metric tons in 1998 (a 40 percent increase from 1994). The Finnish forest industry has utilized increasing amounts (over 80 percent domestic) of recycled paper as raw material, and 1997 production (utilization) equates to about 1.8 million m<sup>3</sup> of industrial wood.<sup>111</sup> Pulp production capacity reached 13.2 million metric tons in 1998, an increase of almost 18 percent over 1994-98 (table G-14). Capacity utilization for pulp was up from 80 percent in 1996 to 87 percent in 1998. Finnish paper and paperboard production capacity steadily increased during 1994-98 from 11.6 million metric tons to 13.7 million metric tons (table G-14). Capacity utilization increased significantly to 94 percent in 1998, up from 85 percent in 1996, generally reflecting greater demand. Employment in this sector was relatively stable at around 37,000 to 38,000 over the period (table G-14).

## ***Markets and Marketing Practices***

### **Consumption**

#### *Wood and wood products*

During 1994-97 Finnish consumption of industrial wood increased about 7 percent from 50 million m<sup>3</sup> to 54 million m<sup>3</sup> (table G-16). Annual lumber consumption increased irregularly over the same period, from 2.8 million m<sup>3</sup> to 3.4 million m<sup>3</sup>, up about 23 percent; and wood panel consumption increased steadily from 480,000 m<sup>3</sup> to 717,000 m<sup>3</sup>, or by 49 percent (table G-16).

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<sup>108</sup> Ibid, p. 3.

<sup>109</sup> USDA, FAS, *Sweden Annual Forest Products Report*, Stockholm, 1998, p. 21.

<sup>110</sup> UNECE, *Forest Products Markets in 1997 and Prospects for 1998*, ECE/TIM/BULL/50/6 (New York and Geneva: UNECE, 1997), p. 4.

<sup>111</sup> Found at Internet address <http://www.forestindustries.fi/en/forest/cofwood.htm>, retrieved on Feb. 10, 1999.

### *Pulp, paper, and paperboard*

In 1998, Finnish per capita consumption of pulp, and paper and paperboard was one of the highest in the world at 321 kg ( the EU average is 190 kg).<sup>112</sup> Finnish consumption of pulp increased by about 14 percent over 1994-98, from 8.6 million metric tons to 9.8 million metric tons, while paper and paperboard consumption declined by 16 percent, from about 2.0 million metric tons to 1.7 million metric tons (table G-16). Finnish wastepaper consumption increased irregularly from 566,000 metric tons to 633,000 metric tons during 1994-98.

## **Imports**

Total Finnish imports of forest products amounted to about \$1 billion in 1997, up from \$860 million in 1994, but down from 1995 when imports were \$1.3 billion (table G-17). Major import items included wood and wood products (47 percent) and paper and paper products (46 percent). Important suppliers included Russia (mostly wood), Sweden (mostly paper and paper products), and Germany (mostly paper and paper products).

### *Wood and wood products*

Finnish imports of wood and wood products amounted to \$487 million in 1997, up from the 1994 level of \$399 million, but below the peak of \$665 million in 1995 (table G-17). The Finnish industry imports significant amounts of pulpwood and wood chips, and some softwood logs and birch logs, mostly from the Baltic States and Russia; Finland also imports eucalyptus, mainly from South America, for use in the production of specialty papers.<sup>113</sup> In 1997, Russia accounted for 57 percent of the value of Finnish wood imports and Estonia accounted for 11 percent (table G-17). Finnish imports of industrial wood increased irregularly from 7.4 million m<sup>3</sup> to 7.7 million m<sup>3</sup> during 1994-97 (table G-18). Finnish lumber imports declined steadily during 1994-96 reaching 149,000 m<sup>3</sup> in 1996, and then increased to 242,000 m<sup>3</sup> in 1997; while wood panel imports increased by about 28 percent over 1994-97, from 80,000 m<sup>3</sup> to 102,000 m<sup>3</sup> (table G-18). Like Sweden, Finland prohibits imports of softwood products from North America, Japan, and China due to the possible presence of the pinewood nematode.<sup>114</sup>

### *Pulp, paper, and paperboard*

During 1994-97 the value of Finnish imports of pulp and wastepaper declined irregularly from \$95 million to \$67 million (table G-17). Table G-18 indicates that the quantity of imports of pulp declined from 82,000 metric tons to 45,000 metric tons over 1994-98, and imports of wastepaper declined from 122,000 metric tons to 59,000 metric tons. Finnish imports of paper and paper products were valued at \$477 million in 1997, up from \$366

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<sup>112</sup> *Pulp & Paper International Annual Review, 1999*, p. 12.

<sup>113</sup> USDA, FAS, *Finland Annual Forest Products Report*, Helsinki, 1998, p. 6.

<sup>114</sup> *Ibid.*

million in 1994 (table G-17). During 1994-98 the quantity of imports of paper and paperboard increased from 119,000 metric tons to 292,000 metric tons, or by 145 percent (table G-18).

## Exports

Finland is a major exporter of forest products and about one-third of its total export revenues are derived from forest product exports.<sup>115</sup> In 1997, Finland's exports of forest products amounted to \$11.9 billion, up from \$10.2 billion in 1994 (table G-17). Exports of paper and paper products made up 71 percent of total exports by value; wood and wood products made up about 22 percent; and pulp and wastepaper accounted for the remainder (table G-17). Finnish forest product manufacturers export to about 150 countries throughout the world.<sup>116</sup> However, the EU is the major market for Finland's forest product exports and in recent years has accounted for over three-quarters of Finnish exports.

### *Wood and wood products*

In 1997 Finnish exports of wood and wood products were valued at \$2.7 billion, up from \$2.5 billion in 1994 (table G-17). During 1994-97 the quantity of industrial wood exports declined by 51 percent from 1.6 million m<sup>3</sup> to 801,000 m<sup>3</sup> (table G-19). However, lumber exports increased by 4.6 percent over the same period from 7.2 million m<sup>3</sup> to 7.5 million m<sup>3</sup>, and 1997 exports were equivalent to about 71 percent of Finnish lumber production (tables G-15 and G-19). In recent years Finnish exports of softwood lumber to Japan have increased significantly and reached 0.5 million m<sup>3</sup> in 1997.<sup>117</sup> Exports of wood panels rose steadily during 1994-96 from 969 thousand m<sup>3</sup> to 1.2 million m<sup>3</sup>; however, they changed little during 1996-97 (table G-19). Panel exports were equivalent to about 67 percent of panel production in 1997 (tables G-15 and G-19).

### *Pulp, paper, and paperboard*

Finnish exports of paper and paper products are significant and in 1997 were valued at \$8.4 billion, up from \$7.0 billion in 1994 (table G-17). During 1994-98, the quantity of exports of paper and paperboard increased by about 25 percent from 9.1 million metric tons to 11.3 million metric tons (table G-19). The Finnish paper and paperboard industry is very export oriented and about 90 percent of Finnish production is exported (tables G-15 and G-19). Major markets include the United Kingdom, Germany, and the United States (table G-17). In recent years, Finland's exports of paper and paperboard

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<sup>115</sup> Ibid., p. 3.

<sup>116</sup> Finnish Forest Industry Assn, "Finland's Main Markets," p. 1, found at Internet address <http://www.forestindustries.fi/en/markkinat/tfinnis2.htm>, retrieved on Feb. 10, 1999.

<sup>117</sup> USDA, FAS, *Finland Annual Forest Products Report*, Aug. 17, 1998, GAIN Report #FI8003, p. 6.

represented about 15 percent of the world market.<sup>118</sup> The Finnish paper industry has emphasized production and exports of high-quality printing and writing papers; and in recent years the Finnish share of the world market for these papers has been about 25 percent.<sup>119</sup> During 1994-98 pulp exports increased about 10 percent, from just under 1.5 million metric tons to over 1.6 million metric tons (table G-19). Finnish pulp exports in 1998 were equivalent to about 14 percent of production (tables G-15 and G-19). Pulp and wastepaper exports were valued at \$809 million in 1997 (table G-17). Wastepaper exports rose steadily from 30,000 metric tons to 91,000 metric tons during 1994-98 (table G-19).

## **Certification**<sup>120</sup>

Finnish industry and government representatives have been actively working on an internal forest certification scheme for the past 4 years. This work complements the efforts made throughout the 1990s to ensure sustainability and preservation of biodiversity in the forest environment. The rules for establishing a certification group have been determined, and certification will be possible at the level of individual forest owner. A national Forest Certification Council is planned to be in charge of the future development work of the system, overseeing how certification is implemented in Finland. The system is expected to begin operating sometime in 1999. In addition, the Finnish Forest Owners Association (MTK) is attempting to develop a general framework and basic requirements for certification within Europe. Under broad guidelines each European country would develop its own certification system.

# **Germany**

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## ***Structure***

About 30 percent (11 million ha) of Germany's land area is forested, and about 90 percent (10 million ha) of this total is considered exploitable forestland.<sup>121</sup> Pine and spruce make up about two-thirds of German forests, while broadleaf trees, such as oak and beech account for the remainder. In contrast to many other European producers, forestland in Germany is not generally held by forest product companies. Approximately 53 percent of German forestland is owned by public entities, such as states and municipalities. A large number of private owners, with an average holding of 8 ha, control the remaining acreage. German forests are managed intensively and are subject

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<sup>118</sup> Finnish Forest Industry Assn, "World Markets," p. 1, found at Internet address <http://www.forestindustries.fi/en/markkinat/wmarkets.htm>, retrieved on Feb. 10, 1999.

<sup>119</sup> Ibid.

<sup>120</sup> The following discussion of Finnish forest certification was adapted from USDA, FAS, *Finland Annual Forest Products Report*, and the *Finnish Forest Certification Project Newsletter*, no. 7, Oct. 1998.

<sup>121</sup> The following discussion of the German forestry sector was adapted from a Confederation of European Paper Industries (CEPI) Internet site found at <http://www.paperonline.org/paperchain/forestry/germany.html>, retrieved on June 2, 1999.

to various Federal, State, and municipal forestry laws which, in part, require that forests be managed for multiple uses (wildlife habitat, recreation, and wood production) and be accessible to the public.<sup>122</sup> Germany is the fourth-largest European producer of industrial wood (after Russia, Sweden, and Finland). In general, the German sawmilling industry is of smaller scale than the German paper industry. The German paper and paperboard industry is the largest in Europe. Production in 1998 was equivalent to 18 percent of total European production, and accounted for about 5 percent of world paper and paperboard production (table G-1). During 1994-98, the number of paper and paperboard mills declined from 222 to 178 (table G-20). Annual capital investment in the German paper and paperboard industry declined steadily over 1994-97, from US \$999 million to US \$543 million.<sup>123</sup> German pulp production has been equivalent to about 20 percent of Swedish or Finnish output, and the majority of German pulp is imported. During 1994-98, the number of German pulp mills declined from 19 to 13 (table G-20). Although overall German pulp and paper production increased during 1994-98, employment in this sector declined from 48,000 to 46,000, primarily reflecting consolidation and increased productivity (table G-20).

Six German companies were listed in the top 150 world pulp and paper companies in 1997.<sup>124</sup> Ranked by sales and listed in descending order were Haindl'sche Papierfabriken (Haindl), Felix Schoeller Holding, MD Papier, Zanders Feinpapiere, Papierfabrik Palm, and Papierfabrik August Koehler. Haindl's sales (concentrating on newsprint and coated papers) were equivalent to about 8 percent of International Paper's sales (the world's largest forest product company) and about 18 percent of UPM-Kymmene sales (the largest European company) in 1997.<sup>125</sup> Over the last decade, German forest product companies have been affected by industry consolidation and reorganization, resulting in certain German forest product companies being purchased or controlled by foreign companies, and/or the creation of strategic alliances between German and foreign companies. In the early 1990's, Swedish Stora took control of Feldmuhle (which had a significant paper sector). In 1995, the Swedish company SCA took a majority stake in the largest German paper group PWA and has since acquired full control. In 1997, Enso (Finnish) took control of Holtzmann (German), Gladfelter (United States) purchased Schoeller & Hoesch's specialty paper division, and an alliance was formed between Finnish UPM-Kymmene (controls Nordland Papier in Germany) and Asia Pacific Resources International.<sup>126</sup> A number of other multinationals with significant pulp and paper assets in Germany in 1998 include Sappi (South African), Procter & Gamble (United States), Metsa-Serla (Finland), Jefferson Smurfit (Ireland), and International Paper (United States).

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<sup>122</sup> U.S. Department of State telegram No. 001831, prepared by U.S. Embassy, Bonn, Apr. 1999.

<sup>123</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 48.

<sup>124</sup> Most of the following discussion of the German forestry sector was adapted from Payne and Payne, eds., *European Analysis and Forecast*, pp. 45-46.

<sup>125</sup> PriceWaterhouseCoopers, *Global Forest & Paper Industry Survey 1998 Edition*, pp. 2-4.

<sup>126</sup> *Pulp & Paper International Annual Review, 1998*, p. 22.

Annual government financial support for private forests in Germany amounts to about \$80 million.<sup>127</sup> Afforestation and reforestation measures account for about \$37 million, and forest road construction is supported by about \$10 million. The major support is earmarked for measures to stabilize forests suffering under emission damages, such as acidic soils.

## ***Production, Products, and Capacity***

Germany is a significant EU producer of industrial wood, paper and paperboard, and other forest products. Annual forest growth is about 79 million m<sup>3</sup> and fellings of industrial wood amounted to 39 million m<sup>3</sup> in 1998, which was the fourth-largest in Europe, behind Russia, Sweden, and Finland (table G-1).<sup>128</sup> However, commercial exploitation of German forestland for pulp production has been relatively modest as Germany imports about three-quarters of its pulp requirements, reflecting a national resource conservation philosophy and a significant fiber resource recovery rate. In 1997, secondary fiber accounted for nearly two-thirds of the total fiber supply for paper and paperboard production.<sup>129</sup> Production of paper and paperboard reached 16.3 million metric tons in 1998, and was equivalent to about 21 percent of EU production (table G-1). During 1994-98, production capacity for paper and paperboard increased from 15.1 million metric tons to 17.3 million metric tons, or by about 14 percent; while capacity for pulp increased about 18 percent to 2.4 million metric tons (table G-20). In 1998, capacity utilization for paper and paperboard was 95 percent, and 100 percent for pulp. USDA forecasts the 1999 German timber harvest to be at or somewhat above 1998 levels, reflecting improved timber prices, especially for hardwoods.<sup>130</sup>

## **Wood and Wood Products**

During 1994-97 industrial wood production in Germany declined by 4 percent from 36.0 million m<sup>3</sup> to 34.5 million m<sup>3</sup> (table G-21). In 1997, sawlogs and veneer logs made up over two-thirds of German industrial wood production; pulpwood accounted for about 30 percent. Over 1994-97, sawlog and veneer log production was up 1 percent, while pulpwood production was down 12 percent. Lumber production increased by 9 percent over the period, reaching 14.8 million m<sup>3</sup> in 1997, while wood panel production increased by 6 percent to 10.9 million m<sup>3</sup> in 1997 (table G-21). Particleboard accounted for 85 percent of total German wood panel production in 1997.

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<sup>127</sup> The following discussion of financial assistance to the German forestry sector was adapted from U.S. Department of State telegram No. 001831, Bonn, Apr. 1999.

<sup>128</sup> CEPI Internet site, found at Internet address <http://www.paperonline.org/paperchain/forestry/germany.html>, retrieved on June 2, 1999.

<sup>129</sup> Payne and Payne, eds., *European Analysis and Forecast*, p-36.

<sup>130</sup> USDA, FAS, *Germany Forest Products Annual Report*, Bonn, AGR No. GM8086, Dec. 27, 1998, p. 2.

## **Pulp, Paper, and Paperboard**

Germany is the largest European producer of paper and paperboard, and in 1997 held 20 percent of total European capacity.<sup>131</sup> It is the world's fifth-largest paper and paperboard producer, behind the United States, Japan, China, and Canada. Paper and paperboard production increased by 13 percent from 14.5 million metric tons to 16.3 million metric tons over 1994-98, and reflects growth in domestic sales as well as strong export sales. Printing and writing paper production increased by 17 percent over the period and accounted for almost 40 percent of the paper and paperboard category in terms of 1998 production quantity. During 1994-98 German pulp production increased about 1 percent, reaching 2.0 million metric tons in 1998 (table G-21). Germany does not produce sulfate pulp for paper production (importing about 4 million metric tons annually from the Nordic countries and Canada). However, plans for the construction of a long-fiber sulfate pulp mill in eastern Germany are proceeding.<sup>132</sup> German wastepaper production (paper recovery) also increased significantly during 1994-98, reaching 11.9 million metric tons in 1998 (a 23 percent increase from 1994). The significant growth in the recovery of secondary fiber likely reflects the environmentally aware German consumers and the introduction of legislation mandating the recycling of packaging.<sup>133</sup>

### ***Markets and Marketing Practices***

#### **Consumption**

An important factor affecting German forest products demand and consumption is the level of economic activity in the construction sector, and during 1996-98 this sector was in a recession.<sup>134</sup> German housing starts in 1998 were down by about 10 percent compared with 1995; and investment support programs for eastern Germany during the early 1990's resulted in surplus construction of homes and commercial buildings. The outlook for future public construction is bleak as public deficits on all levels have dampened new investment. In addition, the German furniture manufacturing industry has come under considerable cost pressure since 1994. Relatively low-priced imports from other European countries and weakening domestic demand have contributed to this development. A number of German furniture manufacturers have relocated part of their production operations to other European countries (Central and Eastern Europe) to take advantage of significantly lower production costs. Demand for paper and paper products (except tissues) increased significantly in recent years, as printing/writing papers benefitted from domestic growth in print advertising, printing activity, and

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<sup>131</sup> *Pulp & Paper International Annual Review, 1998*, pp. 17-18.

<sup>132</sup> USDA, FAS, *Germany Forest Products Annual Report*, Bonn, 1998, p. 2.

<sup>133</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 36.

<sup>134</sup> The following discussion of the market demand for German forest products was adapted from USDA, FAS, *Germany Forest Products Annual Report*, Bonn, 1998, p. 2 and 12, and USDA Bonn, AGR No. GM7073, Dec. 15, 1997, p. 2.

demand for office paper; while packaging paper demand was buoyed by an increase in direct exports and indirect shipments associated with manufactured goods.<sup>135</sup>

### *Wood and wood products*

During 1994-97 German consumption of wood and wood products was relatively stable generally reflecting the recessionary times. Consumption of industrial wood increased about 1 percent from 30.6 million m<sup>3</sup> to 31.0 million m<sup>3</sup> (table G-22). Lumber consumption increased about 2 percent over 1994-97, from 17.7 million m<sup>3</sup> to 18.0 million m<sup>3</sup>; and wood panel consumption declined slightly from 11.8 million m<sup>3</sup> to 11.7 million m<sup>3</sup> (table G-22).

### *Pulp, paper, and paperboard*

German per capita consumption of paper and paperboard in 1998 at 205.4 kg was slightly higher than the EU average of 190.3 kg, and significantly above the 102.4 kg average for all of Europe.<sup>136</sup> German pulp consumption amounted to 5.4 million metric tons in 1998 and declined by less than 1 percent over 1994-98 (table G-22). Paper and paperboard consumption amounted to 16.9 million metric tons in 1998 compared with 16.3 million metric tons in 1994 (table G-22). Over 1994-98, German wastepaper consumption increased steadily from 8.2 million metric tons to 9.9 million metric tons (table G-22).

## **Imports**

During 1994-95 German forest product imports increased from \$15.4 billion to \$19.8 billion; however, imports declined steadily thereafter, reaching \$14.9 billion in 1997 (table G-23). Imports in 1998 increased and were valued at \$15.8 billion. Major import items in 1998 included paper and paper products (53 percent), wood and wood products (33 percent) and pulp and wastepaper (14 percent). Important suppliers (by value) in 1998 included Sweden (13 percent of the total, primarily wood, pulp, and paper and paper products), Finland (13 percent, wood, pulp, and paper and paper products), and France (8 percent, mostly paper and paper products) (table G-23).

### *Wood and wood products*

German imports of wood and wood products amounted to \$5.2 billion in 1998, down by 8 percent from the 1994 level of \$5.6 billion, and down by \$1 billion from the peak of 1995 (table G-23). Major suppliers in 1998 included Poland (11 percent), Sweden (8 percent), Finland (8 percent), and the United States (7 percent) (table G-23). The United States supplied mostly hardwood logs, hardwood lumber, and hardwood veneer. Data reported in table G-24 indicate that German imports of industrial wood increased

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<sup>135</sup> Payne and Payne, eds., *European Analysis and Forecast*, p. 40.

<sup>136</sup> *Pulp & Paper International Annual Review, 1999*, p. 12.

irregularly from 2.3 million m<sup>3</sup> to 2.4 million m<sup>3</sup> during 1994-97. German lumber imports declined steadily during 1994-96 from 6.0 million m<sup>3</sup> to 5.0 million m<sup>3</sup>, and then increased to 5.2 million m<sup>3</sup> in 1997. Wood panel imports declined by about 2 percent over 1994-97, reaching 3.4 million m<sup>3</sup> in 1997 (table G-24). In 1997 German imports of industrial wood were equivalent to 8 percent of consumption; lumber imports and wood panel imports were each equivalent to 29 percent of consumption (tables G-22 and G-24). Most imports are done by importers and agents; direct purchases are limited since most German furniture and flooring manufacturers are mid sized companies.<sup>137</sup> Imported softwood (especially from the United States) is usually only of the highest grades, since Germany is a lumber producer and a major market for other EU producers.

### *Pulp, paper, and paperboard*

Germany was the world's second-largest importer of paper and paperboard in 1997 (behind the United States). During 1994-98, paper and paper products imports increased irregularly from \$7.5 billion to \$8.4 billion (table G-23). Major German suppliers of paper and paper products in 1998 included Finland, Sweden, and France. During 1994-96, imports of paper and paperboard declined steadily from 7.6 million metric tons to 6.9 million metric tons, however imports began to rise in 1997, and continued in 1998, reaching 8.0 million metric tons (table G-24). During 1994-98, German imports of pulp and wastepaper peaked in 1995 at \$3.6 billion, but steadily declined thereafter reaching \$2.2 billion in 1998 (table G-23). Table G-24 indicates that over 1994-98 the quantity of pulp imports increased from 3.7 million metric tons to 3.8 million metric tons; and imports of wastepaper increased from 719,000 metric tons to 1.0 million thousand metric tons. Important 1998 sources of imports included Canada, Sweden, and Finland. In 1998, pulp imports were equivalent to 70 percent of German pulp consumption; paper and paperboard imports were equivalent to 47 percent of German consumption; and wastepaper imports accounted for 10 percent of German wastepaper consumption (tables G-22 and G-24).

## **Exports**

Germany is a major European exporter of forest products, especially paper and paper products. In 1998, Germany's exports of forest products were valued at \$15.0 billion, up from \$12.3 billion in 1994, but significantly below the peak level of \$16.6 billion in 1995 (table G-23). Exports of paper and paper products made up 76 percent (by value) of total exports; wood and wood products made up about 21 percent; and pulp and wastepaper accounted for the remainder. German forest product manufacturers export to countries throughout the world; however, the major German market is the EU, especially France, the Netherlands, the United Kingdom, Italy, and Austria.

### *Wood and wood products*

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<sup>137</sup> USDA, FAS, *Germany Forest Products Annual Report*, Bonn, 1998, p. 10.

In 1998 German exports of wood and wood products were valued at \$3.2 billion, up from \$2.4 billion in 1994 (table G-23). Austria, the Netherlands, and France were the primary markets. During 1994-97 the quantity of industrial wood exports declined by 23 percent from 7.7 million m<sup>3</sup> to 6.0 million m<sup>3</sup>; however, German lumber exports increased by 11 percent from 1.9 million m<sup>3</sup> to 2.1 million m<sup>3</sup> (table G-25). In 1997 German lumber exports were equivalent to about 14 percent of lumber production (tables G-21 and G-25). In recent years German sawmills have exported increased quantities of beech lumber to various Mediterranean countries and Hong Kong, in response to high demand.<sup>138</sup> Exports of wood panels rose by 31 percent during 1994-97 from 1.9 million m<sup>3</sup> to 2.5 million m<sup>3</sup> (table G-25). Panel exports were equivalent to about 23 percent of panel production in 1997 (tables G-21 and G-25).

### *Pulp, paper, and paperboard*

The German paper and paperboard industry is the largest in Europe (followed by Finland, Sweden, and France). Exports of paper and paper products amounted to \$11.4 billion in 1998, up about 20 percent from the level in 1994 (table G-23). Major markets in 1998 included France, the United Kingdom, and the Netherlands (table G-23). The quantity of German exports of paper and paperboard increased by 30 percent during 1994-98 from 5.7 million metric tons to 7.4 million metric tons (table G-25). In 1998 paper and paperboard exports were equivalent to 46 percent of German production. Printing/writing paper was the largest export category (accounting for 55 percent of total paper and paperboard exports in 1998), and increased by 40 percent over the period (table G-25). German exports of pulp and wastepaper are relatively small, although they have been increasing. Exports were valued at \$369 million in 1994 compared with \$378 million in 1998 (table G-23). During 1994-98 the quantity of pulp exports increased from 192,000 metric tons to 342,000 metric tons or by 78 percent (table G-25). Over the same period the quantity of wastepaper exports increased by 34 percent from 2.2 million metric tons to 3.0 million metric tons. In 1998, pulp exports were equivalent to 18 percent of German pulp production (tables G-21 and G-25). Major markets in 1998 included Italy, Switzerland, and Austria (table G-23).

### **Certification**<sup>139</sup>

The German Government, in cooperation with the forest industry, implemented a special promotion program managed by the German Forest Marketing Board (FMB) in the early 1990's. In combination with a multi-year generic wood promotion program managed by the FMB, a special label identifying wood harvested in German forests was developed to indicate that German forest management corresponds with international sustainability principles. Raw material certification through the Forest Stewardship Council (FSC) is supported by the World Wildlife Fund (WWF) and various German furniture and window manufacturers, associations, and buyers groups. The largest demand for certified

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<sup>138</sup> USDA, FAS, *Finland Annual Forest Products Report*, Helsinki, 1998, p. 7.

<sup>139</sup> The following discussion of German forest product certification was adapted from USDA, FAS, *Germany Forest Products Annual Report*, Bonn, 1998, p. 10.

products is from buyers groups (usually organized by the WWF), and in 1998, the German Gruppe 98 buyer group had 31 members.<sup>140</sup> The German Private Forest Owners Association is not a member of this group and has had a negative reaction to its forming. The UN reported that in 1998 Germany was not a country where FSC certified forestland is significant.<sup>141</sup>

In June 1999, the German Forestry Council, which is the central organization of all German forest owners, founded a national PEFC (Pan-European Forest Certification) certification council.<sup>142</sup> Members in the new German PEFC council include forest owners (representing 50 percent of board members), traders, the timber processing industry, national environmental organizations, trade unions, and retailer associations. PEFC intends to certify forest production regions in contrast to FSC which certifies forest operations. The definition of sustainability is generally comparable in FSC and PEFC. In Germany, PEFC plans to operate on a state certification level. Audits are performed by accredited certifiers and owners are then allowed to utilize a PEFC logo.

## Other EU Forest Economies

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Other important EU forest product economies include those of France, Italy, Spain, Austria, and the United Kingdom. France is the fourth-largest EU producer of industrial wood, the third-largest EU pulp producer, and the fourth-largest EU producer of paper and paperboard (table G-1 and tables G-26-31). French forests cover about 16 million ha; two-thirds of which consist of hardwood species.<sup>143</sup> Ownership is mostly by private individuals and corporations (63 percent) and local towns and the state (23 percent).<sup>144</sup> French sawmills numbered approximately 3,400 in 1998 and have declined by about 15 percent over the last 4 years.<sup>145</sup> Paper and paperboard mills, and pulp mill numbers were relatively stable during 1994-98, and in 1998 numbered 137 and 19, respectively (table G-26). Production capacity in 1998 for French pulp mills was 3.3 million metric tons, while paper and paperboard mill capacity was 10.1 million metric tons (table G-26). Employment in the pulp and paper industry was 25,000 in 1998 (table G-26). France is also a major consumer of forest products; in 1998, it ranked third in the EU as a paper and paperboard consumer and fourth as a pulp consumer (tables G-1 and G-28). French forest product trade is also significant; and in 1998 France exported products valued at \$8.2 billion and imported products valued at \$10.5 billion

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<sup>140</sup> *Forest Products Annual Market Review, 1997-1998*, ECE/TIM/Bull/51/3, United Nations Publications ISSN, Geneva, pp. 24-25.

<sup>141</sup> *Ibid.*

<sup>142</sup> The following discussion describing the PEFC certification system was derived from USDS, FAS, GAIN Report No. 9042, June 23, 1999, pp.1-3.

<sup>143</sup> USDA, FAS, Paris, AGR No. FR9028, Apr. 16, 1999, pp. 1-3.

<sup>144</sup> *Ibid.*

<sup>145</sup> *Ibid.*

(table G-29). Major suppliers and markets were mostly other EU countries, especially Germany and Belgium.

Italy is an important EU paper and paperboard manufacturer, accounting for 14 percent of EU production in 1998 (table G-1). Industrial wood production in Italy is not large in relation to total EU production, and was equivalent to 2 percent of such production in 1998 (table G-1). Italy lacks a large forest resource base (6.8 million ha) and only about 20 percent of Italian demand is met by domestically produced wood.<sup>146</sup> Private ownership accounts for 60 percent of Italian forests; municipal ownership represents 28 percent; and the remainder is other public ownership. The Italian pulp, paper and paperboard industry consists of 166 firms employing 25,600 people. In 1998, there were 16 pulp mills with an operating capacity of 700,000 metric tons, and 207 paper and paperboard mills with a capacity of 9.4 million metric tons.<sup>147</sup> Most imports flow through one of the more than 300 importers associated with the National Italian Association of Importers and Dealers. Italy's major forest product trading partners are other EU member countries, especially Germany and France. Most wood pulp is imported and in 1997 major suppliers included Canada (23 percent) and the United States (21 percent). In 1998, Italian consumption of pulp was equivalent to 9 percent of total EU consumption and consumption of paper and paperboard was equivalent to 14 percent of EU consumption (table G-1).

In 1998, Spain and Austria each accounted for about 5 percent of EU industrial wood production; 5 percent of EU pulp production; and 5 percent of EU paper and paperboard production (table G-1). In 1998, Spain had 14 pulp mills with a capacity of 1.9 million metric tons and 135 paper and paperboard mills with a capacity of 4.3 million metric tons.<sup>148</sup> Total pulp, paper, and paperboard sector employment in Spain in 1997 was 17,500. Austrian pulp mills numbered 12 in 1998 with a capacity of 2.0 million metric tons, while paper and paperboard mills amounted to 28 with a production capacity of 4.4 million metric tons. Total sector employment was approximately 10,000 in 1998. Although the United Kingdom is not a large EU producer of industrial wood (3 percent of 1998 EU production), it is an important EU producer (accounting for 8 percent of EU 1998 production) and consumer (17 percent) of paper and paperboard (table G-1). In 1998, the United Kingdom had 5 pulp mills with a capacity of 780,000 metric tons and 95 paper and paperboard mills with a production capacity of 7.0 million metric tons. Pulp, paper, and paperboard sector employment in the United Kingdom in 1998 was 22,000.

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<sup>146</sup> The following discussion describing the Italian forest product industry is mostly derived from USDA, FAS, Rome, AGR No. IT9713, Apr. 16, 1999, pp. 1-5.

<sup>147</sup> *Pulp & Paper International Review*, 1999, p. 20.

<sup>148</sup> Most of the following description of the structure of the Spanish, Austrian, and the British forests product industry is from *Pulp & Paper International Review*, 1999, pp. 21, 22, and 26.

## *Structure*

More than 20 percent of the world's forestland and timber resources are located in Russia; coniferous trees predominate, with large amounts of broadleaf softwoods and lesser amounts of birch, beech, and oak hardwoods.<sup>149</sup> Russia has 1.2 billion ha of forest covering about 69 percent of its land area.<sup>150</sup> The Russian Government controls about 94 percent of Russian forests, which are subject to the oversight of the Russian Forestry Ministry. However, many legal issues concerning Russian land ownership and access have yet to be resolved.<sup>151</sup> The Department of Forestry falls within the Ministry of Economy, which is primarily responsible for the forestry sector. The annual Russian timber growth is estimated at 800 million m<sup>3</sup>, with an allowable cut of 500 million m<sup>3</sup>.<sup>152</sup> However, as a consequence of the general deterioration in the Russian economic situation and the resulting lack of investment in this sector, the forest products industry has been operating at about 30 to 40 percent of capacity and peak production levels reached in the mid- to late-1980s. The actual timber cut in recent years has been about 80 million m<sup>3</sup>.<sup>153</sup> About 60 percent of the annual cut has been from European Russia; about 20 percent has come from Eastern Siberia,<sup>154</sup> and about 11 percent has been harvested in the Russian Far East.<sup>155</sup> European Russian forests are much more accessible and have been utilized to a greater extent than the vast forests of Siberia and the Russian Far East.<sup>156</sup> Timber transportation costs are an important cost component of Russian forest product production. The average log is transported a distance of 1,600 kilometers (the longest in the world), compared with an average distance in Finland and Belorussia of 50 kilometers.<sup>157</sup> In part, this is a reflection of log transportation support provided by the former Soviet Union, which resulted in many sawmills being located far from the best forest resources. Russian forest management practices are reported to be weak and many owners have stopped investing in production.<sup>158</sup> The number of Russian pulp and paper and paperboard mills has remained relatively stable in recent years at 45 pulp mills and 108 paper and paperboard mills (table G-32). Production capacity was also relatively stable during 1994-98 at about 9 million metric tons for paper and paperboard and 9.5 million metric tons for pulp (table G-32). Capacity utilization for paper and paperboard declined from 43 percent in 1994 to an estimated 37 percent in 1997; over the same period capacity utilization for pulp increased from 37 percent to an estimated 41 percent (table G-32). Six large pulp and paper companies produce about 70 percent of

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<sup>149</sup> Thomas Barry, "Doing Business in Russia: Think small, think different," *Pima's Papermaker*, vol. 80, Aug. 1998, p. 36.

<sup>150</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, AGR No. RS8010, Feb. 27, 1998, p. 1.

<sup>151</sup> World Forest Institute, (Portland, OR), "Russian Far East Forests," Sept. 1998, p. 1.

<sup>152</sup> Barry, "Doing Business in Russia," p. 38.

<sup>153</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1998, p. 10.

<sup>154</sup> Eastern Siberia is an administrative area generally west of the Russian Far East.

<sup>155</sup> Barry, "Doing Business in Russia," p. 38.

<sup>156</sup> Barry, "Doing Business in Russia," p. 38.

<sup>157</sup> The following discussion about Russian transportation distances and support is from USDA, FAS, *Russia Annual Forest Products Report*, p. 3-4.

<sup>158</sup> *Ibid.*, p. 9.

Russian pulp production and about half of the production of paper and paperboard.<sup>159</sup> Four of the companies are in northwest Russia: Arkhangelsk Pulp & Paper, Kotlas Pulp & Paper, Segezha Pulp & Paper, and the Sykryvkar Forest Complex. Those in east Siberia, include the Bratsk Forest Complex (purchased by the Ilim Pulp Enterprise) and Ust-Ilimsk Forest Complex. Employment in the Russian pulp and paper industry is approximately 150,000 and did not change appreciably during 1994-98 (table G-32). The major Russian forest product export company, the state-owned Rosexportles or Russian Export Timber Company is controlled by the Ministry of Economy.<sup>160</sup>

The entire Russian forest products industry was recently characterized as “large, integrated manufacturing complexes built and managed according to Soviet principles of extreme scale economics, with a focus on volume at any cost, homogeneity, and self-sufficiency.”<sup>161</sup> An industry-wide shortage of working capital and lack of company profitability have been, and continue to be, significant areas of concern. Lack of capital for new equipment and general maintenance has resulted in many plants being unable to operate efficiently. A recent state inspection reported that over 50 percent of wood processing equipment and over 57 percent of forest harvesting machinery were obsolete or in disrepair.<sup>162</sup> Owners of Russian timber operations are reluctant to invest in the sector because ownership rights are still not clearly defined. According to the Russian Ministry of Economics, the sector lost about 4 billion rubles (US \$412 million) during the first 11 months of 1998, 70 percent of all enterprises reported losses, and the sector’s debt is more than half of its gross annual revenue.<sup>163</sup> Although 95 percent of the medium and large enterprises have been incorporated into joint stock holding companies, the industry has not improved its production efficiency because of weak management. Underfinanced Russian timber firms demand payments in advance of production to compensate for the lack of financial investment. Many companies demand 50 percent down payment to finance production, with the remaining 50 percent due upon the completion of the project; and as a result no stocks of processed wood are available in the Russian market.

## Structural Changes and Investment Developments

Some positive changes are taking place in the Russian industry’s structure. Ilim Pulp Enterprises, a major Russian pulp and paper group that controls 2.5 million metric tons of capacity at three mills, is employing Western management and financial practices to solve existing problems and move forward.<sup>164</sup> A major Russian bank recently purchased the Ust-Ulimsk Lumber Processing Complex and promised to invest \$180 million.<sup>165</sup> In

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<sup>159</sup> The following discussion relating to Russian pulp & paper companies is from *Pulp & Paper International Annual Review, Aug. 1997* (Brussels), pp. 16-18.

<sup>160</sup> The Journal of Commerce Online, “Russian timber trade felled by government dissension,” found at Internet address <http://www.joc.com/issues/current/e1nergy/e41349.htm>, retrieved on Mar. 17, 1999.

<sup>161</sup> Barry, “Doing Business in Russia,” p. 38.

<sup>162</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, AGR No. RS9010, Feb. 19, 1999, p. 9.

<sup>163</sup> The following discussion about Russia’s financial crisis is from the above, pp. 2-3.

<sup>164</sup> *Pulp & Paper International Annual Review, 1998*, (Brussels), p. 39.

<sup>165</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1999, p. 9.

addition, in recent years various major foreign forest products companies have purchased financial interests in Russian forest products businesses, especially integrated pulp and paper plants. These companies, including U.S. conglomerate International Paper, Austrian papermaker Frantschach, and Swedish Svenska Cellulosa (SCA), have made capital investments in Russian plants and have installed Western management and financial techniques hoping to boost capacity, efficiencies, and production. An example is a planned \$150 million investment in the Syktyvkar paper and paperboard mill northeast of Moscow, by Syktyvkar and its Austrian partner Frantschach to increase capacity and improve pulp quality and environmental performance.<sup>166</sup> About \$64 million of this investment is scheduled to be provided by the US Exim Bank.<sup>167</sup> In the summer of 1998, International Paper purchased OAO Svetogorsk. This facility, near the Finnish border, is an integrated pulp and paper business manufacturing uncoated free sheet, liquid packaging board, and softwood pulp. Officials of International Paper have indicated that the company plans to make modest investments to improve efficiencies and to broaden its range of products.<sup>168</sup> In an effort to increase profits, Russian timber exporting companies are trying to improve the efficiencies of their foreign trade operations.<sup>169</sup> In 1998, nine major Russian exporters (including Exportles, Rusexportles, and Corporation Rosexportles) formed a special Council to plan strategies to stem declining forest products sales to Japan.<sup>170</sup> In addition, an announcement in November of 1998 by a Russian deputy economics minister indicated that Russia plans to raise \$1 billion for a program to restructure and increase the efficiency of its forest industry during 1999-2006.<sup>171</sup> The program would create more than 600 vertically integrated timber processing complexes out of 30,000, and attempt to cut production costs by 25 to 30 percent.<sup>172</sup> The financing is expected to come from trade credits, Russian forest companies, and the Russian Government.<sup>173</sup> In addition, the Ministry of Economics, Department of Economic Timber Complex, is attempting to encourage greater vertical integration within the industry by developing further processing within established lumber mills through the use of leased machinery.<sup>174</sup> Pilot projects have been created in various regions. USDA reports that the Russian Government invested 160 billion rubles (US \$27.7 billion) in the Russian forest industry in 1997, and matched 40 percent of private investors' funds in 1998.<sup>175</sup> The European Bank for Reconstruction and Development is negotiating with the Ministry of Economics on possible reconstruction of several timber plants.<sup>176</sup> In January 1997, President Yeltsin signed the Forest Code, a concept paper calling for rational,

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<sup>166</sup> "Syktyvkar plans big mill expansion", *Pima's Papermaker*, Jan. 1999, p. 30.

<sup>167</sup> *Ibid.*

<sup>168</sup> Robert M. Amen, president, International Paper Europe, Brussels, Belgium, Mar. 29, 1999.

<sup>169</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1998, p. 4.

<sup>170</sup> UNECE, *Forest Products Annual Market Review, 1997-98*, ECE/TIM/BULL/51/3 (New York and Geneva: UNECE, 1998), p. 52.

<sup>171</sup> Miller Freeman PLC, "*Russia plots massive shake-up of exporters*", found at Internet address [http://web.lexis-nexis.com/ln.universe/se...5a3&\\_md5=e8f71f0567890f04413ee28d6f5dfc7c](http://web.lexis-nexis.com/ln.universe/se...5a3&_md5=e8f71f0567890f04413ee28d6f5dfc7c), retrieved on Nov. 28, 1998.

<sup>172</sup> *Ibid.*

<sup>173</sup> *Ibid.*

<sup>174</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1998, p. 2.

<sup>175</sup> *Ibid.*, p. 9.

<sup>176</sup> *Ibid.*

sustainable use of forest resources.<sup>177</sup>

## **Tariff and Licensing Developments**

Russia recently imposed a new export tariff of 10 percent on hardwood lumber, but not less than 10 ECU to 12 ECU (depending on species) per cubic meter.<sup>178</sup> The Foreign Agricultural Service (FAS) of USDA has reported that exports have not been significantly affected by the new tariff because profit margins from hardwood exports far outweigh the tariff. On February 15, 1999 the Russian Government began to require licensing for all hardwoods subject to export tariffs when classified under HTS subheading 4403.00 to 4409.20.<sup>179</sup> The tariff was imposed because hardwoods were commanding export prices significantly higher than softwoods, yet incur the same production costs in Russia. In addition, beginning January 21, 1999, a local regulation in the far eastern oblast of Amur requires timber exporters to obtain government permission to export wood products and fixes the price of exported wood according to world prices.<sup>180</sup> This area (near China) had about 100 private companies producing and trading timber at very low prices (\$20 to \$30 per metric ton), compared with the world price of about \$100 per metric ton, and Russian officials hope the decree will raise Russian export prices, especially to markets in Asia.<sup>181</sup>

## ***Production, Products, and Capacity***

Russia is still a major European producer of forest products, even though present production levels are only about a quarter of the levels of 1990. In 1998 Russia produced more industrial wood (58.1 million m<sup>3</sup>) than any other European country (table G-1). However, for most forest product items, production levels continue to decline. Wood production in 1998 is estimated by the FAS at 5 percent less than the 1997 level, and production in 1999 is expected to decline by another 4 percent, reflecting the continuing lack of financial resources and worn equipment and machinery.<sup>182</sup> Privatization (and the subsequent loss of state support), the loss of markets in the former Soviet Union, poor management, and the lack of capital have all contributed to the decline. Production capacity was relatively stable during 1994-98, at about 9 million metric tons for paper and paperboard and 9.5 million metric tons for pulp (table G-32). Capacity utilization for paper and paperboard declined from

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<sup>177</sup> Ibid., p. 2.

<sup>178</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1999, pp. 9-10.

<sup>179</sup> Ibid.

<sup>180</sup> Ibid.

<sup>181</sup> Ibid.

<sup>182</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1998, p. 3.

43 percent in 1994 to 37 percent in 1997; over the same period capacity utilization for pulp increased from 37 percent to 41 percent (table G-32).

## **Wood and Wood Products**

During 1994-97 total industrial wood production in Russia declined from 79.8 million m<sup>3</sup> to 63.2 million m<sup>3</sup>, or by about 21 percent (G-33). Over the same period, sawlog and veneer log production declined by 29 percent, from 53.6 million m<sup>3</sup> to 38.1 million m<sup>3</sup>. Lumber production also declined significantly during the period, reaching 19.5 million m<sup>3</sup> in 1997, a decline of about 37 percent. Wood panel production in 1997 was down 28 percent to 3.1 million m<sup>3</sup>. However, production of plywood, which accounts for about 30 percent of wood panels, was up about 9 percent. Russian plants are producing new types of plywood, including fire-resistant plywood.<sup>183</sup>

## **Pulp, Paper, and Paperboard**

Russian pulp production was relatively stable during 1994-98, declining slightly from 3.9 million metric tons to 3.8 million metric tons (table G-33). Paper and paperboard production increased by nearly 4 percent over the same period, from 3.4 million metric tons to 3.5 million metric tons (table G-33). Wastepaper production (recovery) was relatively stable over the period at around 600,000 metric tons (table G-33).

## ***Markets and Marketing Practices***

### **Consumption**

Generally poor economic conditions over 1994-98 dampened Russian demand for forest products. Russian per capita consumption of paper and paperboard in 1998 was one of the lowest in Europe at 13.2 kg (comparable EU consumption is 190.3 kg).<sup>184</sup> The financial crisis of 1998 further weakened demand as housing starts were down by 63 percent, production of miners' beams declined by 38 percent, and window and door production were down 10 percent and 8 percent, respectively, compared with 1997.<sup>185</sup> FAS reports that in 1999 negative economic conditions have continued to depress domestic demand for forest products, leading Russian firms to focus on the more profitable export markets. In recent years, Russian timber has been utilized as follows: 40 percent for the production of lumber; 23 percent for firewood; 20 percent for cellulose; 5 percent for particleboard; and 12 percent for other products.<sup>186</sup>

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<sup>183</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1999, p. 8.

<sup>184</sup> *Pulp & Paper International Annual Review, 1999*, p. 12.

<sup>185</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1999, p. 4.

<sup>186</sup> *Ibid*, p. 3.

### *Wood and wood products*

During 1994-97 Russian consumption of industrial wood declined by about 35 percent, from 69.1 million m<sup>3</sup> to 44.9 million m<sup>3</sup>, (table G-34). The decline in lumber consumption was even greater, from 25.4 million m<sup>3</sup> to 14.7 million m<sup>3</sup>, or by about 42 percent (table G-34). Wood panel consumption declined 39 percent over the period; 1997 consumption shares by panel type were as follows: particleboard (62 percent), fiberboard (20 percent), plywood (16 percent), and insulating board and veneer sheet (each 1 percent). Consumption of all panel types declined, except plywood, which increased by 11 percent (table G-34). In general, consumption reflected the depressed housing and construction markets.

### *Pulp, paper, and paperboard*

Reflecting general economic conditions, apparent consumption of pulp declined irregularly from 3.0 million metric tons to 2.8 million metric tons, or by about 6 percent during 1994-98 (table G-34). Consumption of paper and paperboard also decreased over the period; declining from 2.1 million metric tons to 2.0 million metric tons, or also by about 6 percent (table G-34).

## **Imports**

Russian forest product imports are small in relation to domestic production, consumption, and exports. Total Russian imports of forest products amounted to about \$1.3 billion in 1997, up from \$1.0 billion in 1996 (table G-35). The major import item is paper and paper products, accounting for 79 percent of the value of 1997 imports. Imports of wood and wood products made up 18 percent and pulp and wastepaper accounted for about 3 percent (table G-35). In 1997, the EU accounted for 64 percent of the value of Russian forest product imports, while China and the United States each accounted for about 3 percent.

### *Wood and wood products*

Russian imports of wood and wood products amounted to \$230 million in 1997, up by about a third from the previous year's level of \$172 million (table G-35). In 1997, the EU was the major supplier of Russian wood and wood product imports. Table G-36 shows Russian imports of industrial wood declining from 962,000 m<sup>3</sup> to 325,000 m<sup>3</sup> during 1994-97. Russian lumber imports declined by 28 percent during that period, from 50,000 m<sup>3</sup> to 36,000 m<sup>3</sup> (table G-36). Imports of industrial wood and lumber were equivalent to less than 1 percent of domestic production and consumption in 1997 (tables G-33, G-34, and G-36). Although total wood panel consumption was down over 1994-97, imported wood panels were up by 283 percent from 30,000 m<sup>3</sup> to 115,000 m<sup>3</sup>, reflecting an increased use in construction applications. However, wood panel imports still only accounted for 5 percent of domestic consumption (tables G-34 and G-36).

Particleboard was the most important wood panel import and accounted for over 90 percent of panel imports.

### *Pulp, paper, and paperboard*

Russian imports under the category of pulp and wastepaper were valued at \$31 million in 1997, up almost 50 percent from 1996 (table G-35). Imports of paper and paper products were valued at \$996 million in 1997, up from \$817 million in the previous year (table G-35). The quantity of pulp imported during 1994-98 was small, ranging from zero in 1994 to 49,000 metric tons in 1997 (table G-36). The quantity of paper and paperboard imports increased 507 percent during 1994-98, from 27,000 metric tons to 164,000 metric tons (table G-36).

## **Exports**

Russia's forest products exports consist mostly of items that are not highly processed, such as industrial wood. The Russian economic crisis and subsequent devaluation of the ruble in the summer of 1998 strengthened Russia's relative competitive position as an exporter, and Russian firms have placed increased emphasis on export markets as a result of the depressed domestic market.<sup>187</sup> In 1998, Russia earned over \$3 billion from forest product exports, about 4 percent less than in 1997;<sup>188</sup> however, the decrease in value was primarily the result of a decline in commodity prices worldwide. Finland and Japan accounted for 70 percent of all Russian exports of forest products in 1998.<sup>189</sup> Rusexportles, historically the largest Russian forest products supplier, split into two export suppliers in 1998; Rusexportles and Corporation Rosexportles. In addition, nine major Russian exporters (including Exportles, Rusexportles, and Corporation Rosexportles) have formed a special council to plan strategies to stem declining forest products sales to Japan.<sup>190</sup>

In 1997, Russia's exports of forest products amounted to \$3.1 billion, down slightly from the previous year (table G-35). Exports of wood and wood products accounted for about two-thirds of the total; 21 percent consisted of paper and paper products; and pulp and wastepaper made up the remainder (table G-35). The EU is the major market for Russian forest product exports and in recent years has accounted for about 30 percent of Russian exports (table G-35). Japan and China are also important markets.

### *Wood and wood products*

In 1997 Russian exports of wood and wood products were valued at \$2.0 billion, up from \$1.9 billion in 1996 (table G-35). Exports of wood and wood products are significant in

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<sup>187</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1999, p. 2.

<sup>188</sup> *Ibid.*, p. 5.

<sup>189</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1999, p. 5.

<sup>190</sup> UNECE, *Forest Products Annual Market Review, 1997-98*, p. 52.

relation to domestic production. In 1997 exports of industrial wood, lumber, and wood panels were equivalent to about 29 percent, 25 percent, and 31 percent, respectively, of domestic production (tables G-33 and G-37). The quantity of Russian exports of industrial wood increased from 11.6 million m<sup>3</sup> to 18.6 million m<sup>3</sup> (table G-37). Exports of wood logs increased by 3.5 percent in 1998 compared with 1997. Four countries accounted for over 80 percent by quantity of the total: Japan (36 percent), Finland (34 percent), Sweden (7.5 percent), and China (5 percent).<sup>191</sup> Russian lumber exports generally declined over 1994-97 from 5.4 million m<sup>3</sup> to 4.8 million m<sup>3</sup> (table G-37). During 1994-97, wood panel exports increased by 42 percent from 673,000 m<sup>3</sup> to 955,000 m<sup>3</sup> (table G-37). FAS reports that Russian mills have been increasing exports of plywood because of competitive prices and better processing of cut logs.<sup>192</sup>

### *Pulp, paper, and paperboard*

In 1997 Russian exports of pulp and wastepaper were valued at \$374 million, while exports of paper and paper products were valued at \$657 million (table G-35). During 1994-98, the quantity of Russian pulp exports increased by about 10 percent from 934,000 metric tons to 1.0 million metric tons (table G-37). Pulp exports in 1998 were equivalent to about 27 percent of domestic production (tables G-33 and G-37). Paper and paperboard exports reached 1.8 million metric tons in 1998, up 21 percent from the level of 1997 (table G-37). Paper and paperboard exports in 1998 were equivalent to 49 percent of 1998 paper and paperboard production (tables G-33 and G-37). Russian exports of wood pulp to Sweden and Finland continue to expand, as a result of increasing demand for raw material for paper manufacturing.<sup>193</sup>

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<sup>191</sup> USDA, FAS, *Russia Annual Forest Products Report*, Moscow, 1999, p. 5.

<sup>192</sup> *Ibid.*

<sup>193</sup> UNECE, *Timber Committee Yearbook 1999*, ECE/TIM/INF/6 (New York and Geneva: UN 1999), p. 5.

# CHAPTER 7

## U.S. TRADE IN FOREST PRODUCTS AND FACTORS AFFECTING TRADE

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Trade in forest products between the United States and its NAFTA partners increased by 30 percent between 1994 and 1998, and now accounts for 60 percent of all U.S. trade in forest products. Trade with the rest of the world grew by 8 percent over the same period. The United States has been a net importer of forest products since 1993. Between 1994 and 1998, the difference between U.S. imports and U.S. exports increased by \$6.1 billion (from \$3.0 billion to \$9.1 billion), while the total value of U.S. trade in forest products increased by \$8.1 billion (from \$40.0 billion to \$48.1 billion). In 1998, the United States was a net importer of wood and wood products (\$7.5 billion) and paper and paper products (\$2.7 billion), and a net exporter of pulp and wastepaper (\$1.0 billion).

### U.S. Exports

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#### *Export Levels and Trends*

The value of U.S. forest product exports increased 5 percent to \$19.5 billion during 1994-98 (appendix table H-1). Canada, Japan, and Mexico were the principal destinations, accounting for 52 percent of forest products exports in 1998. The value of exports peaked in 1995 at \$23.3 billion, and then declined (with a slight upturn in 1997) to \$19.5 billion in 1998. Exports to NAFTA partners, Canada and Mexico, increased 30 percent during the period, from \$5.8 billion to \$7.5 billion, offsetting declining exports in other markets. When NAFTA exports are subtracted, U.S. exports show a decline of about 6 percent for the period. Exports to Japan, the leading market in 1994, fell behind Canada in 1997, and neared the value exported to Mexico in 1998. In general, exports to NAFTA and the major markets in Europe trended upwards during the period. Paper and paper products accounted for nearly 53 percent of forest product exports, followed by wood and wood products (30 percent) and pulp and wastepaper (18 percent).

#### *Major Products*

##### **Wood and Wood Products**

Logs, lumber, and wood panels are the principal wood and wood product exports (table H-2). Log exports, valued at \$1.2 billion, account for 21 percent of these exports. Until 1997, Japan accounted for over 70 percent of the value of U.S. log exports, with Canada a distant second. In 1997, that share fell to 69 percent, and in 1998 it dropped to 61 percent. A lagging housing market in Japan is most often cited as the reason for the

decline in exports.<sup>1</sup> During the period 1994-98, U.S. log exports fell 47 percent and 27 percent in value and quantity, respectively. In terms of quantity, logs are the principal export item, and have been throughout the decade (table H-3). Lumber exports declined by 19 percent from \$2.5 billion in 1994 to \$2.0 billion in 1998. Although lumber prices declined during 1994-98, strong demand in the United States kept U.S. prices comparatively high in world markets hurting U.S. exporters' competitiveness. The composite price for lumber fell to \$410 per thousand board feet (mbf) in 1994 and to \$337 in 1995, but then climbed up to \$417 in 1997 as the homebuilding and construction markets improved.<sup>2</sup> The domestic market remained strong in 1998, but poor export markets for logs and lumber in 1998 helped bring the composite price down to \$349 per mbf. Lumber and logs together accounted for 56 percent of the value of all wood and wood product exports (down from 67 percent in 1994).

Wood panels follow lumber and logs in importance, accounting for 10 percent of exports in 1998. Wood panel exports, excluding veneer, declined by 21 percent in quantity and by 13 percent in value during 1994-98 (table H-3). Increasing prices and falling foreign currencies relative to the dollar likely contributed to the decline. Average unit values for wood panel exports have increased each year since 1995, and were 9 percent higher than in 1994. Wood panel exports to the EU, the largest market, were on an upward trend, peaking at \$476 million in 1997, but then declined by 33 percent to \$321 million in 1998 (table H-6). Plywood exports to the EU peaked at \$221 million in 1997 and then fell by 64 percent to \$80 million in 1998. Industry representatives cited high U.S. prices and increased imports of tropical plywood, benefitting from lower exchange rates, as the reason for the rapid decline.<sup>3</sup> Veneer exports, over 90 percent of which is of hardwood species, increased 11 percent in quantity and 15 percent in value during 1994-98. Hardwood veneer exported from the United States is highly valued for use in furniture and decorative panel manufacture. The demand is for particular species, and substitutes are usually not acceptable.

## **Pulp, Paper, and Paper Products**

Most pulp produced in the United States is consumed captively in the conversion to paper in the pulp producer's mills. About 30 percent of U.S. pulp production is sold on the market for domestic use or export. In 1998, wood pulp exports were nearly 9 percent of production. U.S. exports of wood pulp and wastepaper were valued at \$3.4 billion in 1998, a decline of 9 percent from 1994. The value of exports peaked at \$6.2 billion in 1995, when a shortage of pulp led to a spike in prices. The average unit value of exported wood pulp increased from \$464 per ton in 1994 to \$605 per ton in

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<sup>1</sup> See chapter 5 for a detailed account of the market conditions in Japan.

<sup>2</sup> *Yearbook, 1998, Forest Product Market Prices and Statistics*, (Eugene, OR: Random Lengths, 1999).

<sup>3</sup> Conversations with Duncan A. King, UK representative, American Plywood Association, in London, Mar. 23, 1999, and Robert Verhorst, Director APA, Antwerp, in Brussels, Mar. 30, 1999.

1995 (30 percent). In 1996, the export price fell back to \$489 per ton, and by 1998 was \$464 per ton.

Chemical pulp used in a variety of high-quality papers accounted for 59 percent of pulp and wastepaper exports in 1998, down from a share of 62 to 63 percent in the previous 4 years (table H-2). Over the 5-year period, chemical pulp exports declined by 15 percent in value. In quantity, low-valued wastepaper exports (7.3 million metric tons) exceeded pulp exports (table H-4).

The value of paper and paper product exports increased during the five-year period from \$7.6 billion to \$10.3 billion (table H-2). The export value increased each year from 1994 to 1997 before falling in 1998 (down 3 percent). Paper products (converted paper), printing and writing paper, and linerboard were the major export items. The quantity and unit values of exports of the principal pulp, paper, and paper products are shown in table H-4.

## ***Major Markets and Market Shares***

Canada, Japan, and Mexico were the principal national markets for U.S. forest product exports in 1998. These three countries accounted for 50 to 54 percent of the value of such exports in each of the past five years. The European Union collectively accounted for 20 percent of U.S. exports in 1998.

### **Canada**

U.S. exports to Canada increased 37 percent from \$3.6 billion to \$4.9 billion during 1994-98 (table H-5). Though Canada produces a greater volume of forest products than it consumes, it imports certain grades of wood and paper and paper products that it either cannot produce from its resources or competitively against other suppliers. Canada's limited hardwood resources are supplemented by imports, mostly from the United States. Hardwood and softwood logs are imported for processing (mostly from the Northeastern United States to border areas of Eastern Canada) into areas of Canada where Canada's own supplies are long distances away. Certain grades of lumber, particularly in larger sizes, are limited due to the predominance of small diameter trees in Canada's forests. U.S. exports of most forest product categories increased during the five years covered by this report. A wide variety of consumer paper products is the principal Canadian import from the United States.

### **European Union**

Collectively, the European Union (EU) is the second largest market for U.S. exports. U.S. forest product exports to the region increased 16 percent during 1994-98, but have generally been on a downward trend since 1995 (table H-6). Exports to the EU peaked at \$4.5 billion in 1995, in part due to high pulp and paper prices, and then fell to

\$3.8 billion in 1996 as prices abated. They then recovered in 1997, before falling back to \$3.8 billion in 1998.

Germany, the United Kingdom, and Italy are the principal importers of U.S. forest products (table H-1). Exports to the EU were nearly equally divided between the three major product groupings in 1996, but growth in paper and paper products exports put that group slightly ahead by 1998 (table H-6). Paper and paper products exports showed the best growth over the five-year period, at 48 percent, led by kraft linerboard (up 54 percent in the period). Hardwood lumber, followed by wood panels, are the leading wood product imports from the United States. Because Europe lacks the diversity of hardwood species found in the United States, it imports high grade material for re-manufacture.<sup>4</sup>

U.S. pulp and wastepaper exports to the EU peaked at \$2.0 billion in 1995, due in large part to high prices (table H-6).<sup>5</sup> Exports of pulp and wastepaper to the EU steadily declined over the next 3 years but ended the 5-year period with a 7 percent gain in value.

The value of U.S. paper and paper products exports to the EU increased 48 percent from \$0.9 billion in 1994 to \$1.4 billion in 1998. Kraft linerboard was the leading export item, increasing by 54 percent in value during the 5 years.

## **Japan**

Until 1997, Japan was the top market for U.S. forest product exports; a position it held for many years back through the 1980s. Exports to Japan peaked at \$5.1 billion in 1995 and then declined steadily to \$2.7 billion in 1998 (table H-1). Over the five-year period, exports to Japan declined by 38 percent. The Asia financial crisis beginning in the summer of 1997 contributed to the decline. In 1997, exports were down by 21 percent from 1996, and in 1998 exports dropped by another 27 percent.

Japan remained the top market for U.S. exports of wood and wood products, even though these exports declined by 49 percent over the period. Wood and wood products, headed by logs and lumber, made up 59 percent of U.S. forest product exports to Japan, while paper and paper products accounted for another 25 percent (table H-7).

## **Mexico**

Exports of U.S. forest products to Mexico increased 19 percent during 1994-98 (table H-8). The increase was due entirely to gains by paper and paper products, which increased from \$1.4 billion in 1994 to \$1.8 billion in 1998. Exports of wood and wood products declined from \$410 million in 1994 to \$246 million in 1995, likely reflecting the

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<sup>4</sup> Conversation with Michael Buckley, American Hardwood Export Council, London, Mar. 23, 1999.

<sup>5</sup> The average unit value of exported non-dissolving chemical pulp increased by 39 percent from 1994 to 1995 (table H-4).

devaluation of the peso. Thereafter, wood and wood product exports increased each year to \$366 million in 1998. Pulp and wastepaper exports peaked in 1995, mostly as a result of unusually high prices in that year. Exports of paper and paper products to Mexico are mostly comprised of a variety of finished paper products, of which cartons make up about 60 percent.

## *Major Competitors in Major Markets*

Forest product exports from the United States compete against foreign production and exports from a number of forest product supplying countries. Competition varies depending on the product exported. For instance, Canada is a major competitor of the U.S. in softwood lumber and pulp, paper, and paperboard, but lacking hardwoods and restricting log exports is not a major competitor in U.S. log and hardwood lumber markets. Similarly, Russia competes with the United States in Asian and European markets for softwood products. However, in eastern Russia, the lack of manufacturing facilities and infrastructure combine to restrict exports from that region to logs destined for Asian markets, principally Japan and China.

In Japan, where U.S. exports have declined in the last 5 years, the U.S. competes with Canada, New Zealand, Chile, and nearby Asian suppliers Indonesia, Malaysia, and Russia. Competition from Canada is primarily in the Japanese lumber market. Canada's exports of softwood lumber to Japan declined by 45 percent, from \$1.7 billion in 1994 to \$1.0 billion in 1998 (table C-4). During the same period, U.S. exports of softwood lumber to Japan declined by 66 percent, from \$0.7 billion to \$0.2 billion. Some of the reasons for this decline, in addition to the Asian crisis, were reportedly high U.S. prices, new competition from Europe, and increased competition from Chile and New Zealand.<sup>6</sup>

Canada is the leading supplier of pulp and wastepaper to Japan, followed by the United States and Brazil (table F-5). In 1994, Canada, the United States, and Brazil supplied 40, 34, and 9 percent, respectively, of the value of Japan's pulp and wastepaper imports. In 1998, Canada's and the United States' shares of Japan's imports had each fallen 1 percentage point, while Brazil maintained its 9 percent share. Increased pulp imports from Indonesia accounted for most of the change. These losses were anticipated as a result of increased Indonesian pulp capacity.<sup>7</sup> Similar changes occurred for Japanese paper and paper product imports. The United States, the EU, and Canada held import market shares of 48, 22, and 16 percent, respectively, in 1994, but by 1998 these had fallen to 45, 20, and 12 percent. Further details of United States' competitors in Asia are given in Chapter 5.

The United States is the principal non European country supplying forest products to Europe, and the principal offshore supplier of wood and wood products and paper and

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<sup>6</sup> Bruce Lippke, Associate Dean and Director of the Center for International Trade in Forest Products, testimony at the Commission hearing, May 26, 1999, transcript at pp. 147-148.

<sup>7</sup> Mike Brummer, President and CEO, Can-Am Converting, Incorporated, transcript of the Commission hearing, May 26, 1999, p. 156., and David Paterson, Vice Pres. Market Pulp, Georgia Pacific Corp., transcript of the Commission hearing, p. 165.

paper products (appendix table G-4). Canada, Brazil, Indonesia, and Malaysia round out the top five suppliers. Together these countries accounted for 42 percent of European imports in 1997. The U.S. share of the value of European forest product imports increased from 31 percent in 1994 to 33 percent in 1997 (the last year for which comparative data are available). The United States gained import market shares in wood and wood products and in paper and paper products.

## **U.S. Imports**

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### ***Import Levels and Trends***

U.S. imports of forest products totaled \$28.6 billion in 1998, up 33 percent during the period 1994-98. Imports from Canada (\$20.4 billion) far exceeded those of all other suppliers (table H-1). China (\$0.9 billion) and Mexico (\$0.8 billion) were the second- and third-ranked suppliers. Principal imports were lumber (\$6.7 billion), printing and writing paper (\$4.4 billion), and newsprint (\$3.8 billion). Though the United States has huge, accessible timber resources and the largest forest products industry in the world, the large home market for forest products requires imports to fill shortfalls in demand. Imports supplied about 8 percent of U.S. forest products consumption estimated at \$250 billion.

High levels of demand in the United States have kept imports strong. Low inflation, low interest rates, and high employment have all combined to keep both the quantity and value of imports at record levels. During the five-year period, imports of wood and wood products were up 32 percent, paper and paper products up 35 percent, and wood pulp and wastepaper up 6 percent. With few exceptions, imports from major supplying countries showed healthy increases.

### ***Major Products***

#### **Wood and Wood Products**

The principal wood and wood product imports are shown in table H-9. Lumber, most of which is softwood, accounted for 51 percent of U.S. wood and wood product imports. Other important products include wood panels and builders' joinery, 21 percent and 9 percent of imports, respectively. These products are destined for the construction market in the United States and affected by the level of home and other building construction.

Softwood lumber imports increased 14 percent in quantity and 10 percent in value during 1994-98. In 1998, softwood lumber imports (44 million m<sup>3</sup>) accounted for 35 percent of U.S. consumption, up slightly from 34 percent in 1994. After Canada, Brazil, Chile, New Zealand, and Mexico round out the top five softwood lumber suppliers. Together these four countries accounted for less than 3 percent of the quantity of U.S. imports in 1998. Imports from all suppliers of softwood lumber other than Canada doubled from 1994 to

1998, and accounted for a little over 3 percent of the total in 1998 (up from 2 percent in 1994).

Wood panel imports, excluding veneer, totaled 11 million m<sup>3</sup>, up 92 percent during 1994-98. Particleboard was the largest imported wood panel product. The quantity of particleboard imports, 92 percent of which was imported from Canada, doubled during the five-year period.<sup>8</sup> Plywood was the second largest U.S. wood panel import valued at \$0.8 billion in 1998, up 6 percent from \$0.7 billion in 1994. Wood panel imports accounted for 13 percent of U.S. consumption in 1998.

U.S. imports of builders' joinery increased 124 percent in value during 1994-98, from \$0.5 billion to \$1.2 billion. Canada is the principal supplier of U.S. imports of builders' joinery (74 percent in 1998). Builders' joinery imports are likely a small part of domestic consumption. Joinery is most often assembled at the construction site and production numbers are incomplete. For example, pre-assembled wall framing is counted as joinery when imported and domestically assembled and shipped to a building site, but virtually not at all when assembled by carpenters at the building site (by far the most common practice).

## **Pulp, Paper, and Paper Products**

Total U.S. imports amounted to \$15.4 billion in 1998 and are up by 34 percent since 1994. Canada supplied \$10.7 billion (70 percent) in 1998, followed by Finland (\$0.7 billion), Germany, Mexico, China, and Japan. U.S. pulp, paper, and paper products imports represented 14 percent of consumption in 1997.

Table H-10 shows imports of the principal pulp, paper, and paper products. Chemical pulp made up 90 percent of pulp and wastepaper imports in 1998. Imports of chemical pulp increased 9 percent by quantity and 6 percent by value during 1994-98. Canada was the principal supplier in 1998 (82 percent). Printing and writing paper was the top paper item imported, accounting for 34 percent of the value of paper and paper product imports in 1998. Imports of printing and writing paper increased 36 percent in quantity and 59 percent in value in the five-year period. Imports of printing and writing paper fell to \$3.6 billion in 1996, but increased each year thereafter, reflecting strong demand in business and consumer markets.<sup>9</sup> Newsprint followed printing and writing paper in importance with a 29 percent share of paper and paper product imports. Newsprint imports declined 9 percent in quantity, but increased 13 percent in value during 1994-98. The strong U.S. economy helped imports of paper products, which increased 59 percent in quantity and 63 percent in value to \$2.7 billion during 1994-98.

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<sup>8</sup> Imports of oriented strandboard, which make up the largest portion of particleboard imports (\$1.0 billion in 1998), increased 47 and 76 percent in quantity and value, respectively, from 1996 to 1998 (the only years when such imports were reported separately in U.S. trade statistics).

<sup>9</sup> Pulp & Paper, *1999 North American FactBook*, (San Francisco: Miller Freeman, 1998), p. 5.

## ***Major Suppliers***

### **Canada**

Canada's timber resources and common border with the United States provide an advantage over other supplying countries. Canada's exports to the United States move over an efficient transportation network by rail, truck, and ship providing an advantage in the U.S. market not equaled by any other exporter. U.S. imports from Canada are shown in table H-11. Imports of forest products from Canada increased each year, from \$15.9 billion in 1994 to \$20.4 billion in 1998. Softwood lumber is the largest single item, accounting for 29 percent of Canadian forest product imports in 1998. Imports of softwood lumber declined from \$5.5 billion in 1994 to \$5.0 billion in 1995 when poor U.S. construction markets depressed demand and prices for lumber. The quantity of softwood lumber imports from Canada increased each year from 37.5 million m<sup>3</sup> in 1994 to 41.6 million m<sup>3</sup> in 1997, the year in which a quota on imports was agreed to by the United States and Canada. Softwood lumber imports from Canada then dropped to 40.7 million m<sup>3</sup> in 1997 before rebounding to a record high of 42.2 million m<sup>3</sup> in 1998. Other important wood products imports from Canada are wood panels and builders' joinery.

The value of pulp imports from Canada increased markedly in 1995, but was otherwise stable during 1994-98, increasing less than 1 percent. The value of paper and paper product imports increased 36 percent during the period, from \$6.4 billion in 1994 to \$8.7 billion in 1998. Reflecting the high pulp prices in 1995, paper and paper product imports peaked that year at just under \$9.0 billion. Newsprint and printing and writing papers accounted for 72 percent of the paper and paper products that Canada exported to the United States in 1998.

### **European Union**

Collectively the EU was the second-largest supplier of forest products to the United States, accounting for 9 percent of U.S. forest products imports in 1998 (table H-12). EU exports to the United States increased from \$1.9 billion in 1994 to \$2.7 billion in 1998, an increase of 40 percent. Paper and paper products, principally printing and writing papers, accounted for 78 percent of EU exports to the United States in 1998. Finland and Germany were the top EU exporters, with 1998 forest product exports to the United States totaling \$1.3 billion.

### **Other**

No country other than Canada supplied more than \$1 billion annually in forest products to the United States during 1994-98. China, Mexico, Brazil, and Finland round out the top five suppliers. Together with Canada, these countries supplied 82 percent of the value of U.S. imports in 1998 (table H-1). The United States is the primary export market for Brazil and Mexico, China's number two market after Japan, and a small market for Finland after the countries of the European Union (see chapters 4, 5, and 6).

U.S. imports from China more than doubled during the five-year period to \$0.9 billion,

and are nearly equally divided between wood and paper products. Most imports from China are value added specialty products. For instance, the top paper imports from China are registers, account books, and similar books and business forms (\$0.2 billion in 1998), and the top wood imports are wood marquetry and cases for jewelry or cutlery and similar items (\$0.2 billion in 1998). Similarly, imports from Mexico are nearly equally divided between wood and paper. In 1998, the principal paper imports from Mexico were registers, etc. and cartons, boxes and cases, and the principal wood imports were frames for pictures and mirrors. Forest product imports from Mexico increased from \$0.5 billion in 1994 to \$0.8 billion in 1998. Imports from Brazil, just under \$0.8 billion in 1998, consisted primarily of chemical wood pulp (\$0.3 billion) and lumber (\$0.2 billion). Imports from Finland totaled \$0.7 billion in 1998 and consisted primarily of printing and writing paper (78 percent of forest product imports in 1998).

## ***Tariff and Non-Tariff Barriers***

World trade in wood and paper products is affected by a number of tariff and non-tariff barriers. In general, there is a greater incidence of trade barriers on value-added products, particularly those geared toward export markets, than on raw materials. Tariffs on wood products are generally greater than those on paper. Tariffs on plywood and fiberboard are substantial, with a range of 5 percent to 20 percent. By contrast, most countries import logs, chips, or pulp duty free or with a very low tariff. A listing of tariff levels for major wood and paper products of the main U.S. markets and competitors is provided in the tables located in appendix I.

Non-tariff measures fall into four major categories: phytosanitary regulations, other regulations, government intervention policies, and export restrictions. Phytosanitary regulations are imposed by a number of countries as a means to protect domestic forests from foreign pests and diseases. Other regulations, such as building codes, product standards, and certification schemes, may impede the entry of specific types of wood and paper products. Certain building codes, for instance, ignore performance-based tests, relying instead on more prescriptive perceptions of quality. Certification programs, such as eco-labeling, implemented under programs promoting sustainable forestry practices, may exclude wood products that fail to meet those standards. A third type of non-tariff barrier can be classified as government intervention policies, which take the form of industry assistance, state ownership of forest resources, and government control of marketing. These practices may distort the relative competitiveness of the domestic industry and can provide these producers with an advantage in pricing and marketing. Finally, export restrictions, such as export taxes and bans, are sometimes placed on raw materials, such as logs and chips. Such restrictions may create an oversupply of domestic raw materials and artificially reduce the domestic price of raw materials, and have the effect of enhancing value-added, export-oriented industries, such as plywood and paper. These measures can become trade distorting barriers when applied.

A synopsis of the various types of non-tariff barriers imposed by major wood and paper producers can be found in the tables located in appendix J.

## **Europe**

## *Tariff Barriers*

Tariffs on wood products in the EU countries follow the pattern mentioned above. Imports of logs, moldings, and chips generally enter duty free or with a duty less than 1 percent. More moderate tariffs exist on veneer, which range between 0 and 4 percent, and joinery (tariffs range from 0.8 to 6 percent, with most tariffs under 3 percent). Tariffs on plywood, particleboard, and fiberboard are considerably higher. Applied fiberboard tariffs are set at 7.6 percent, while plywood has a rate of duty between 6.8 and 10 percent. In addition, the EU maintains a tariff-rate quota (TRQ) on certain types of plywood (HS 4412.19 and HS 4412.99) that allows for the duty-free entry of 650,000 m<sup>3</sup> of plywood, with additional quantities being subject to the overquota rate of 7.6 percent. Tariffs on other types of wood products, such as clothes hangers and toothpicks, are lower than in most countries. While the tariff range on these items is between 0 and 4.9 percent, most tariffs are 1 percent or less. In Russia, most wood products have a 20 percent duty. But, since Russia is not a member of the WTO, the rates are not bound and can be raised with impunity at any time.

Paper tariffs in the EU countries are scheduled to fall to zero by 2005. Despite this, current tariffs on most paper products are relatively high. The lowest tariffs are found on kraft linerboard, with rates between 4 and 4.6 percent. Duties on paper and paperboard range between 5 and 6.6 percent, with most products having rates at the higher end of the range. Toilet paper and diapers have tariffs of 5 percent, while other toiletries and household paper have tariffs of up to 7 percent. Tariffs on cartons and sacks are between 5.6 and 7.2 percent, with larger sacks having higher rates than smaller sacks. Other paper products have duties from zero to 8.2 percent. In Russia, most applied tariffs on paper products are around 15 percent, with major exceptions being printing paper (duty free), plastic coated paperboard (5 percent), certain varieties of kraft linerboard (5 percent), sanitary tissue and diapers (5 percent), and sacks (20 percent for large sacks and bags). Russian tariffs on pulp are 15 percent; pulp enters the EU duty free.

## *Non-Tariff Barriers*

In a submission to the United States Trade Representative, the American Forest and Paper Association (AF&PA) claims that three non-tariff barriers unfairly limit trade. These are unscientific phytosanitary restrictions, metric labeling requirements, and sustainable forest management certification. All of these can be overcome at additional cost, which like tariffs raise the price of imports thus favoring local production. According to the AF&PA, the EU is proposing a metric-only labeling program, which would require wood imports to contain only metric measurements by the year 2000.<sup>10</sup> Such an initiative would constrict American imports, given the use of the foot-pound system of measurement in the United States. Eco-labeling initiatives, mainly at the local level, are becoming increasingly common with many governments

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<sup>10</sup> American Forest & Paper Association (AF&PA), "Submission to the Office of the United States Trade Representative on Trade Barriers to Solid Wood Products for the National Trade Estimate Report on Foreign Trade Barriers," Dec. 4, 1998, p. 17.

and consumers in Europe. A recent article in the *Far Eastern Economic Review* suggests that consumers in Europe are increasingly demanding products that come from sustainable forests, despite any increase in costs such labeling may cause for consumers.<sup>11</sup> These initiatives typically, though not exclusively, target tropical wood products. In the Netherlands, a number of local governments have banned the use of tropical timber in public construction projects “unless it is certified as coming from sustainably-managed sources”; a similar measure is being proposed by local governments in Britain.<sup>12</sup> Paper imports into the EU are subject to a number of the same types of constraints as wood products, such as metric labeling and eco-labeling.<sup>13</sup>

Given the current state of the Russian economy, it is unclear what types of non-tariff barriers exist. It is likely that the uncertainty created by the current political and economic climate acts as a barrier to trade by limiting the information available to suppliers and users of wood products.<sup>14</sup>

## Asia

### *Tariff Barriers*

Tariff rates on wood products in Asia are generally low or zero for unprocessed wood and significantly higher for processed varieties of wood, such as fiberboard and plywood. An exception to this trend is Malaysia, which imposes substantial tariffs on all wood products: most, regardless of the degree of processing, have an applied duty rate of 20 percent or more. By contrast, Japan, Indonesia, and Taiwan allow the duty-free import of logs, chips, and certain types of veneer and siding, flooring, and molding, while Korea assesses a 2 percent tariff on logs and chips and an 8 percent duty on most other types of wood. In China, wood chips have a low tariff of 1 percent, while veneer and siding, flooring, and molding have relatively high duties of 8 percent and 15 percent, respectively.

Throughout Asia, tariffs on plywood are high. The lowest in the region are found in Japan and Taiwan. Plywood tariffs in Japan range from 6.7 to 12 percent, while those in Taiwan are slightly higher, varying between 7.5 and 20 percent. Discussions with industry officials in Japan suggest that current tariff levels affect the price-competitiveness of U.S. products more than they preclude their entry.<sup>15</sup> In addition,

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<sup>11</sup> Bruce Gilley, “Sticker Shock: Westerners’ calls for labeling of forest-friendly wood imports are putting pressure on Asian timber producers,” *Far Eastern Economic Review*, Jan. 14, 1999, found at Internet address [http://www.feer.com/Restricted/99jan\\_14/environ.html](http://www.feer.com/Restricted/99jan_14/environ.html), retrieved on Feb. 18, 1999.

<sup>12</sup> I. J. Bourke and Jeanette Leitch, *Trade Restrictions and Their Impact on International Trade in Forest Products*, (Rome: FAO, 1998), p. 22.

<sup>13</sup> AF&PA, *1999 National Trade Estimate Report on Foreign Trade Barriers (NTE): Barriers to U.S. Paper Exports*, 1998, pp. 11-12.

<sup>14</sup> Conversation with Jake Handelsman, director, International Trade Policy, AF&PA, May 26, 1999.

<sup>15</sup> Conversations with industry representatives, Tokyo, Mar. 1999. Officials from one company noted that a unilateral reduction in Japanese tariffs would reduce housing

specific species of wood receive different tariffs in Japan. For example, in the case of dimension lumber, it has been reported that while hemlock, Douglas fir, Sitka spruce, yellow cedar, and red cedar can be imported duty free, “SPF and larch are subject to duties ranging from 4.8 percent to 6.5 percent.”<sup>16</sup> Malaysian tariffs on plywood are particularly high, with a range between 25 and 40 percent. Elsewhere, tariff levels are around 15 percent. Applied Korean plywood tariffs were raised from 8 percent in 1997 to 15 percent in 1998. Tariffs on joinery in Japan and Taiwan are generally low (most products enter duty free in Japan and at 2.5 percent in Taiwan), while elsewhere tariffs range from 8 percent (Korea) to 20 percent (Malaysia).

Paper tariffs in Asia vary widely by country, while pulp tariffs are generally low. In Korea, all pulp products have a tariff of 2 percent, while all paper products have an 8 percent rate of duty. Pulp is traded duty free everywhere else in Asia, except for China, which assesses a tariff of 1 percent. Japan has relatively moderate tariffs on paper products, ranging from zero to slightly over 3 percent. The highest tariffs in Japan are on cartons and sacks, where the tariffs are between 3.2 and 3.4 percent. Tariffs on kraft linerboard, paper, and paperboard in Taiwan typically fall between 5 and 7 percent, though certain types of plastic-coated paper and paperboard have a tariff range of 2.5 to 7 percent. Toiletries, sanitary papers, sacks, and cartons have a tariff range of 7.5 to 9 percent. Malaysia’s tariffs on paper products vary greatly. Malaysia imposes low tariffs on most varieties of paper and paperboard (0 to 5 percent), though kraft linerboard has a high 20-percent tariff and adhesive paper has a high 25-percent tariff. Toiletries, cartons, and bags have tariffs between 20 and 30 percent. In Indonesia, tariffs range from 0 to 15 percent. Lower tariffs exist on certain types of paper and paperboard, particularly printing paper which enters Indonesia duty free. Chinese tariffs are sizable across the board. Tariffs on kraftliner, paper, and paperboard in China are 15 percent, though adhesive papers and bleached paper with a plastic coating have tariffs of 20 percent. Most toiletries, sanitary papers, sacks, cartons, and other types of paper have tariffs of 25 percent.

Forest products were included as one of the sectors in APEC’s (Asia Pacific Economic Cooperation forum) proposed early voluntary sectoral liberalization (EVSL) initiative of November 1998. Under the EVSL, tariffs on forest products were to be eliminated by no later than 2004. While a number of countries were committed towards large-scale tariff reductions in forest products, the refusal of Japan to accept reductions of tariffs on forest and fishery products at the APEC Ministerial in November 1998 prevented APEC from adopting the EVSL package.<sup>17</sup> Any future reductions of tariffs on forest

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construction costs by less than 1 percent, but emphasized that this reduction in costs would enhance the competitiveness of home builders.

<sup>16</sup> Department of Foreign Affairs and International Trade, Government of Canada, “Canada’s International Market Access Priorities: Opening Doors to Asia Pacific,” found at Internet address <http://www.infoexport.gc.ca/section4/mktx5-e.asp>, retrieved on Feb. 14, 1999.

<sup>17</sup> AF&PA, *Solid Wood Products*, p. 5.

products in the APEC region will be negotiated during the next trade negotiation round, likely to be launched at the upcoming WTO Ministerial.

### *Non-Tariff Barriers*

No evidence is available to suggest the existence of major unscientific phytosanitary regulations on wood or paper products in any of the Asian countries covered in this study. However, a substantial number of other important non-tariff barriers impede trade in wood products. The U.S. industry, the U.S. Department of Commerce, and the USDA Foreign Agricultural Service (FAS) consider certain Asian countries' building regulations as restrictions to trade. Perhaps the most common barrier to trade concerns building codes and standards as applied by Japan, Korea, Taiwan, and China. Japan, Korea, and Taiwan presently maintain ordinances that restrict the use of wood as a building material for structures of certain sizes and/or in specific areas.

Although building codes are non-discriminatory in nature, a number of regulations govern the types of materials that can be used for construction purposes. The main issue is the existence of prescriptive standards in the building codes of several countries, including Japan, Korea, and Taiwan. Prescriptive standards specify the product mix that can be used for a given type of construction (e.g., fireproof construction) but do not necessarily make any determination of the standards for performance of these products. As a result, while wooden products may perform better than other materials in many situations, such building codes may not sanction their use in construction. In June 1998, the Building Standards Law of Japan was revised to allow the use of any product that has been approved by formal, performance-based testing procedures.<sup>18</sup> Prescriptive building codes are still in effect to some extent in Korea, although according to the Foreign Agricultural Service, there has been an easing of these standards, as evidenced by the allowance of temperate softwoods in interior construction.<sup>19</sup> The existence of prescriptive building codes often creates a situation where guidelines for wood construction are few or nonexistent. In Taiwan, the lack of construction standards for wooden structures has led to uncertainty in the housing market, as financing for wood construction is often difficult or impossible to obtain.<sup>20</sup>

In Japan, imported wood must be certified by the Ministry of Agriculture, Forestry, and Fisheries (MAFF) as "JAS approved" in order to be used in most applications. While a number of foreign mills have been recognized by MAFF as producing JAS-approved lumber, Japan still does not accept the results of foreign testing of product quality as equivalent to Japanese standards.<sup>21</sup> Industry sources allege that new and proprietary

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<sup>18</sup> USDA, FAS, *Japan Forest Products Annual*, Tokyo, 1998.

<sup>19</sup> USDA, FAS, *Korea: Korea Forest Products Annual*, Seoul, AGR No. KS8062, July 1998. In addition, according to AF&PA, *Solid Wood Products*, a new building code for wooden structures is currently being drafted.

<sup>20</sup> Keith McKellar, *Taiwan Market Study for Softwood Lumber*, Forest Industries & Building Products Branch, Industry Canada, Mar. 1998, p. 5.

<sup>21</sup> AF&PA, *Solid Wood Products*, p. 12. According to USDA, FAS, *Japan Forest Products Annual Report*, there is a proposal in a recent report by MAFF on policy revisions of agricultural standards that would allow for foreign grading of wood products.

wood products are carefully scrutinized by Japanese customs officials and are often assigned a tariff classification that is not only incorrect, but has a higher rate than the claimed product category.<sup>22</sup> The Japanese Government provides significant financial support to the forest sector in Japan, funding projects such as road maintenance and construction, afforestation, the development of forestry business in river basins, the upgrading of production machinery for greater efficiency, and investment in new production facilities such as pre-cut plants and kiln-dried chambers.<sup>23</sup>

The structure of the Japanese paper industry impedes imports. While the industry is relatively concentrated in the hands of a few firms, there are a multitude of small distributors and end users of paper. According to a 1996 U.S. Department of Commerce study, this creates an environment where producers, through their control of the distribution network, maintain substantial leverage on the supply of paper that enters the market. In times of short supplies, any imports that enter the market are distributed by these networks rather than through direct orders by end users. Conversely, this leverage prevents end users from going to the world market as a source of supply for fear of losing stable domestic supplies.<sup>24</sup> All of these factors make it difficult for foreign manufacturers to break into the Japanese market.<sup>25</sup>

The financial crisis that has affected much of Asia has led to the reduction or removal of many of the non-tariff barriers on wood products that used to exist in Indonesia. Prior to 1998, the marketing of wood products was controlled by an organization called APKINDO, a Government-sanctioned cartel that directed price and supply decisions.<sup>26</sup> In addition, Indonesia imposed high export taxes and, in some cases, export bans on logs as a means of keeping a ready supply of raw material available for domestic value-added production of plywood and other panel products geared towards export markets. As part of the conditions for disbursement of International Monetary Fund (IMF) aid, Indonesia disbanded APKINDO for the marketing of wood products, reduced export taxes, and removed its export bans on logs. In its place, however, Indonesia established a practice known as “check price” that is *de facto* equivalent to the export tax/ban system it once maintained.<sup>27</sup> Check prices are the prices against which export taxes are

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<sup>22</sup> Conversations with industry representatives, Tokyo, Mar. 1999.

<sup>23</sup> Canadian Embassy, Energy, Resources, and Building Products Section, Tokyo, *Japan's Forest Sector Management Strategies: An overview*, Aug. 1998.

<sup>24</sup> USDOC, ITA, *Japan -- Paper*, Market Research Report, Aug. 1996.

<sup>25</sup> It should be noted that representatives of the Japan Paper Assn. (JPA) refute many of the claims made by foreign associations and industries regarding business practices in the Japanese paper market. In a memorandum provided by JPA, they acknowledge the requirements for paper quality and just-in-time delivery in the Japanese market, but stress that the distribution system (and market in general) is free and fair to foreign competition. In particular, they mention that foreign companies have been successful in several niche markets in Japan, a point that was echoed in talks with several foreign-owned paper companies in Tokyo in Mar. 1999. It should be emphasized, however, that many of these niche markets are fairly small in volume and revenue.

<sup>26</sup> USDA, FAS, *Indonesia: Indonesia Forest Products Annual*, Jakarta, AGR No. ID8075, Nov. 1998.

<sup>27</sup> USDA, FAS, *Indonesia: Indonesia Forest Products Annual*, Jakarta, AGR No. ID8075, Nov. 1998.

levied. These are set at levels considerably higher than world prices, so while export taxes have been slashed considerably, the overall effect has been to curtail log exports.<sup>28</sup>

The Indonesian Government maintains control over forest resources and issues concession rights to private loggers. In the past, concessions were granted only to companies with processing units, but according to a recent IMF Letter of Intent issued by the Indonesian Government, this practice was abolished by Presidential decree in January 1999 and now allows for the general sale of concessions rights.<sup>29</sup> The Indonesian Government has also pressed ahead with an eco-labeling program designed to certify its timber as being compliant with sustainable forestry practices. While only a handful of companies have been certified, Indonesia is currently working with the Forest Stewardship Council (FSC) to reach a mutual consensus on sustainable forest management standards.<sup>30</sup> Non-tariff barriers in paper products include a cumbersome customs process and the requirement that foreign-owned businesses may not combine wholesale and retail operations; they must choose one or the other.<sup>31</sup>

Non-tariff barriers on wood and paper products in China are similar to those observed in other sectors of the economy and are mostly related towards a general lack of transparency, given the Government's monopoly of marketing and trade through state-owned enterprises. According to reports by FAS, AF&PA, and the International Tropical Timber Organization (ITTO), import licenses and quotas are no longer in effect. However, China restricts trade and raises costs by the use of Designated Trading Enterprises, which are trading houses accorded official concessions to handle trade in wood products.<sup>32</sup> The ITTO reports that Designated Trading Enterprises add 1 to 2 percent to the total costs, while the margin going to middlemen ranges from "10 percent to 20 percent of the product price for reselling."<sup>33</sup> Similar problems are reported for paper and pulp imports as well.<sup>34</sup> There are also reports of the inconsistent administration and valuation of tariffs and the value-added tax (currently 17 percent, versus 6 percent for domestic products) on wood and paper products.<sup>35</sup> Imports of newsprint are subject to a sliding tariff that assigns a low rate of duty (3 percent) on high-value imports and a high tariff (45 percent) on low-value imports.<sup>36</sup>

Malaysia's main non-tariff barriers are mainly related to its wood products industry. These include a substantial amount of Government control of forestry resources in Malaysia, the existence of export bans on logs from Peninsular Malaysia, and export

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<sup>28</sup> Ibid.

<sup>29</sup> International Monetary Fund, *Indonesia Letter of Intent, Mar. 16, 1999*.

<sup>30</sup> Gilley, "Sticker Shock."

<sup>31</sup> USDOC, ITA, *Indonesia -- Pulp & Paper*, Market Research Report, Nov. 1998.

<sup>32</sup> AF&PA, *Solid Wood Products*, p. 30.

<sup>33</sup> International Tropical Timber Organization (ITTO), *Annual Review and Assessment of the World Tropical Timber Situation, 1997*, found at Internet address [http://www.itto.or.jp/timber\\_situation/timber1997/index.html](http://www.itto.or.jp/timber_situation/timber1997/index.html), retrieved on Jan. 25, 1999.

<sup>34</sup> AF&PA, *Barriers to U.S. Paper Exports*, pp. 6-7.

<sup>35</sup> USDOC, ITA, *China -- Building Materials*, Market Research Report, Dec. 1997; and AF & PA, *Solid Wood Products*, p. 31.

<sup>36</sup> Department of Foreign Affairs and International Trade, Canada, "Canada's International Market Access Priorities: Opening Doors to Asia Pacific."

taxes on logs from Sabah.<sup>37</sup> While Malaysia has resisted third-party certification of its forests from groups such as the FSC, it established the National Timber Certification Council (NTCC) in January 1999 in response to the growing trend towards eco-labeling, and in March 1999 began negotiations with the FSC regarding the collaboration of both groups in developing mutually agreeable certification standards.<sup>38</sup>

## Latin America

### *Tariff Barriers*

Tariffs on most wood products in the Latin American countries covered in this study (Mexico, Brazil, and Chile) are relatively high. In Chile, all products (with the exception of a few agricultural products and certain alcoholic beverages) are assigned a uniform tariff of 11 percent. While this type of tariff is transparent and easy to administer, it also distorts trade and investment priorities. Chile recently announced plans to reduce its tariffs by 1 percent each year until they reach 6 percent by 2003.<sup>39</sup> Tariffs in Brazil are sizable. The lowest rate of duty, on logs, is 5 percent; in most other countries, logs can be imported duty free. Board, plywood, siding, flooring, and molding have tariff rates of 13 percent, while veneer has a duty of 9 percent. Moreover, these rates are bound at levels ranging from 20 to 35 percent.

NAFTA has helped to reduce or eliminate the duties faced by American exporters of wood products. Logs, veneer, siding, flooring, molding, and fiberboard enter Mexico duty free as a result of NAFTA. At the same time, however, tariffs on particleboard (7.5 to 10 percent) and plywood (10 percent) are still significant. Mexico also maintains tariff-rate quotas on chips and planks. These TRQs, however, are  `a l l e g e d l y` underutilized and plagued by  `p o o r` administration, thus limiting  `e x p o r t` opportunities for  `U . S .` producers.<sup>40</sup>

Tariffs in Latin America on paper products are significant. As mentioned previously, Chile maintains a uniform 11 percent tariff even on products such as wood pulp that are

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<sup>37</sup> USDA, FAS, *Malaysia: Malaysia Forest Products Annual*, Kuala Lumpur, AGR No. MY8040, July 1998 and Bourke and Leitch, *Trade Restrictions*, p. 20.

<sup>38</sup> Malaysian Timber Council, "Press Release on Discussions Between Malaysian Forestry and Timber Organisations and Forest Stewardship Council (FSC) Regarding Timber Certification," Mar. 5, 1999, found at Internet address [http://www.mtc.com.my/ntcc/ntcc\\_press.html](http://www.mtc.com.my/ntcc/ntcc_press.html). See also Gilley, "Sticker Shock."

<sup>39</sup> USDA, FAS, *Chile: Duties and Taxes Facing Agricultural Imports*, Santiago, AGR No. CI8035, Nov. 1998.

<sup>40</sup> AF&PA, *Solid Wood Products*, pp. 25-26.

traded duty free in many countries. Brazilian tariffs on pulp are currently 7 percent. Brazilian paper tariffs are very high. The lowest tariffs (15 percent) are on kraftliner board and uncoated paper and paperboard. Other tariffs range between 16 and 19 percent. Most applied MFN paper tariffs in Mexico are set at 10 percent, though

NAFTA has reduced most of these to zero or 5 percent. Nonetheless, under NAFTA certain types of newsprint are still assessed high tariffs of 10.5 percent, while a number of kraft paper varieties have tariffs of 7 percent.

### *Non-Tariff Barriers*

The incidence of non-tariff barriers in Latin America appears to be lower than in Asia. No major non-tariff barriers on wood or paper products were identified for Brazil or Chile. In Brazil, the main barriers to trade are a combination of high tariffs and high taxes on imports (see table I-1). Chile provides Government assistance to small forestry operations in the form of cost deferments and tax breaks.<sup>41</sup> Although there is no evidence of non-tariff barriers on paper imports in Mexico, there are a number of phytosanitary requirements on imported wood. In 1998, Mexico announced phytosanitary certificates were needed for imports of wooden pallets, new sawn lumber, plywood, and veneer. In addition, further documentation was required for imports of used sawn lumber, plywood, and veneer destined for border areas. The announcements made by the Mexican Government specify both the necessary type of treatment (kiln-dried, air-dried) and the requirement that these imports be accompanied by an International Phytosanitary Certificate that the imports originated from a pest-free area; the latter regulation would consider a USDA Animal Plant Health Inspection Service (APHIS) certificate as insufficient.<sup>42</sup> Recent information from FAS, however, suggests that fumigation can be carried out by Mexican Customs officials at little cost.<sup>43</sup> Mexico also provides assistance to the forest sector through a variety of projects that fund investment in wood and paper industries by large companies and provide infrastructure and development to common, *ejido* land.<sup>44</sup>

## **United States and Canada**

Most tariffs on wood products in the United States are lower than those in Europe and Asia. Logs, chips, and veneer enter the United States duty free. Tariffs on particleboard are generally less than 1 percent. The United States maintains relatively high tariffs on certain varieties of wood, fiberboard, plywood, and joinery. While most types of wood (coniferous and nonconiferous) have a tariff that is less than 1 percent, sanded and grooved dowel rods have a 5.4 percent tariff. Miscellaneous varieties of fiberboard have duty rates between 4.3 and 6 percent, depending on their density. Certain plywoods have high tariffs, ranging from 8 percent (for some varieties of tropical plywoods from places like Indonesia) to 10.4 percent (for certain domestic

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<sup>41</sup> USDA, FAS, *Chile: Forest Products Annual*, Santiago, AGR No. CI8031, Oct. 1998.

<sup>42</sup> See USDA, FAS, *Mexico: Translation of Mexican Draft Rule for Used Lumber*, Mexico City, AGR No. MX8066, June 1998; and USDA, FAS, *Mexico, Translation of Mexican Draft Rule for New Lumber*, Mexico City, AGR No. MX8065, July 1998.

<sup>43</sup> USDA, FAS, *Mexico: Forest Products Annual*, Mexico City, AGR No. MX9006, Apr. 1999.

<sup>44</sup> USDA, FAS, *Mexico: Forest Products Annual (Part I, Production and Trade Sections)*, Mexico City, AGR No. MX8124, Oct. 1998.

varieties, such as Douglas fir). There are also sizable tariffs on doors (5.3 percent) and other articles of wood, such as wooden blinds (5.7 to 11.9 percent).

Canadian MFN tariffs on wood products tend to be lower than U.S. tariffs (as a result of NAFTA, duties on substantially all American forest products entering Canada are set to zero). As in the United States, logs, chips, and veneer enter Canada duty free. Tariffs on siding, flooring, and molding range between zero and 3.5 percent. Certain particleboard tariffs are higher than those in the United States, while fiberboard rates are on par with American tariffs. Most plywood tariffs in Canada are around 5 to 6 percent, with the exception of certain varieties, such as Douglas fir, which have a 9.5 percent tariff. Joinery products, with the exception of window frames (6 to 8 percent tariff), have a zero tariff, while other wood products, such as clothes hangers and toothpicks, are dutiable at between 6 and 7 percent.<sup>45</sup>

Paper tariffs in the United States are also relatively low. Tariffs on kraft paper range between zero and 2.6 percent, while duties on paper and paperboard vary between zero and 1.5 percent. Adhesive paper enters the United States with a 3.5 percent duty. Sanitary paper is assessed higher duties, between 3.2 and 3.4 percent. Other types of paper, such as sacks, cartons, and filter paper have tariffs between 1.7 and 3.2 percent, though hand fans have a duty of over 10 percent. Cartons enter the United States at a lower rate of duty than sacks.

As with wood products, U.S. and Mexican paper products enter Canada duty free under NAFTA. Non-NAFTA Canadian paper tariffs are similar to those in the United States. Most kraft paper and paper and paperboard have no tariff. Adhesive paper has a relatively high 6 percent tariff. Sanitary papers have a tariff range of 0 to 10.5 percent. While cartons enter Canada duty free, sacks, containers, and boxes have tariffs between 3 and 7.5 percent. Miscellaneous paper, such as filter paper, trays, and dishes, has a tariff range of zero to 6 percent.<sup>46</sup>

No major non-tariff barriers were identified in either country for wood or paper products. In the United States, there is increased awareness at the local level regarding wood products that originate from sustainably managed forests. Several cities, including New York City, ban the use of tropical woods from city public works projects unless accompanied by FSC certification.<sup>47</sup>

## Exchange Rates

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A foreign country's real or nominal "exchange rate" refers to the rate of exchange of a foreign currency per U.S. dollar. Whenever data are available, real exchange rates are

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<sup>45</sup> General, non-NAFTA tariffs on wood products for Canada can be found at Internet address <http://www.apectariff.org>.

<sup>46</sup> General, non-NAFTA tariffs on pulp & paper products for Canada can be found at Internet address <http://www.apectariff.org>.

<sup>47</sup> Bourke and Leitch, *Trade Restrictions*, p. 22. According to Gilley, "Sticker Shock," this also occurs in Los Angeles.

presented. Real, and not necessarily nominal, exchange rates can influence forest product trade flows.<sup>48</sup>

Some analysis is presented below for the exchange rates of the Swedish krona, Finnish markka, and French franc for the 1994-98 period. Note that as of January 1999 these three currencies have been replaced by the euro because these three nations are among the EU's eleven members that opted to join the European Monetary Union.<sup>49</sup> These three exchange rates denominated in kronas, markkas, or francs are no longer published after December 1998.

### *Role of Real Exchange Rates*<sup>50</sup>

A real depreciation of a forest product producer's currency relative to the U.S. dollar, reflected by a rise in the relevant real rate, might have two conflicting effects on the foreign industry - - one beneficial and the other adverse. The real depreciation would render the foreign forest products more price-competitive than U.S. products, and would possibly result in importers switching from U.S. forest products to the now less expensive products produced in the foreign country with the devalued currency. On the other hand, the depreciation would work to the foreign producer's disadvantage if the foreign forest product industry imports substantial volumes of the now more costly U.S.-produced inputs. Likewise, a real appreciation of the foreign producer's currency relative to the U.S. dollar, reflected by a decline in the relevant real rate, would have effects opposite to those just attributed to a real depreciation. Therefore, the net impacts on a foreign forest products industry of a real exchange rate movement's offsetting demand and supply effects are not always evident when the foreign industry competing with the U.S. industry purchases substantial inputs from the United States.

A real depreciation of a foreign forest product consumer's currency relative to the U.S. dollar would render U.S. forest products more expensive than those of a foreign producer,

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<sup>48</sup> The real exchange rate of a foreign country's currency (currency "K") per U.S. dollar is the nominal currency K/U.S. dollar rate adjusted by a ratio of price deflators to account for the relative movements in the general price levels across country K and the United States (a "relative inflation factor"), and may be written as:

$$(\text{currency K/U.S. dollar}) * (\text{deflUS/deflK})$$

The first term is the nominal exchange rate, while the second term is the ratio of U.S. and country-K price deflators (deflUS, deflK) or the relative inflation factor.

<sup>49</sup> See unauthored and undated "The Exchange of National Bank notes in the Euro Area," found by USITC staff at <http://www.ecb.change/bnØ1.htm>, on Sept. 1, 1999.

<sup>50</sup> This section provides a discussion of the effects of real depreciations and appreciations of foreign currencies relative to the U.S. dollar, where foreign currencies are those of both forest product producer and consumer countries. Such real currency depreciations and appreciations are analyzed under the *ceteris paribus* assumption. A foreign producer country's currency change relative to the dollar is assumed without concurrent changes in other producers' currencies relative to the dollar. Likewise, a foreign consumer country's currency is assumed to change in value relative to the dollar without concurrent changes in other consumers' currencies relative to the dollar.

and may result in the consuming nation switching to more competitively priced non-U.S. forest products. A real appreciation of the forest product consumer's currency relative to the U.S. dollar would enhance the price competitiveness of U.S. products relative to foreign forest products, and may lead to the consumer country's switch to U.S. products.

### ***Forest Product Producers***

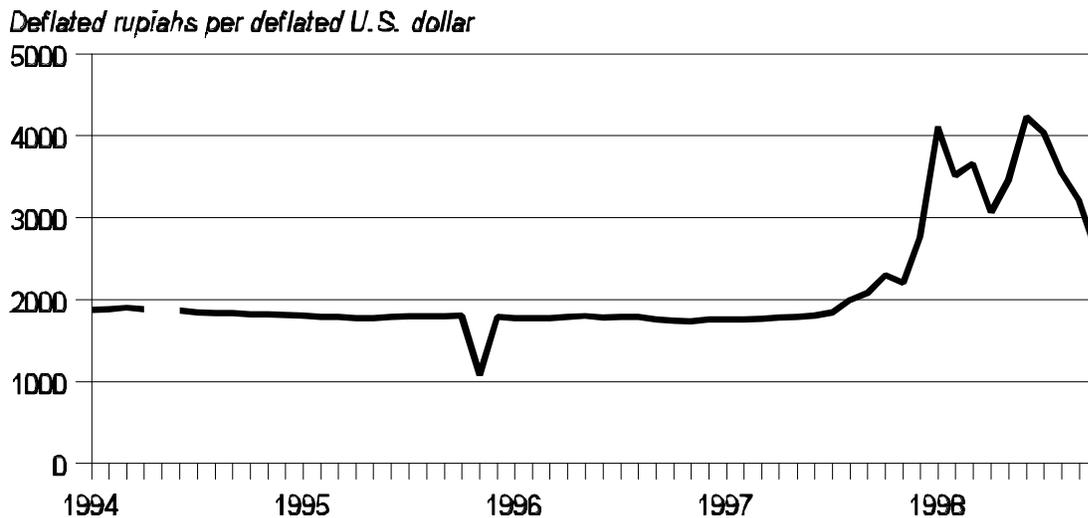
Indonesia and Malaysia are two forest product producers that have experienced sharp real devaluations relative to the U.S. dollar since mid-1997. During the January 1997-June 1998 period, Indonesia's rupiah weakened considerably in real terms against the dollar, as reflected by a 141 percent rise in the real Indonesian exchange rate (figure 7-1). Malaysia's ringgit also began weakening in real terms against the dollar in early 1997, as evidenced by a 56 percent rise in the real Malaysian exchange rate during the March 1997-August 1998 period (figure 7-2). And while both the Indonesian rupiah and Malaysian ringgit strengthened somewhat during late 1998, both currencies have remained weak relative to the dollar by historical standards. These rather pronounced and sustained real devaluations of Indonesian and Malaysian currencies may have contributed to the diversion of world import demand from U.S. forest products towards the now relatively less expensive Indonesian and Malaysian products. Such possibly devaluation-induced demand diversions toward Indonesian and Malaysian products would benefit these two Asian industries insofar as the effects of these devaluations on prices of imported U.S. inputs are not raising Indonesian and Malaysian production costs.

Sweden, Finland, and Canada also compete as producers with the United States in world forest product markets. In real terms against the U.S. dollar, Sweden's krona, Finland's markka, and Canada's dollar have varied modestly in value, such that real exchange rate movements for these three currencies have likely not influenced U.S. forest product exports to an appreciable degree. In real terms against the dollar, and particularly since 1995, the Brazilian reais and Chilean peso have varied modestly in value, such that movements in these two real rates have likely had little or no appreciable influences on U.S. forest product imports.

### ***Forest Product Consumers***

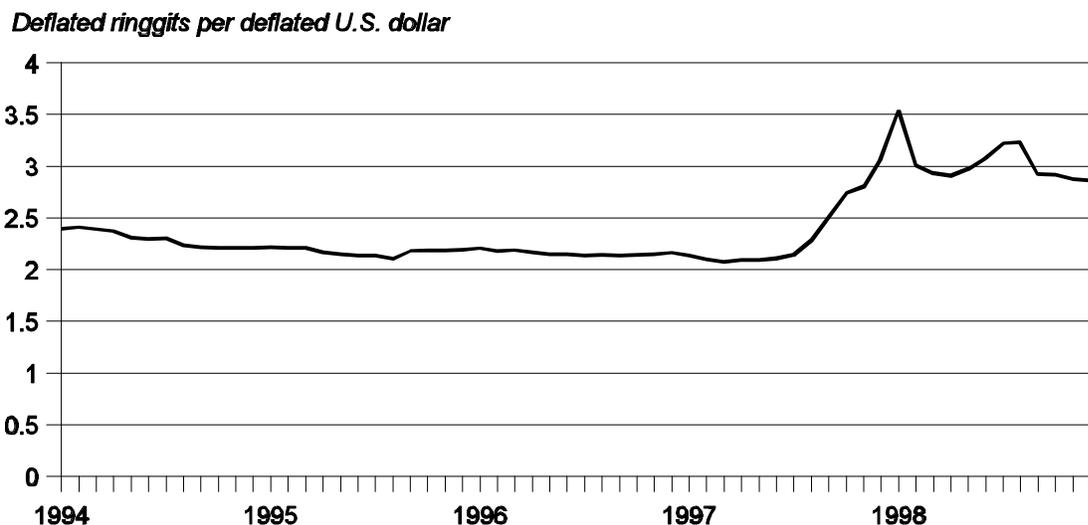
There are three forest product-importing nations of note with currencies that noticeably depreciated in real terms relative to the U.S. dollar during the 1994-1998 period: Japan, Korea, and France. Japan's yen weakened considerably in real terms against the U.S. dollar during much of the period, as evidenced by the 66 percent increase in the real Japanese exchange rate during the June 1995-August 1998 period (figure 7-3). Concurrently with the Asian financial crisis, Korea's won devalued precipitously in real terms against the dollar, as evidenced by the real Korean exchange rate's 65 percent rise during the six months ending January 1998 (figure 7-4). On a less pronounced and more gradual scale, France's franc declined in real terms against the U.S. dollar, as

**Figure 7-1**  
**Indonesia: Monthly real exchange rates of rupiahs per U.S. dollar, 1994-1998**



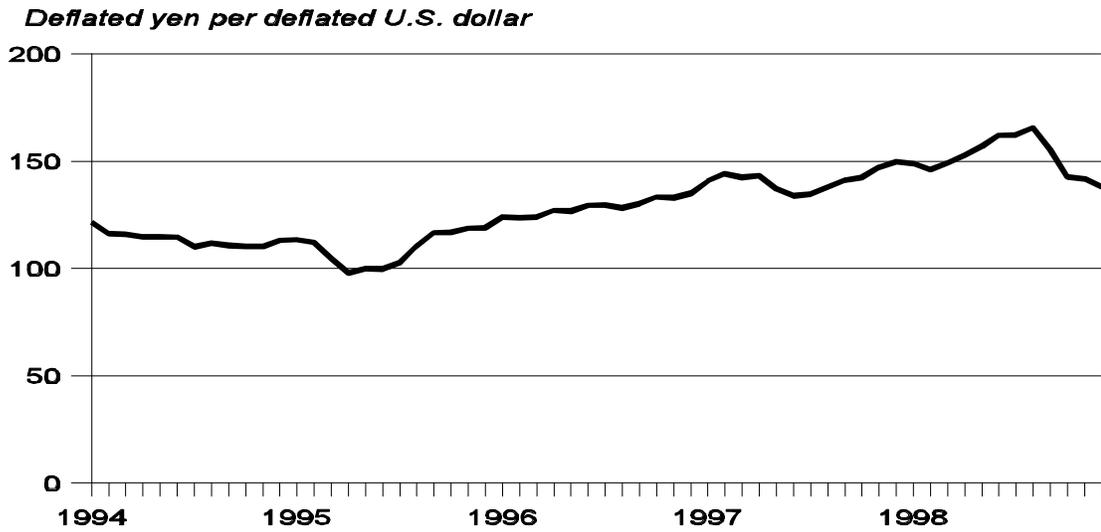
Sources: Plotted data were calculated by USITC staff with data published by the IMF, *International Financial Statistics*, monthly issues of Oct. 1994 through May 1999, Indonesia and U.S. country pages. IMF data used to calculate the real Indonesian exchange rate included the nominal exchange rate of rupiahs per U.S. dollar; the U.S. producer price index; and the Indonesian wholesale price index (petroleum included). Data were not available to calculate the real Indonesian exchange rate for May 1994 and Nov.-Dec. 1998.

**Figure 7-2**  
**Malaysia: Monthly real exchange rates of ringgits per U.S. dollar, 1994-1998**



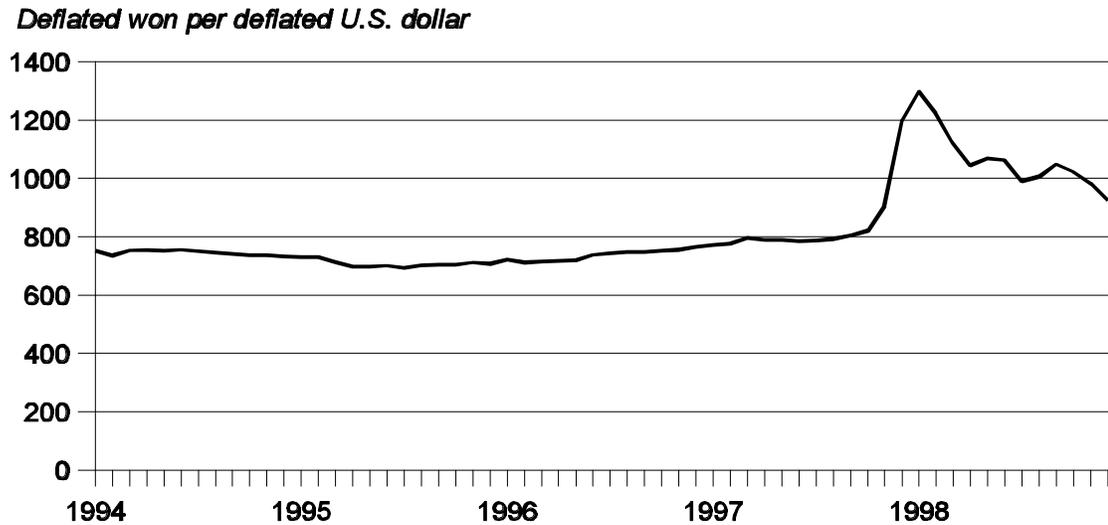
Sources: Plotted data were calculated by USITC staff with data published by the IMF, *International Financial Statistics*, monthly issues of Oct. 1994 through May 1999. IMF data used to calculate the real Malaysian exchange rate included the nominal exchange rate of ringgits per U.S. dollar; the U.S. producer price index; and given the unavailability of wholesale or producer price index values for Malaysia over the calculation period, the Malaysian consumer price index.

**Figure 7-3**  
**Japan: Monthly real exchange rates of yen per U.S. dollar, 1994-1998**



Sources: Plotted data were calculated by USITC staff with data published by the IMF, *International Financial Statistics*, monthly issues of Oct. 1994 through May 1999, Japan and U.S. country pages. IMF data used to calculate the real Japanese exchange rate included the nominal exchange rate of yen per U.S. dollar; the U.S. producer price index; and the Japanese wholesale price index.

**Figure 7-4**  
**Korea: Monthly real exchange rates of won per U.S. dollar, 1994-1998**



Sources: Plotted data were calculated by USITC staff with data published by the IMF, *International Financial Statistics*, monthly issues of Oct. 1994 through May 1999, Korea and U.S. country pages. IMF data used to calculate the real Korean exchange rate included the nominal exchange rate of won per U.S. dollar; the U.S. producer price index; and the Korean producer price index.

reflected by a 36 percent increase in the real franc/dollar rate during the period April 1995-August 1998 (figure 7-5). Such notable periods of real depreciation of the yen, won, and franc relative to the U.S. dollar may have led to a decline in import demand for U.S. forest products, and perhaps to a demand diversion towards competing foreign-produced products, as U.S. forest product prices, denominated in these foreign currencies, rose relative to competing prices of other producer countries. In late 1998, the real values of the yen, won, and franc relative to the U.S. dollar began rising, and may have lessened or offset the possible adverse effects of the just-cited devaluations.

Mexico is an important market for U.S. forest products, and movements in the real exchange rate of pesos per U.S. dollar may have had both negative and positive effects on Mexican import demand for U.S. forest products during alternate subperiods of the 1994-1998 period (figure 7-6). The Mexican peso's value fell precipitously relative to the dollar, as evidenced by the 68 percent real Mexican exchange rate increase during the brief November 1994-March 1995 period. Mexican import demand for U.S. forest products may well have been dampened by the resulting increases in deflated peso-denominated prices of such imports.<sup>51</sup> Thereafter, the peso began to gradually but steadily recover against the dollar, as reflected by a 36 percent decline in the real Mexican exchange rate during the March 1995-December 1998 period. It is possible that this real peso appreciation against the dollar since 1995 has offset some of the previously weakening peso's adverse impacts on Mexican demand for U.S. forest products.<sup>52</sup>

### ***Mercantilistic Theory of Exchange Rate Management***

The idea that forest product exporting countries may be manipulating their exchange rate in order to retain a weak currency relative to the dollar and to promote their forest product exports through lower dollar-denominated export prices, was suggested by testimony of the U.S. forest and paper product industry.<sup>53</sup> Such testimony stated that

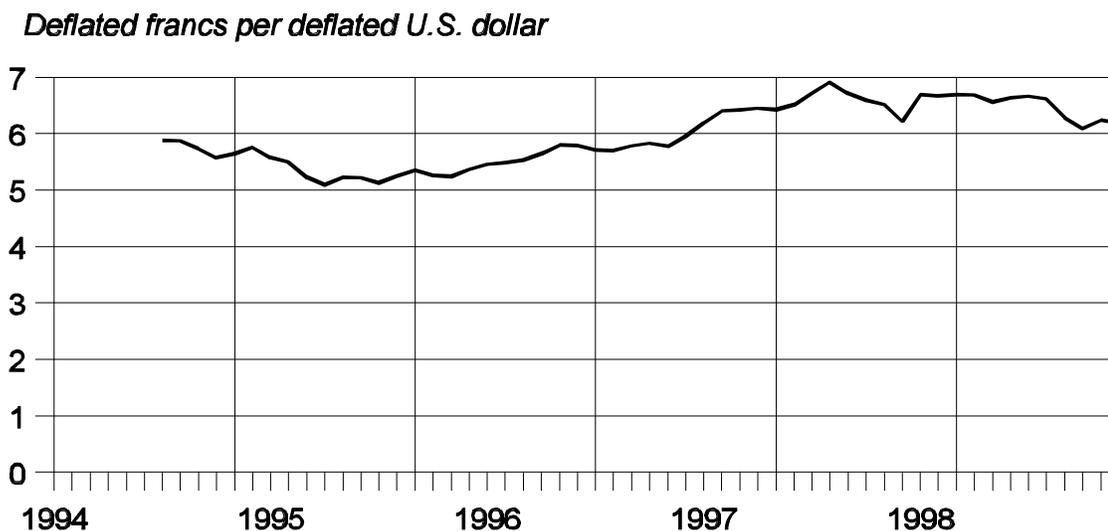
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<sup>51</sup> Such Mexican import demand for U.S. forest products may have suffered from adverse influences from dampened income and aggregate demand from the concurrent Mexican recession. Mexico's real 1995 gross domestic product or GDP fell more than 6 percent from 1994 levels. One cannot discern, a priori, the relative influences on Mexican import demand for forest products from the drop in real peso's value or the real GDP decline. See IMF, *International Financial Statistics*, May 1999, Mexico country pages.

<sup>52</sup> Such Mexican import demand for U.S. forest products may have been augmented from rising real income and aggregate demand from the concurrent Mexican macroeconomic recovery. Mexico's deflated GDP rose from year-previous levels by over 5 percent in 1996 and by nearly 7 percent in 1997 (1998 figures were not yet published). See IMF, *International Financial Statistics*, May 1999, Mexico country pages.

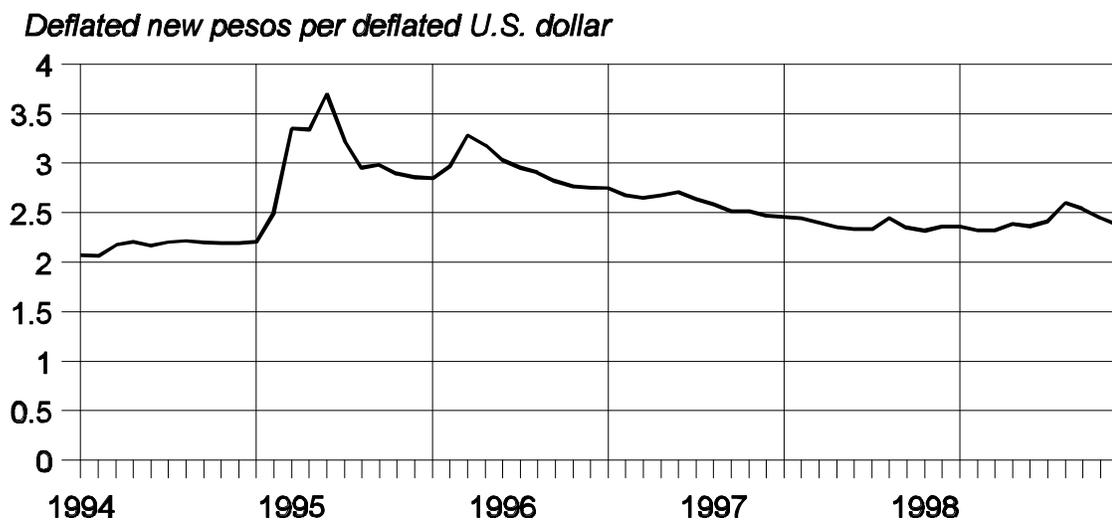
<sup>53</sup> W. Henson Moore, president and chief executive officer, AF&PA, transcript of the Commission hearing, May 26, 1999, pp. 65-66.

**Figure 7-5**  
**France: Monthly real exchange rates of francs per U.S. dollar, 1994-1998**



Source: Plotted data were calculated by USITC staff with data published by the IMF, *International Financial Statistics*, monthly issues of Oct. 1994 through May 1999, France and U.S. country pages. The IMF data used to calculate the real French exchange rate included the nominal exchange rate of francs per U.S. dollar; the U.S. producer price index; and the French price index of intermediate industrial goods. Some of the data needed for calculating the real French exchange rate were not available for the first 6 months of 1994, and the real exchange rate was not calculated for these dates.

**Figure 7-6**  
**Mexico: Monthly real exchange rates of pesos per U.S. dollar, 1994-1998**



Source: Plotted data were calculated by USITC staff with data published by the International Monetary Fund, (IMF), *International Financial Statistics*, monthly issues of Oct. 1994 through May 1999, Mexico and U.S. country pages. IMF data used to calculate the real Mexican exchange rate included the nominal exchange rate of new pesos per U.S. dollar; the U.S. producer price index; and the Mexican wholesale price index.

certain work that labels such policy as “mercantilistic” exchange rate policy may apply to

certain foreign product exporters.<sup>54</sup>

The USITC staff examined the changes in U.S. dollars and financial assets held by Japan and Sweden against movements in each country's currency/dollar exchange rate. Japan was selected because of the importance of its economy and its importance as a forest products market. Sweden was selected because of its importance as a forest products producer and exporter.

No positive correlation was found between Japanese purchases or sales of U.S. dollars and financial assets and fluctuations of the Japanese real exchange rate. Throughout 1994-98, the yen seemed to weaken against the dollar regardless of Japanese sales or purchases of U.S. dollars and financial assets. Similarly, no evidence was found that Sweden conducted a policy of exchange rate management with the U.S. dollar. Further, the U.S. Treasury, which monitors exchange rate manipulation in an annual report to Congress, did not report recent evidence of exchange rate manipulation by major U.S. trading partners, including Japan and Sweden.<sup>55</sup> The staff analysis of possible exchange rate manipulation and a review of literature available on the subject are presented in appendix K.

## **U.S. and Foreign Government Policies Affecting Forest Products Trade**

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### ***U.S.- Canada Softwood Lumber Agreement***

Lumber has been the subject of the longest running bilateral trade dispute between the United States and Canada, dating from 1982. Following a series of CFTA (U.S.-Canada Free-Trade Agreement)/NAFTA panel decisions that upheld the Canadian position (i.e. that Canadian policies with regard to softwood lumber do not constitute support), the U.S. industry, citing increased market share by Canada, threatened a countervailing duty action in 1994. High level negotiations resulted in a 5-year trade agreement-in principle between both countries. Under the terms of the agreement, which became effective April 1, 1996, Canada limits its exports of softwood lumber to the United States, while the United States

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<sup>54</sup> Preeg's work includes: E. Preeg, "The U.S. Trillion Dollar Debt to Foreign Central Banks," unpublished essay draft, Sept. 1998; E. Preeg, "The Truly New Financial Architecture," *Journal of Commerce*, Opinion section, Apr. 22, 1999; E. Preeg, "Call to Halt Chinese Mercantilism," *Journal of Commerce*, Opinion section, Apr. 1, 1999; E. Preeg, "The Dollar and the Trade Deficit," *Journal of Commerce*, Opinion section, Feb. 22, 1999; and E. Preeg, "Japan's Temptation to Buy Dollars," *Journal of Commerce*, Opinion, July 2, 1997. See testimony by W. Henson Moore, president and chief executive officer, AF&PA, transcript of the Commission hearing, May 26, 1999, pp. 65-66.

<sup>55</sup> U.S. Department of the Treasury, Annual Report to Congress on International Economic and Exchange Rate Policy, period covered from Nov. 1, 1996 to Oct. 31, 1999, found at Internet address <http://www.treas.gov/press/release/docs/fxrpt98.pdf>, retrieved on July 19, 1999.

agrees to take no official action against softwood lumber imports from Canada.<sup>56</sup>

Canada agreed to apply an export tax on exports in excess of 14.7 billion board feet (about 34.6 million m<sup>3</sup>). The export tax rate is \$50 per 1,000 board feet for the first 650 million board feet in excess of the annual threshold, and \$100 per 1000 board feet in excess of the additional amount. A provision of the agreement allows additional Canadian lumber imports in times of increased demand. The limits apply to manufacturers in the Provinces of Alberta, British Columbia, Ontario, and Quebec. The quota is divided among firms based on their historical exports. In turn, Canada received a pledge by U.S. lumber companies, unions, and trade associations that they will not seek recourse to the trade laws for the duration of the agreement (due to expire in March 2001). Canada was assured that the U.S. Department of Commerce would not self initiate any trade action during the life of the agreement, and would dismiss any petition for softwood lumber that was brought under the countervailing duty or dumping law as long as the agreement is in effect and not breached.<sup>57</sup>

## *Export Promotion*

Since 1979, the AF&PA (formerly the National Forest Products Association) and the USDA Foreign Agricultural Service have conducted a cooperative export market development program for selected wood products. The program has grown from \$125,000 in 1979 to \$265,460 for fiscal 1999.<sup>58</sup>

Additional money is available through the FAS Market Access Program, which uses funds from the USDA's Commodity Credit Corporation to enter into agreements with U.S. agricultural trade organizations, state regional groups, and cooperatives to encourage the development, maintenance, and expansion of commercial export markets for U.S. agricultural commodities and products.<sup>59</sup> The 1999 allocation for the AF&PA was \$7,745,222.

The program funds are used, among other things, to rent office space and pay staff in important foreign wood product markets, conduct product demonstrations, produce brochures and other literature regarding U.S. wood products, provide information on wood markets and trade, and identify trade opportunities. The allocated funds for 1999 are being spent principally in Asia (\$5.0 million) and Europe (\$3.5 million). Allocations are made through the AF&PA and its member associations. The 1999 allocations by association are: American Hardwood Export Council (\$3.8 million), AF&PA (\$2.1 million), The Engineered Wood Products Association (\$2.1 million), the Southern Forest Products Association (\$0.6 million), and the Western Wood Products Association

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<sup>56</sup> U.S. International Trade Commission, *The Year in Trade, 47th Report, 1995*, USITC publication 2971, Aug. 1996.

<sup>57</sup> U.S. International Trade Commission, *The Year in Trade, 48th Report, 1996*, USITC publication 3024, Apr. 1997.

<sup>58</sup> USDA, FAS, found at Internet address <http://www.fas.usda.gov>, retrieved on May 4, 1999.

<sup>59</sup> Ibid.

(\$0.4 million).<sup>60</sup>

## *Financial Assistance to Forestry Sector*

### **Multilateral Institutions**

#### *World Bank*

The World Bank's forest portfolio (including forestry and forestry-related projects) amounted to about \$5 billion in 1998.<sup>61</sup> The Bank's involvement in forestry sector activities includes direct financing of forestry projects, as well as making forestry issues part of its policy dialogue with developing countries. Forest policy reforms required by the Bank might include removing inefficient concession policies and distortive market incentives (such as transport subsidies and underpriced timber).<sup>62</sup>

Projects funded by the World Bank cover a wide range of forest activities, including investments in collaborative forest management and social forestry.<sup>63</sup> For example, a forestry development project in China involves the dissemination of improved silvicultural models for intensively managed plantations in poverty areas, while a natural resource management project in Tunisia is aimed at promoting sustainable land resource management and planning. An environmental management project in Malawi includes support and technical assistance to local communities in managing forest resources.

Most World Bank forest projects contain some support for institution building and strengthening in the forestry sector. Examples include a forestry development project in Albania which aims to promote reforms in marketing, pricing, and trade policies for forest products, and a forest sector development project in the Punjab region of Pakistan which provides funds for strengthening the state ministry of forestry. Several World Bank forest projects are focused on environmental protection and the conservation of biodiversity. For example, a natural resource management project in Ghana provides support for implementation of forestry and wildlife policy, in particular biodiversity conservation through management of forests and protected wildlife areas. Similarly, a forest protection and rural development project in Vietnam aims to protect and manage special use forests with high biodiversity values through strengthening protection measures and improving the livelihood of residents. World Bank forestry projects also provide technical assistance for policy reform and for regulatory and enforcement systems. In the Kerala, Bihar, and Uttar Pradesh regions of India, projects support policy and institutional reforms, while

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<sup>60</sup> USDA, FAS, facsimile transmission, signed by Tom Westcot, Sept. 3, 1999, Washington, DC.

<sup>61</sup> World Bank forest portfolio, found at Internet address <http://wbln0018.worldbank.org/essd/kb.nsf/44723e10ef66df7d852566740076a09c/08a5f06f55d2af9c852566740078a41b?OpenDocument>, retrieved July 6, 1999.

<sup>62</sup> Ibid.

<sup>63</sup> The information provided in this paragraph was obtained from the World Bank, Project Information Documents, found at Internet address <http://www.worldbank.org/html/pic/dpo4.htm>.

a forests and parks protection project in Haiti provides technical assistance to stem environmental degradation in three national reserves. A forestry development project in Argentina focuses on improving the policy and regulatory framework through improved forest institutions.

### *International Finance Corporation*

The International Finance Corporation (IFC) is the world's largest source of multilateral lending for private sector projects. A member of the World Bank Group, the major roles of the IFC are to finance private sector investments in developing countries, mobilize capital in the international financial markets, and provide technical assistance to governments and private sector entities.

The IFC has invested in, and provided financing for, several pulp and paper companies, most recently in Asia, Eastern Europe, and Russia.<sup>64</sup> In 1999, the IFC signed an agreement to invest \$30 million in United Pulp and Paper Company Inc., a leading producer of packaging paper in the Philippines.<sup>65</sup> The company will use the funds to finance working capital and to restructure its debt portfolio. In 1998, the IFC invested \$48 million in Korea's Shinmoorim Paper Manufacturing Co. Ltd., which produces and exports high quality coated paper. The company will use the funds to finance capital equipment to expand its productive capacity.<sup>66</sup> In Bosnia and Herzegovina, the IFC will provide credit to a small number of medium-sized wood processing and furniture companies.<sup>67</sup> The funds will be used to finance working capital and to pay for plant modernization. In Croatia, the IFC is investing \$42 million in a major paper company (Belisce d.d.). Financing will be spent on modern technology to improve efficiency in the plant.<sup>68</sup> In central Romania, the IFC recently assisted a major corrugated paper producer in financing (\$4 million) plant revitalization and debt restructuring.<sup>69</sup> It also provided \$15 million in funds to update Celhart Pulp and Paper Mill's production

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<sup>64</sup> Information on IFC activities compiled from IFC Press Releases found at Internet address [www.ifc.org](http://www.ifc.org).

<sup>65</sup> IFC Press Release, found at Internet address <http://www.ifc.org/pressroom/Archive/1999/99146/99146.html>, retrieved July 7, 1999.

<sup>66</sup> IFC Press Release, found at Internet address <http://www.ifc.org/pressroom/Archive/1999/9948/9948.html>, retrieved June 3, 1999.

<sup>67</sup> IFC Press Release, found at Internet address <http://www.ifc.org/pressroom/Archive/1999/wood.html>, retrieved June 3, 1999.

<sup>68</sup> IFC Press Release, found at Internet address <http://www.ifc.org/pressroom/Archive/1999/belisce.html>, retrieved June 3, 1999.

<sup>69</sup> IFC Press Release, found at Internet address <http://www.ifc.org/pressroom/Archive/1999/9926.html>, retrieved June 3, 1999.

facility in Bulgaria.<sup>70</sup> In 1995, the IFC provided \$75 million to a newly privatized newsprint mill in Russia.<sup>71</sup>

### *Inter-American Development Bank*

The Inter-American Development Bank's (IDB) forest sector activities are aimed at helping Latin American and Caribbean countries to better use and conserve their forest resources.<sup>72</sup> To meet this objective, the IDB provides financing and technical cooperation for forest activities in the following areas:<sup>73</sup> (1) institutional strengthening, such as supporting forestry institutions and training forestry professionals, (2) research and studies, including providing scientific data on forestry resources and undertaking forest management studies, (3) financing resource management and conservation activities, (4) support of agroforestry operations aimed at developing rural communities, (5) support for the establishment of forest-based industries, and (6) assistance in providing forest-related services such as land titling activities, education, and land use planning.

Between 1991 and 1996, total IDB lending for forestry projects amounted to \$314 million.<sup>74</sup> Recent projects include \$15 million to support a forestry development project in Nicaragua, \$23 million for a national environmental program in El Salvador, and \$15 million for a sustainable development project in Guatemala. In the 1970s, the IDB provided financing for the development of wood products and paper industries, including \$83 million toward construction of a pulp mill in Argentina and \$138 million toward the construction of a sawmill in Honduras. However, since the 1980s, the IDB has not made loans for industrial development, and all forestry projects are generally geared toward social and environmental concerns.

### *Asian Development Bank*

The Asian Development Bank (ADB) is a multilateral development institution that supports economic development in the Asian and Pacific region through lending and technical assistance activities.<sup>75</sup> Like the World Bank and IDB, involvement by the ADB in forestry is generally to address social and environmental concerns in member countries.<sup>76</sup> ADB forest projects typically focus on resource management, technical assistance, and forest institution strengthening. For example, a project approved in 1994

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<sup>70</sup> IFC Press Release, found at Internet address

<http://www.ifc.org/pressroom/Archive/1999/9959/9959.html>, retrieved June 3, 1999.

<sup>71</sup> IFC Press Release, found at Internet address

<http://www.ifc.org/pressroom/Archive/1995/AOVOLGA2.html>, retrieved June 3, 1999.

<sup>72</sup> Inter-American Development Bank, found at Internet address

<http://www.iadb.org/cont/poli/OP-723E.htm>, retrieved Feb. 1, 1999.

<sup>73</sup> Ibid.

<sup>74</sup> Inter-American Development Bank, IDB Financing in Forestry Project List and Summary Description, May 20, 1999.

<sup>75</sup> Asian Development Bank, found at Internet address

<http://www.adb.org/About/Bankprof.asp>, July 1, 1999.

<sup>76</sup> Ibid.

provided \$77 million for a forestation and sustainable wood utilization project in China, involving the development of forest resources through the preparation of forest management plans. The project included establishment of a pulp mill with a 51,000 ton annual capacity. A community-based forest management and reforestation project in the Philippines provided funds for forest protection, land use planning, tenurial security, and monitoring. In Bangladesh, \$37 million were approved to support biodiversity conservation, as well as ecotourism and environmental awareness. Funds from this project also support effluent treatment at the newsprint mill at Khulna.<sup>77</sup>

## **Export-Import Banks**

### *United States*

The Export-Import Bank (Ex-Im) is an independent agency of the U.S. Government established in 1934 to provide financial assistance to U.S. exports and to facilitate trade.<sup>78</sup> One function of the Bank is to grant finance to foreign buyers for the purchase of U.S. products.<sup>79</sup> Any type of good or service qualifies for financial assistance (excluding military products), although it must have a U.S. content of more than 50 percent and not harm U.S. production of like products.<sup>80</sup> Ex-Im Bank differs from other international financial organizations in that it does not provide foreign aid or concessional loans.<sup>81</sup>

The Bank guarantees loans to U.S. exporters for working capital. The Bank also underwrites loans where the risk to commercial lenders is deemed to be too high.<sup>82</sup> Up to 85 percent of the price of transaction is covered by the Ex-Im Bank loans, while the foreign buyer must cover the remainder in cash payment.<sup>83</sup> The fees charged for providing financing depend on the riskiness of the venture.<sup>84</sup>

During the period 1996-98, the Ex-Im Bank processed guarantees and loans for the export of U.S. forestry and pulp and paper production machinery totaling \$464 million.<sup>85</sup> Guarantees were 95 percent of the total, or \$439 million; actual loan amounts were \$24 million, or 5 percent. Asia was the largest recipient of both guarantees and loans for the period, with about 75 percent (\$333 million) of total guarantees and 46 percent (\$11 million) of total loans. Indonesia was the largest country recipient in both guarantees and loans, receiving \$313 million (71 percent of total) in guarantees and \$11 million (46

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<sup>77</sup> Information on ADB forest projects was provided through correspondence with ADB officials, June 25, 1999.

<sup>78</sup> Ex-Im Bank, found at Internet address <http://www.exim.gov/history.html>, retrieved June 30, 1999.

<sup>79</sup> Ex-Im Bank, found at Internet address <http://www.exim.gov/general.html>, retrieved Mar. 3, 1999.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

<sup>82</sup> Ibid.

<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> All data provided in this paragraph were provided to the USITC by the Ex-Im Bank, May, 1999.

percent of total) loans. Russia received \$56 million in loan guarantees for pulp and paper projects in 1997, while during 1996-97 Brazil and Mexico received guarantees amounting to \$40 million and \$3 million, respectively.

### *Japan*

The Export-Import Bank of Japan (JEXIM) is a government financial institution which facilitates Japanese trade with foreign countries through the provision of a wide range of financial services.<sup>86</sup> One activity of JEXIM is to provide credit to foreign purchasers of Japanese products, as well as to provide credit assistance to Japanese corporations wishing to import natural resources.<sup>87</sup> JEXIM also provides financial assistance to Japanese firms making investments overseas.<sup>88</sup> Typically, JEXIM supports Japanese projects in developing economies where local financing is inadequate.<sup>89</sup>

Some JEXIM loans have been made to support the Japanese forest products sector. For example, in 1997, natural resource loans in the wood, wood chip, and pulp sectors amounted to \$33 million.<sup>90</sup> In the same year, overseas investment loans in the wood and pulp industry amounted to \$8 million.<sup>91</sup> A recent example is the cofinancing with the World Bank of a loan to help Uruguay boost wood exports by developing port and land transportation infrastructure in the country. JEXIM also provided financial assistance to forestry and wood chip operations in Oceania in order for the Japanese paper industry to be guaranteed a reliable supply of pulp.<sup>92</sup>

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<sup>86</sup> The Export-Import Bank of Japan, *1998 Annual Report*, p. 4.

<sup>87</sup> *Ibid.*

<sup>88</sup> *Ibid.*

<sup>89</sup> *Ibid.*

<sup>90</sup> *Ibid.*, p. 30.

<sup>91</sup> *Ibid.*

<sup>92</sup> *Ibid.*, p. 19.

# **CHAPTER 8**

## **A COMPARISON OF THE U.S. FOREST PRODUCTS INDUSTRY WITH MAJOR PRODUCERS IN LATIN AMERICA, ASIA, AND EUROPE**

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This chapter provides a comparative assessment of various economic factors identified in the request letter for the United States and other major producing countries. To the extent possible these comparisons were made using comparative data. When such data were not available, the comparison was based on the research of third parties and/or the opinions and reports of persons knowledgeable of existing conditions. Items assessed include raw material supplies, capital availability, technological capability, plant and equipment modernization, present capacity, planned capacity, and government support for both wood and paper. The conditions affecting each are discussed below and summarized in figure 8-1. More information on these factors can be found in the individual country analysis presented in prior chapters of this report.

### **Raw Materials**

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Raw material comparisons are based on accessibility, quality, and quantity. Access is affected by geography, ownership, infrastructure, and the intent of owners regarding appropriate use. The extent of government ownership and regulation also affects accessibility to the degree that governments allow access and dictate use. Quality of the resource depends on such factors as volume of commercial species, age, and growing conditions. Information on the quality of resources, especially the volume of commercial species, is not available for many important forest products producers. Forestland area, however, has been reasonably well documented. More than 60 percent of the world's forests is located in seven countries. Listed in order of forested area, these include: the Russian Federation, Brazil, Canada, the United States, China, Indonesia, and the Democratic Republic of Congo (formerly Zaire).<sup>1</sup> Among the regions examined in this report, Europe (including Russia) contains the largest forested area, followed in order by Latin America, Asia, and North America.

The Russian Federation has the largest area of forestland, but much of it is commercially inaccessible. This is particularly true in the Russian Far East, where

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<sup>1</sup> "State of the World's Forests," (UN, FAO: Rome 1998), p. 10.

<b>Figure 8-1 Comparison of selected factors for major forest products producers and markets</b>								
<b>Country</b>	<b>Product</b>	<b>Raw material supplies</b>	<b>Capital availability</b>	<b>Technological capabilities</b>	<b>Extent of plant and equipment modernization</b>	<b>Present Capacity</b>	<b>Planned Capacity</b>	<b>Government support</b>
<b>United States</b>	Wood	++	+++	+++	+++	+++	+	+
	Paper	+++	+++	+++	+++	+++	+	+
<b>Canada</b>	Wood	+++	+++	+++	+++	+++	++	++
	Paper	+++	+++	+++	+++	+++	+	++
<b>Brazil</b>	Wood	+++	++	++	++	++	++	++
	Paper	+++	++	+++	+++	++	++	++
<b>Chile</b>	Wood	++	++	+++	+++	++	++	++
	Paper	++	++	+++	++	++	++	++
<b>Mexico</b>	Wood	+	++	++	++	++	++	++
	Paper	+	++	++	++	++	++	++
<b>China</b>	Wood	+	+	+	+	++	+	+++
	Paper	++	++	++	++	++	++	+++
<b>Indonesia</b>	Wood	+++	++	++	++	++	++	+++
	Paper	+++	++	++	++	++	+++	++
<b>Japan</b>	Wood	+	+++	+++	++	+++	+	++
	Paper	+	+++	+++	+++	+++	++	++
<b>Malaysia</b>	Wood	++	++	+++	+++	+++	+	+++
	Paper	++	++	+	+	+	+	++

Country	Product	Raw material supplies	Capital availability	Technological capabilities	Extent of plant and equipment modernization	Present Capacity	Planned Capacity	Government support
South Korea	Wood	+	++	++	++	++	+	+
	Paper	+	+++	++	++	++	++	+
Taiwan	Wood	+	++	++	++	++	+	+
	Paper	+	+++	++	++	++	++	+
France	Wood	++	+++	+++	+++	++	+	+
	Paper	++	+++	+++	+++	++	+	+
Finland	Wood	+++	+++	+++	+++	+++	+	++
	Paper	+++	+++	+++	+++	+++	+	++
Germany	Wood	++	+++	+++	+++	+++	++	+
	Paper	++	+++	+++	+++	+++	++	+
Russia	Wood	+++ <sup>1</sup>	+	++	++	++	+	+
	Paper	+++	+	+++	++	++	+	+
Sweden	Wood	+++	+++	+++	+++	+++	++	+
	Paper	+++	+++	+++	+++	+++	+++	+

<sup>1</sup> Much of Russia's resource base is currently inaccessible.

Note: +++ denotes most favorable, ++ favorable, and + least favorable.

Figure 8-1

heavily forested areas lack infrastructure and harvests are small. Even in areas where the forest is accessible, the means to process and transport wood are limited. Log and lumber production in the Russian Far East, for instance, is limited to export markets in Japan, China, and other southeast Asian countries.<sup>2</sup> The conversion of Russia to a market economy has further disrupted harvesting and production. Russia, once number two in industrial wood harvest and the world's leading producer of softwood lumber, has fallen behind the United States in harvest, and the United States, Canada, the EU, Japan, and China in softwood lumber production. The remaining forestland area in Europe is fragmented among many countries. The Scandinavian and certain Eastern European countries have significant volume in excess of domestic demand. The intensive management that is practiced in the major European producing areas accounts for wood costs as high or higher than those in North America.<sup>3</sup>

Vast areas of Latin America remain unharvested, but excellent growing conditions and the concentration of harvesting in intensively managed plantations are favorable to the development of the forest products industry. The current availability of wood and the low domestic demand relative to supply give Latin America the potential to significantly expand production and exports. This is particularly true for Brazil, the largest producer and exporter in Latin America. Chile, the second largest producer in Latin America, has become a significant exporter of wood products based primarily on plantations of pine and eucalyptus.

Canada has large forestland holdings and over 90 percent is controlled by the provincial and federal governments. The provincial governments have generally supported the forest products industry through the granting of long term leases and harvesting concessions. Canada's reserves are extensive, the area under management is half of Canada's estimated commercial forestland, and Canada's annual area harvested is only 1 percent of the area under management.<sup>4</sup> Loss of wood to fires, insects, and disease is slightly less than the amount harvested.

The United States is able to harvest large volumes of wood on a forestland base smaller than that of Canada or Russia because of favorable growing conditions. Access to resources in the United States is supported by a diverse and highly-developed infrastructure, but tempered at the same time by diverse ownership that leads to uncertainty regarding owners' intentions on land and wood uses (chapter 3). Restrictions on harvesting from the National Forest for environmental protection and alternative uses of the forest have greatly lowered the availability of wood supply, particularly in the western United States. Environmental regulations to protect endangered species and the environment have lowered harvests and raised log prices on private, as well as government lands. Wood costs in the United States are among the highest in the world.<sup>5</sup>

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<sup>2</sup> Elisa Miller, "Russia," Marketing Forest Products Conference, Proceedings 15th annual Seattle Conference, p. 180.

<sup>3</sup> Interview with Robert Amen, President, International Paper Corp, Europe. Brussels, Mar. 29, 1999.

<sup>4</sup> "The State of Canada's Forests," p. 6.

<sup>5</sup> W. Henson Moore, transcript of the Commission hearing, May 26, 1999, p. 11.

The forested areas of Asia excluding Russia are concentrated in China, Japan, and the southeast, principally in Indonesia, Burma (Myanmar), Malaysia, and Thailand. China is the largest producer of industrial wood in Asia, followed by Indonesia and Malaysia. Nevertheless, China is a net importer of wood and paper. To meet the growing demand for forest products, the country has conducted tree-planting campaigns to increase the supply of timber. China accounts for over 40 percent of the world's plantation area.<sup>6</sup> Virtually all of Indonesia's forestland is controlled by the Government, which issues harvesting concessions to logging firms. Indonesia's forests are sufficient to supply its domestic needs, and to maintain or expand its current exports of wood and paper products. Indonesia's forests are primarily hardwood species limiting production to hardwood products. Although Japan is heavily forested, much of its forestland is uneconomical to harvest. Japan's large forest products industry is thus heavily dependent on imports of raw materials such as logs and wood chips.

While the Democratic Republic of Congo (formerly Zaire) is among the countries with the largest forest area, its resources are largely untapped for commercial use. Industrial wood harvest accounted for 10 percent of the total harvest; the remainder is used primarily for fuel.

## **Capital Availability**

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Capital is generally available to the most efficient and profitable companies or industries.<sup>7</sup> In the global economy, capital is widely available, although in the more developed countries access to financial institutions may make capital acquisition easier. Availability may be limited or enhanced by the overall economic conditions in any country. Capital will move to a firm in part based on the overall performance of the industry to which it belongs. Capital is also generated internally by a firm's operations, and would be expected to increase according to the industry's profitability. In developing countries, capital is often obtained through investment by foreign producers. For instance, Western European forest products producers are investing in Eastern Europe.<sup>8</sup>

The U.S. forest products industry is mature and capital is more likely to be generated from within. However, the wood and wood products industry, with the exception of a few products, has been contracting slowly, while the pulp and paper industry has not performed as well as expected given the favorable economic environment in the United States in recent years. The U.S. forest products industry has thus experienced weak profits and stock prices, forcing it to rely increasingly on debt financing to provide operating capital.<sup>9</sup>

In the major Latin American producing countries, Brazil and Chile, capital has generally been readily available for expansion of forest product manufacturing facilities. Investment in plantations and the pulp and paper industry by foreign companies has

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<sup>6</sup> "State of the World's Forests," p. 14.

<sup>7</sup> Mark Diverio, transcript of the Commission hearing, p. 193.

<sup>8</sup> See chapter 6.

<sup>9</sup> Mark Diverio, prepared statement for the Commission hearing, May 26, 1999.

helped development in both countries. That both Chile and Brazil are low cost producers with fast growing plantations has in part attracted investments from North American and Asian firms. Brazilian Government intervention in fiscal policy after the beginning of the Asia financial crisis is credited with increasing Brazil's international reserves and maintaining capital inflows.<sup>10</sup>

Before the Asian financial crisis, capital was flowing to the southeast Asian region through both financial institutions and investment by manufacturers.<sup>11</sup> Favorable access to capital has contributed to the development of low cost manufacturing sites in the paper industries of Indonesia and Malaysia.<sup>12</sup> After the financial crisis began, much capital investment in the region was canceled or put on hold, although some producers in North America and Europe took advantage of the crisis to buy Asian assets.

Capital availability could also be construed to include infrastructure such as transport facilities, communications, and energy availability. In North America, Western Europe, and Japan, the infrastructure is extensive, and raw material supplies move over that infrastructure to important producing countries such as Japan and Germany which are lacking in raw material. In eastern Russia, the lack of infrastructure dictates that most production is exported to nearby Asian countries. Brazil has little infrastructure away from the coastal areas. Where infrastructure is lacking, development costs to industry are increased. In developing countries such as Brazil and Indonesia, roads and rail to significant raw material resources are lacking, labor must be brought long distances to remote areas. Consequently, the industry must often build roads and other facilities to improve access.

## **Technological Capabilities and the Extent of Plant and Equipment Modernization**

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The industrial and developing countries have ready access to modern technology. The production of state-of-the-art equipment used in the forest products industry, however, is concentrated in North America and Europe. This is particularly true of the wood panel and pulp and paper equipment manufacturers. This technology is transferred to countries by the purchases of modern machinery and equipment.<sup>13</sup> Generally the larger mills producing commodity items such as lumber, wood panels, and pulp and paper incorporate new technology at a rapid pace. For specialty products with limited markets older machinery may still be used to manufacture competitively. Used equipment may be sold to equip new mills, but many of the new pulp, paper, and paperboard mills in the developing countries have the most modern equipment. In general, the wood and wood products industries of many countries lag behind the pulp and paper industries in the modernization of equipment. With the increase in cross border ownership, technology is readily transferred between geographically disparate divisions of the same company.

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<sup>10</sup> World Bank, found at Internet address <http://www.worldbank.org/html/extdr/faq/faqf98-106.htm>, retrieved on Mar. 15, 1999.

<sup>11</sup> See chapter 5.

<sup>12</sup> Mike Brummer, transcript of the Commission hearing, p. 156.

<sup>13</sup> Victor Menotti, transcript of the Commission hearing, p. 212.

The extent of plant and equipment modernization varies greatly within individual countries and by manufacturing processes. In the forest products industry there are many product lines. In the United States, for instance, the variety of wood and paper products leads to a wide range of processing and of plant and equipment age. Many manufacturing processes have not changed in decades. The more developed countries are likely to have extensive research facilities working on the development of new processes. However, information on new technology is increasingly available worldwide through the Internet.

The forest products industries of Brazil and Chile have been enlarged and modernized in part by foreign investment, and by the participation of North American, European, and Asian companies in establishing manufacturing plants. This is particularly true of the pulp and paper industries in both countries, and the wood products industry in Chile. The largest paper mill in Mexico was developed with considerable participation by a United States firm, and with some assistance from the U.S. EX-IM Bank.

In Europe, the number of countries and the disparity of their resource base and economic situation leads to wide variation in plant and equipment modernization. In general, the pulp and paper industries of the major producing countries are capital intensive and technologically advanced.<sup>14</sup> In Finland and Sweden, wood harvesting is highly mechanized. By comparison, harvesting in the United States is adapted to its varied resource and terrain, and as a result has not incorporated mechanization to the extent that it has been in Europe. Sweden and Finland have made substantive investments to increase capacity and efficiency in their pulp and paper industries, whereas, Russia's forest products harvesting and processing equipment for both the wood and paper industries is aging and in disrepair.<sup>15</sup>

In Asia wide disparities also exist. In Indonesia and Malaysia, recent expansion has resulted in the establishment of new and modern panel, pulp, and paper industries. On the other hand, much of the plant and equipment in China is aging and in need of replacement. However, restructuring of the Chinese paper and paperboard industry is gradually resulting in the modernization of that sector.

## **Present Capacity and Planned Capacity**

Two measures of present capacity may be useful for comparison: (1) total capacity, and (2) capacity surplus to domestic needs. Planned capacity is an indication of the economic strength and outlook for an industry.

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<sup>14</sup> See chapter 6.

<sup>15</sup> Ibid.

Capacity for the production of most forest products in the United States and Canada exceeds that of other countries. Indications for the United States are that capacity for most products will expand slowly, and for a few products it is likely to decline (e.g., softwood plywood).<sup>16</sup> Future increases in capacity in the United States will likely be met by improved manufacturing processes and innovations which allow manufacturing from underutilized wood. Canada's production facilities greatly exceed domestic needs and are export market driven, primarily for the U.S. market.

In Latin America, capacity in the wood products industry is small by comparison to other major world areas. Recent expansion in the pulp and paper industries has greatly increased capacity, but total pulp capacity in 1998 of 13 million metric tons accounted for only 6 percent of the world total. Future capacity expansion will depend on the establishment of plantation forests, and the time it takes for these to mature.

Capacity for both wood and paper production in Japan exceeds the availability of domestic fiber supplies, causing Japan to import much of its raw material. To assure sources of raw material supply, Japan has invested in plantations in southeast Asia, eastern Russia, and other areas. China has many antiquated and inefficient mills but new, modern mills are being built. Indonesia recently expanded its pulp and paper capacity to become Asia's third largest producer of pulp and fourth largest producer of paper. Future expansion is dependent on recovery from current stagnation.

The forest product industry in Europe is mature and capacity expansion proceeds at a moderate rate. With the exception of the wood panel sector, the wood products industry is characterized by a high number of small mills. Between 1994 and 1998, pulp capacity grew by 3 percent and a similar pace is likely in the future.

## **Government Support**

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Government support to the forest products industry varies from country to country and may involve raw material supply, direct and indirect financial assistance, export promotion, research, trade and domestic regulation, dissemination of information, or economic and technical support.

Support for the forest products industry in North America is fragmented between the State, Provincial and Federal governments. In the United States, the Federal Government provides little direct support, although some funds are available for export promotion and development loans. Canada has similar programs. Both the United States and Canada have research facilities providing information on forestry and forest product manufacture, but these are not directly aimed at industry concerns. Many State and Provincial governments, especially those in which the forest products industry is significant, provide a variety of services as well. Some of these, such as export promotion, overlap Federal programs.

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<sup>16</sup> See chapter 3.

In Canada, the Provincial governments have generally made forest resources available to industry through long term leases. In the United States, on the other hand, the Forest Service has been reducing the number and size of timber sales and further restricting access to forestland. This was pointed out as one of the two principal reasons for the lack of competitiveness of the U.S. forest products industry.<sup>17</sup>

Government support in the producing countries of Latin America has helped develop the forest products industry. The Government of Brazil encouraged investment in the establishment of forest plantations and manufacturing facilities through a variety of tax incentives. Brazil's Government indirectly owns significant plantations through ownership of companies who invest in plantations. The Government of Chile was also significantly involved in the establishment of plantation forests which provide most of Chile's industrial wood. A support that provided 75 percent of the costs of forest planting and management has been phased out, but planting costs for small farmers are still paid in part. Chilean Government ownership of plantation forest is minimal.

In the major forest products producing countries of Asia (except Japan), the government generally controls the forestland and offers timber cutting concessions, some at reportedly low costs.<sup>18</sup> Financial support is generally limited to tax incentives and payments for forestry practices. However, the governments of China, Indonesia, and Malaysia have taken action supportive of industrial activity. The low level of regulatory control in some of these countries has been alluded to as a reason for the flow of investment to them.<sup>19</sup>

The Government of China maintains control of most forest products manufacturing facilities through large government corporations. Public ownership of the industry is increasing but the Government continues to exercise control over the country's forest resources. Forty-five percent of China's forests is owned by the government and the remainder is collectively owned. In the past, the Government of China directed and financed industry expansion, but recent policies have placed more production decisions in the hands of plant managers and forced firms to seek private financing.

The Government of Indonesia has been active in the development of the forest products industry. The Indonesian Government controls most of the forestland and issues logging concessions to private and government companies. The Government is also active in the conversion of natural forests to plantations. In order to ensure supplies for domestic producers, high export taxes are imposed to discourage raw material exports. A Government supported cartel and favorable tax provisions were significant in the development of the plywood industry. In 1998, as a provision of obtaining IMF loans, the Government entered into an agreement containing several provisions aimed at reducing government influence over the industry.

Government intervention in the forest products industry of Malaysia is similar to that in Indonesia. Forestland is controlled by the State governments and timber cutting

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<sup>17</sup> W. Henson Moore, transcript of the Commission hearing, p. 10.

<sup>18</sup> David Paterson, transcript of the Commission hearing, p. 190.

<sup>19</sup> Victor Menotti, transcript of the Commission hearing, p. 212.

concessions are issued to both State and private companies. Industry development is supported through export controls and tax incentives.

In Europe, government support varies widely. Most governments provide some financial assistance for reforestation and forest health improvement, and nearly all governments have comprehensive forestry laws. A few governments are actively involved in forestry and manufacturing operations.

European Union policy relating to forestry is addressed within the framework of agricultural policy. Direct financial support is available for conversion of agricultural land to forests, and some co-financing is available for machinery purchases. For the most part, financial assistance is provided for reforestation purposes. State and local government ownership of forest resources in the major producing countries varies widely, from 53 percent in Germany to 9 percent in Finland.

The Government of Russia maintains oversight on 94 percent of the country's forestland. Ownership rights to harvest are not clearly defined, resulting in reluctance to invest in the forestry sector. The Government owns and operates large forest products manufacturing facilities and controls the principal forest products exporting company. Lack of capital investment, however, has resulted in poor support for the industry.

**APPENDIX A**  
**REQUEST LETTER AND NOTICE OF THE**  
**INVESTIGATION (not included in electronic version)**









**APPENDIX B**  
**LIST OF WITNESSES APPEARING AT THE**  
**HEARING**

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CALENDAR OF PUBLIC HEARINGS

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject: CONDITIONS OF COMPETITION IN U.S. FOREST PRODUCTS TRADE

Inv. No.: 332-400

Date and Time: May 26, 1999 - 9:30 a.m.

**ORGANIZATION AND WITNESS**

**TIME  
CONSTRAINTS**

**PANEL 1**

20 minutes

American Forest & Paper Association, Washington, D.C.

**W. Henson Moore**, President and CEO

Webster Industries, Wayzata, Minnesota

**Paul D. Webster**, President

**PANEL 2**

20 minutes

Resources for the Future, Washington, D.C.

**Roger Sedjo**, Senior Fellow

American Forests, Alexandria, Virginia

**Neil Sampson**, Senior Fellow

ENSR Consulting, Acton, Massachusetts

**Patricia Fleischauer**, Vice President

**PANEL 3**

20 minutes

PACE, Nashville, Tennessee

**Keith Romig**, Communications Director

**-MORE-**

**ORGANIZATION AND WITNESS**

**TIME  
CONSTRAINTS**

Association of Western Pulp and Paperworkers (affiliated with the United Brotherhood of Carpenters and Joiners of America), Camas, Washington

**Bob Watrous**, Member

Great Lakes Region of the Pulp and Paperworkers  
Resource Council, Brainerd, Minnesota

**Tom Isle**, Region Director

**PANEL 4**

30 minutes

CINTRAFOR/University of Washington, Seattle, Washington

**Bruce Lippke**, Professor

Can-Am Converting, Incorporated

**Mike Brummer**, President and COO

Georgia-Pacific Corporation, Atlanta, Georgia

**David Paterson**, Vice President, Market Pulp

Westvaco Corporation, New York City, New York

**Mark Diverio**, Vice President, Strategic Planning

American Forest & Paper Association, Washington, D.C.

**Maureen Smith**, Vice President, International

**PANEL 5**

30 minutes

Environment Program International Forum on Globalization,  
San Francisco, California

**Victor Menotti**, Director

American Lands Alliance, Washington, D.C.

**Antonia Juhasz**, Director, International Trade and Forests Program

Defenders of Wildlife, Washington, D.C.

**William Snape**, Legal Director

**-MORE-**

**ORGANIZATION AND WITNESS**

**TIME  
CONSTRAINTS**

**PANEL 6**

30 minutes

Pacific Environment and Resources Center, Washington, D.C.

**Doug Norlen**, Policy Advisor

American Lands Alliance, Washington, D.C.

**Faith Campbell**, Director, Invasive Species Program

Global Forest Policy Project, Washington, D.C.

**Bill Mankin**, Director

**-END-**

**APPENDIX C**  
**SELECTED WORLD TRADE TABLES**

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**Table C-1**  
**Production, trade, and consumption of selected forest products, by selected world region, 1997**

	Production	Exports	Imports	Consumption
	<i>Thousand cubic meters</i>			
<b>Industrial wood:</b>				
World total . . . . .	1,524,628	120,673	134,540	1,538,495
North America . . . . .	601,951	20,727	10,344	591,568
Latin America . . . . .	141,670	89,060	325	132,877
Asia . . . . .	277,152	13,294	69,703	333,561
Europe . . . . .	394,510	52,371	53,295	395,434
<b>Lumber and wood panels:</b>				
World total . . . . .	593,949	162,675	164,116	595,388
North America . . . . .	226,030	66,681	55,390	214,739
Latin America . . . . .	42,409	6,467	4,272	40,214
Asia . . . . .	142,369	23,072	42,629	161,926
Europe . . . . .	163,283	62,544	55,022	155,761
	<i>Thousand metric tons</i>			
<b>Pulp:</b>				
World total . . . . .	178,132	32,159	32,971	178,944
North America . . . . .	84,192	15,492	6,072	74,722
Latin America . . . . .	10,083	3,695	1,226	7,614
Asia . . . . .	36,563	1,209	10,427	45,781
Europe . . . . .	42,103	10,065	14,795	46,833
<b>Paper and paperboard:</b>				
World total . . . . .	299,092	87,574	85,377	296,896
North America . . . . .	105,446	24,455	15,561	96,552
Latin America . . . . .	13,605	2,098	5,314	16,821
Asia . . . . .	86,344	10,203	20,040	96,182
Europe . . . . .	87,492	49,413	41,136	79,214

Note: Includes interregional trade.

Source: Food & Agriculture Organization of the United Nations and Pulp & Paper International.

**Table C-2**  
**Per capita consumption for selected forest products, 1996**

Country or Region	Per capita consumption (1996)		Paper and paperboard <i>Kilograms</i>
	Lumber <i>Cubic meters</i>	Wood panels <i>Cubic meters</i>	
<b>North America:</b>			
United States . . . . .	.546	.162	329
Canada . . . . .	.598	.148	220
South America . . . . .	.084	.014	35
Europe . . . . .	.149	.065	106
Asia . . . . .	.032	.013	27
Africa . . . . .	.017	.003	6
Oceania . . . . .	.227	.068	113
World . . . . .	.076	.026	50

Source: 1997 Yearbook of Forest Products, FAO Forestry Series No. 32, (Rome: FAO, 1999).

**Table C-3**  
**Forest products: Regional import and export shares, 1997**

Country	Wood		Lumber and wood panels		Pulp, paper, and paperboard	
	Imports as a percent of consumption	Exports as a percent of production	Imports as a percent of consumption	Exports as a percent of production	Imports as a percent of consumption	Exports as a percent of production
North America . . . . .	2	3	26	30	13	21
Latin America . . . . .	0	2	11	15	27	24
Europe . . . . .	11	16	35	38	44	46
Asia . . . . .	6	1	26	16	21	9
Africa . . . . .	0	1	38	16	35	30
Oceania . . . . .	0	34	13	22	28	24

Source: Food & Agriculture Organization of the United Nations and Pulp & Paper International.

**Table C-4**  
**Canada: Softwood lumber exports, 1994-98**

Country	1994	1995	1996	1997	1998	Change 1998 over 1994
	<i>Million dollars</i>					<i>Percent</i>
United States . . . . .	5,835	5,214	6,540	6,885	6,206	6.36
Japan . . . . .	1,727	1,904	1,887	1,626	948	-45.11
EU-15 . . . . .	353	322	258	279	207	-41.36
All other . . . . .	186	227	184	213	133	-28.49
Total . . . . .	8,101	7,667	8,869	9,003	7,494	-7.49

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table C-5**  
**Canada: Forest products exports, 1994-98**

Items	1994	1995	1996	1997	1998	Change 1998 over 1994
	<i>Million dollars</i>					<i>Percent</i>
Wood and wood products . . . . .	10,579	10,558	12,009	12,684	11,913	12.61
Pulp and wastepaper . . . . .	4,976	8,074	5,142	5,068	4,588	-7.80
Paper and paper products . . . . .	8,281	11,476	10,924	10,410	10,329	24.73
Total forest products . . . . .	23,837	30,108	28,075	28,162	26,830	12.56

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**APPENDIX D**  
**U.S. INDUSTRY TABLES**

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**Table D-1****United States: Forest products industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

Product	1994	1995	1996	1997	1998
	Mills				
Number of mills:					
Panel .....	214	204	194	193	( <sup>1</sup> )
Paper and paperboard .....	534	537	527	533	526
Pulp .....	190	190	190	193	190
	1,000 cubic meters				
Production capacity:					
Sawmill .....	88,200	77,150	84,000	89,500	91,000
Structural panels .....	29,795	30,900	32,435	30,850	31,250
	1,000 tons				
Paper and paperboard .....	84,081	87,832	89,900	91,800	92,900
Pulp .....	61,520	62,087	62,087	64,000	64,211
	Percent				
Capacity utilization:					
Sawmill .....	79	73	77	79	80
Structural panels .....	90	88	91	93	92
Paper .....	94	92	90	94	( <sup>1</sup> )
Paperboard .....	97	95	93	96	( <sup>1</sup> )
Pulp .....	94	95	93	94	( <sup>1</sup> )
	1,000 persons				
Employment:					
Sawmill .....	172	179	172	170	170
Panel .....	76	79	79	80	80
Pulp and paper:					
Pulp mills .....	13	14	13	12	12
Paper mills .....	169	164	161	159	156
Paperboard mills .....	51	51	50	50	50
Converted paper products .....	460	464	458	464	466
Total pulp and paper .....	693	693	682	685	684
Total employment .....	943	951	933	935	934

<sup>1</sup> Not available.

Source: USDOC, ITA, *U.S. Industry & Trade Outlook*, (Washington: McGraw-Hill, 1999); Pulp & Paper International, *Annual Review*, 1995-98; Food and Agriculture Organization, *Pulp & Paper Capacities*, 1996-2001.

**Table D-2****U.S. housing starts and construction expenditures, 1994-98**

Year	Housing starts			Value of construction		
	Single family	Multifamily	Total	Private	Public	Total
	Thousand units			Billion dollars		
1994 .....	1,198	259	1,457	399	120	520
1995 .....	1,076	278	1,354	407	131	538
1996 .....	1,161	316	1,477	446	137	584
1997 .....	1,134	340	1,474	471	147	618
1998 .....	1,271	345	1,616	510	145	655

Source: *Housing Starts*, and *Value of Construction Put in Place*, (Washington, DC: U.S. Census Bureau, Feb. 1999).

**Table D-3**

**United States: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change,
						1998 over 1994
	1,000 cubic meters					Percent
<b>Wood:</b> <sup>1</sup>						
Industrial wood:						
Logs	244,303	242,874	241,502	247,112	248,000	1.5
Pulpwood and particles	150,743	150,000	149,533	153,240	153,000	1.5
Other industrial wood	15,735	16,074	15,560	15,740	15,800	0.4
Total industrial wood	410,781	408,948	406,595	416,092	416,800	1.5
Residual wood <sup>2</sup>	92,229	94,844	88,710	74,600	74,500	-19.2
Total wood	503,010	503,792	495,305	490,692	491,300	-2.3
<b>Lumber:</b>						
Softwood	80,493	75,440	78,508	81,812	82,548	2.6
Hardwood	30,234	30,247	30,531	31,515	31,600	4.5
Total lumber	110,727	105,687	109,039	113,327	114,200	3.1
<b>Wood panels:</b>						
Plywood	19,442	19,174	18,992	17,928	17,762	-8.6
Softwood	17,380	17,140	16,975	15,897	15,732	-9.5
Hardwood	2,062	2,034	2,017	2,031	2,030	-1.6
Oriented strandboard <sup>3,4</sup>	6,625	6,994	8,243	9,323	9,330	40.8
Particleboard <sup>3</sup>	8,039	7,434	7,731	7,898	7,900	-1.7
Fiberboard	6,864	6,508	6,415	6,262	6,300	-8.2
Total wood panels	40,970	40,110	41,381	41,411	41,292	0.8
<b>Pulp:</b>						
1,000 metric tons						
Chemical pulp	49,440	50,480	49,437	50,292	49,078	-0.7
Semichemical pulp	3,745	3,610	3,500	3,669	3,626	-3.2
Mechanical pulp	5,324	5,595	5,392	5,402	5,439	2.2
Total pulp	58,509	59,685	58,329	59,363	58,143	-0.6
<b>Paper and paperboard:</b>						
Newsprint	6,336	6,352	6,304	6,545	6,503	2.6
Printing and writing	23,328	23,047	22,554	24,159	24,180	3.7
Corrugating materials	28,350	28,702	29,772	31,618	31,009	9.4
Other wrapping papers	2,467	2,184	2,109	2,088	1,972	-20.1
Tissue	5,532	5,634	5,683	5,832	5,990	8.3
Other paper	1,670	1,696	1,904	1,927	2,063	23.5
Board	13,131	13,610	13,511	14,055	14,137	7.7
Total paper and paperboard	80,814	81,225	81,837	86,224	85,854	6.2
Wastepaper	35,674	38,590	38,351	39,689	41,103	15.2

<sup>1</sup> Data for 1998 estimated.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Data for 1994 estimated.

<sup>4</sup> Includes waferboard.

Source: Calculated from Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Western Wood Products Assoc., "Lumber Facts", Apr. 1999; Pulp & Paper International, *Annual Review*, 1995-98.

Table D-4

**United States: Apparent consumption of wood, lumber, and wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change,
						1998 over 1994
						Percent
						1,000 cubic meters
<b>Wood:<sup>1</sup></b>						
Softwood logs . . . . .	165,158	162,047	160,973	167,359	170,209	3.1
Hardwood logs . . . . .	67,438	68,374	69,111	69,469	69,672	3.3
Pulpwood and particles . . . . .	143,530	142,800	141,810	145,213	145,024	1.0
Other industrial wood . . . . .	15,566	16,215	15,226	15,516	15,783	1.4
Total industrial wood . . . . .	391,692	389,436	387,120	397,557	400,688	2.3
Residual wood <sup>2</sup> . . . . .	92,753	95,161	88,912	74,798	74,625	-19.5
Total wood . . . . .	484,445	484,597	476,032	472,355	475,313	-1.9
<b>Lumber:</b>						
Softwood . . . . .	113,691	111,426	116,619	119,746	123,366	8.5
Hardwood . . . . .	28,517	28,369	28,691	29,548	29,952	5.0
Total lumber . . . . .	142,208	139,795	145,310	149,294	153,318	7.8
<b>Wood panels:</b>						
Plywood . . . . .	19,643	19,548	19,486	18,201	19,044	-3.0
Softwood . . . . .	16,396	16,109	15,955	14,643	15,244	-7.0
Hardwood . . . . .	3,247	3,439	3,531	3,558	3,800	17.0
Oriented strandboard <sup>3,4</sup> . . . . .	9,164	10,085	12,011	13,841	14,993	63.6
Particleboard <sup>3</sup> . . . . .	8,600	8,117	8,540	8,755	8,732	1.5
Fiberboard . . . . .	6,696	6,383	6,588	6,752	7,375	10.1
Total wood panels . . . . .	44,103	44,133	46,625	47,549	50,144	13.7
						1,000 metric tons
<b>Pulp:</b>						
Chemical pulp . . . . .	48,137	48,232	48,014	49,708	48,961	1.7
Semichemical pulp . . . . .	3,943	3,745	3,553	3,782	3,662	-7.1
Mechanical pulp . . . . .	5,372	5,536	5,317	5,227	5,357	-0.3
Total pulp . . . . .	57,452	57,513	56,884	58,717	57,980	0.9
<b>Paper and paperboard:</b>						
Newsprint . . . . .	12,624	12,683	11,597	12,081	12,243	-3.0
Printing and writing . . . . .	25,923	26,062	25,047	27,416	28,146	8.6
Corrugating materials . . . . .	25,999	25,994	26,558	27,965	28,038	7.8
Other wrapping papers . . . . .	2,542	2,197	2,071	1,870	1,756	-30.9
Tissue . . . . .	5,538	5,639	5,711	5,916	6,060	9.4
Other paper . . . . .	1,667	1,655	1,877	2,001	2,152	29.1
Board . . . . .	12,500	12,124	11,934	12,393	12,558	0.5
Total paper and paperboard . . . . .	86,793	86,354	84,795	89,642	90,953	4.8
Wastepaper . . . . .	28,914	29,612	32,286	33,167	34,213	18.3

<sup>1</sup> Data for 1998 estimated.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Data for 1994 estimated.

<sup>4</sup> Includes waferboard.

Source: Calculated from data in: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Western Wood Products Assoc., "Lumber Facts" Apr. 1999; and Pulp & Paper International, *Annual Review*, 1995-98.

**APPENDIX E**  
**LATIN AMERICA TABLES**

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**Table E-1**  
**Brazil: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	182	220	139	139	139
Pulp .....	35	35	35	35	35
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	6,509	6,908	7,093	7,093	7,544
Pulp .....	6,103	6,656	7,109	7,109	7,447
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	87	84	87	92	86
Pulp .....	96	89	87	89	90
	<i>1,000 persons</i>				
Employment .....	70	62	102	102	102

Source: Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-2**  
**Brazil: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	46,779	47,779	47,779	47,779	( <sup>1</sup> )	2.1
Pulpwood and particles . . . . .	30,701	30,701	30,701	30,701	( <sup>1</sup> )	0.0
Other industrial wood . . . . .	5,937	6,025	6,104	6,181	( <sup>1</sup> )	4.1
Total industrial wood . . . . .	83,417	84,505	84,584	84,661	( <sup>1</sup> )	1.5
Residual wood <sup>2</sup> . . . . .	140,267	135,652	135,652	135,652	( <sup>1</sup> )	-3.3
Total wood . . . . .	223,684	220,157	220,236	220,313	( <sup>1</sup> )	-1.5
Lumber . . . . .	18,691	19,091	19,091	19,091	( <sup>1</sup> )	2.1
Wood panels:						
Veneer sheets . . . . .	310	300	300	300	( <sup>1</sup> )	-3.2
Plywood . . . . .	1,870	1,900	1,900	1,900	( <sup>1</sup> )	1.6
Particleboard . . . . .	660	660	660	660	( <sup>1</sup> )	0.0
Fiberboard . . . . .	637	637	637	637	( <sup>1</sup> )	0.0
Insulating board . . . . .	61	61	61	61	( <sup>1</sup> )	0.0
Total wood panels . . . . .	3,538	3,558	3,558	3,558	( <sup>1</sup> )	0.6
1,000 metric tons						
Pulp:						
Bleached sulfate . . . . .	3,984	3,988	4,299	4,434	4,812	20.8
Unbleached sulfate . . . . .	1,260	1,322	1,325	1,342	1,315	4.4
Mechanical pulp . . . . .	308	314	297	231	234	-24.0
Other . . . . .	277	312	280	324	358	29.2
Total pulp . . . . .	5,829	5,936	6,201	6,331	6,719	15.3
Paper and paperboard:						
Newsprint . . . . .	264	295	277	265	273	3.4
Printing and writing . . . . .	1,825	1,802	1,807	1,983	1,966	7.7
Corrugating materials . . . . .	1,853	1,940	2,206	2,304	2,317	25.0
Other wrapping papers . . . . .	488	488	594	607	598	22.5
Tissue . . . . .	429	466	549	565	576	34.3
Other paper . . . . .	233	219	138	146	142	-39.1
Board . . . . .	562	588	597	648	652	16.0
Total paper and paperboard . . . . .	5,654	5,798	6,168	6,518	6,524	15.4
Wastepaper . . . . .	1,699	1,795	2,201	2,239	2,184	28.5

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-3**  
**Brazil: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood .....	82,243	82,673	83,465	83,296	( <sup>1</sup> )	1.3
Residual wood <sup>2</sup> .....	140,234	135,630	135,636	135,635	( <sup>1</sup> )	-3.3
Total wood .....	222,477	218,303	219,101	218,931	( <sup>1</sup> )	-1.6
Lumber .....	17,667	17,956	18,348	18,037	( <sup>1</sup> )	2.1
Wood panels:						
Veneer sheet .....	227	122	210	162	( <sup>1</sup> )	-28.6
Plywood .....	1,144	1,250	1,350	1,319	( <sup>1</sup> )	15.3
Particleboard .....	599	643	742	729	( <sup>1</sup> )	21.7
Fiberboard .....	345	345	398	407	( <sup>1</sup> )	18.0
Insulating board .....	44	44	45	45	( <sup>1</sup> )	2.3
Total wood panels .....	2,359	2,404	2,745	2,662	( <sup>1</sup> )	12.8
1,000 metric tons						
Pulp:						
Bleached sulfate .....	2,061	2,213	2,363	2,333	2,442	18.5
Unbleached sulfate .....	1,240	1,306	1,307	1,316	1,274	2.7
Mechanical pulp .....	308	310	291	230	234	-24.0
Other .....	275	321	300	346	384	39.6
Total pulp .....	3,884	4,150	4,261	4,225	4,334	11.6
Paper and paperboard:						
Newsprint .....	566	701	641	723	658	16.3
Printing and writing .....	1,043	1,228	1,249	1,377	1,464	40.4
Corrugating materials .....	1,461	1,667	1,947	2,079	2,108	44.3
Other wrapping papers .....	482	479	566	579	576	19.5
Tissue .....	375	431	520	538	555	48.0
Other paper .....	216	330	319	215	196	-9.3
Board .....	461	539	615	656	655	42.1
Total paper and paperboard .....	4,604	5,375	5,857	6,167	6,212	34.9
Wastepaper .....	1,719	1,840	2,225	2,259	2,203	28.2

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

Table E-4

## Brazil: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Sector trade:						
Brazil exports:						
EU-15 .....	1,035	1,424	987	1,000	( <sup>1</sup> )	-3.4
United States .....	604	883	689	721	( <sup>1</sup> )	19.4
Argentina .....	196	235	272	312	( <sup>1</sup> )	59.2
Japan .....	168	280	241	241	( <sup>1</sup> )	43.5
Korea .....	57	79	111	100	( <sup>1</sup> )	75.4
All other .....	799	939	744	834	( <sup>1</sup> )	4.4
Total .....	2,859	3,840	3,044	3,208	( <sup>1</sup> )	12.2
Brazil imports:						
United States .....	146	358	390	446	( <sup>1</sup> )	205.5
EU-15 .....	149	330	289	358	( <sup>1</sup> )	140.3
Canada .....	151	290	224	189	( <sup>1</sup> )	25.2
Argentina .....	14	86	107	144	( <sup>1</sup> )	928.6
Chile .....	39	84	58	54	( <sup>1</sup> )	38.5
All other .....	64	198	150	132	( <sup>1</sup> )	106.3
Total .....	563	1,282	1,218	1,323	( <sup>1</sup> )	135.0
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
Brazil exports .....	1,066	1,135	1,110	1,218	( <sup>1</sup> )	14.3
Major markets:						
EU-15 .....	462	522	435	470	( <sup>1</sup> )	1.7
United States .....	327	352	348	404	( <sup>1</sup> )	23.5
Korea .....	8	8	25	45	( <sup>1</sup> )	462.5
Brazil imports .....	39	66	100	133	( <sup>1</sup> )	241.0
Major suppliers:						
Argentina .....	2	15	40	45	( <sup>1</sup> )	2150.0
EU-15 .....	2	6	12	27	( <sup>1</sup> )	1250.0
Paraguay .....	29	30	29	22	( <sup>1</sup> )	-24.1
Pulp and wastepaper: <sup>3</sup>						
Brazil exports .....	851	1,475	999	1,024	( <sup>1</sup> )	20.3
Major markets:						
EU-15 .....	313	589	386	378	( <sup>1</sup> )	20.8
United States .....	228	435	282	257	( <sup>1</sup> )	12.7
Japan .....	142	236	137	169	( <sup>1</sup> )	19.0
Indonesia .....	30	35	32	71	( <sup>1</sup> )	136.7
Brazil imports .....	83	190	160	175	( <sup>1</sup> )	110.8
Major suppliers:						
United States .....	26	81	90	93	( <sup>1</sup> )	257.7
Canada .....	24	43	31	34	( <sup>1</sup> )	41.7
Argentina .....	5	14	10	24	( <sup>1</sup> )	380.0
Chile .....	25	46	23	18	( <sup>1</sup> )	-28.0
Paper and paper products: <sup>4</sup>						
Brazil exports .....	942	1,230	935	966	( <sup>1</sup> )	2.5
Major markets:						
United States .....	48	93	58	60	( <sup>1</sup> )	25.0
EU-15 .....	260	313	166	152	( <sup>1</sup> )	-41.5
Argentina .....	154	199	234	254	( <sup>1</sup> )	64.9
Brazil imports .....	440	1,026	957	1,016	( <sup>1</sup> )	130.9
Major suppliers:						
United States .....	118	274	298	345	( <sup>1</sup> )	192.4
EU-15 .....	146	323	276	330	( <sup>1</sup> )	126.0
Canada .....	127	246	193	154	( <sup>1</sup> )	21.3

<sup>1</sup> Not available.<sup>2</sup> Wood and wood products included in Chapter 44 of the Harmonized Tariff Schedules of the United States (HTS).<sup>3</sup> Items included in Chapter 47 of the HTS.<sup>4</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table E-5**  
**Brazil: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	----- 1,000 cubic meters -----					Percent
Wood:						
Industrial wood:						
Logs .....	9	10	5	6	( <sup>1</sup> )	-33.3
Chips and particles .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Wood residue .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Total industrial wood .....	9	10	5	6	( <sup>1</sup> )	-33.3
Residual wood <sup>3</sup> .....	40	46	47	46	( <sup>1</sup> )	15.0
Total wood .....	49	56	52	52	( <sup>1</sup> )	6.1
Lumber .....	381	461	572	379	( <sup>1</sup> )	-0.5
Wood panels:						
Veneer .....	36	17	38	29	( <sup>1</sup> )	-19.4
Plywood .....	0	1	4	3	( <sup>1</sup> )	( <sup>2</sup> )
Particleboard .....	4	46	148	121	( <sup>1</sup> )	2925.0
Fiberboard .....	4	11	37	37	( <sup>1</sup> )	825.0
Insulating board .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Total wood panels .....	44	75	227	190	( <sup>1</sup> )	331.8
----- 1,000 metric tons -----						
Pulp:						
Bleached sulfate .....	99	147	198	249	283	185.9
Unbleached sulfate .....	3	4	2	4	4	33.3
Mechanical pulp .....	0	0	0	2	1	( <sup>2</sup> )
Other .....	7	13	21	24	26	271.4
Total pulp .....	109	164	221	279	314	188.1
Paper and paperboard:						
Newsprint .....	319	423	384	471	400	25.4
Printing and writing .....	87	146	149	231	249	186.2
Corrugating materials .....	3	17	22	22	5	66.7
Other wrapping papers .....	11	8	15	11	13	18.2
Tissue .....	3	4	5	2	1	-66.7
Other paper .....	41	181	284	180	174	324.4
Board .....	16	27	67	61	62	287.5
Total paper and paperboard .....	480	806	926	978	904	88.3
Wastepaper .....	23	50	29	23	22	-4.3

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-6**  
**Brazil: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	649	1,235	512	792	( <sup>1</sup> )	22.0
Chips and particles .....	534	607	613	579	( <sup>1</sup> )	8.4
Wood residue .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Total industrial wood .....	1,183	1,842	1,125	1,371	( <sup>1</sup> )	15.9
Residual wood <sup>3</sup> .....	73	67	63	63	( <sup>1</sup> )	-13.7
Total wood .....	1,256	1,909	1,188	1,434	( <sup>1</sup> )	14.2
Lumber .....	1,405	1,596	1,316	1,433	( <sup>1</sup> )	2.0
Wood panels:						
Veneer .....	119	196	128	167	( <sup>1</sup> )	40.3
Plywood .....	726	651	554	584	( <sup>1</sup> )	-19.6
Particleboard .....	65	62	66	51	( <sup>1</sup> )	-21.5
Fiberboard .....	296	303	276	267	( <sup>1</sup> )	-9.8
Insulating board .....	17	18	16	16	( <sup>1</sup> )	-5.9
Total wood panels .....	1,223	1,230	1,040	1,085	( <sup>1</sup> )	-11.3
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	2,022	1,922	2,134	2,350	2,653	31.2
Unbleached sulfate .....	23	20	20	30	45	95.7
Mechanical pulp .....	0	4	6	3	1	( <sup>2</sup> )
Other .....	9	4	1	2	0	-100.0
Total pulp .....	2,054	1,950	2,161	2,385	2,699	31.4
Paper and paperboard:						
Newsprint .....	17	17	20	13	15	-11.8
Printing and writing .....	869	720	707	837	751	-13.6
Corrugating materials .....	395	290	281	247	214	-45.8
Other wrapping papers .....	17	17	43	39	35	105.9
Tissue .....	57	39	34	29	22	-61.4
Other paper .....	58	70	103	111	120	106.9
Board .....	117	76	49	53	59	-49.6
Total paper and paperboard .....	1,530	1,229	1,237	1,329	1,216	-20.5
Wastepaper .....	3	5	5	3	3	0.0

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-7**  
**Chile: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	16	16	16	16	16
Pulp .....	6	6	6	6	6
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	590	650	650	720	750
Pulp .....	2,100	1,800	2,600	2,600	2,350
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	83	86	98	92	97
Pulp .....	73	91	79	78	88
	<i>1,000 persons</i>				
Employment .....	8	6	6	6	6

Source: Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-8**  
**Chile: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the
	1,000 cubic meters					period
						Percent
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	10,011	11,645	11,024	12,132	( <sup>1</sup> )	21.2
Pulpwood and particles . . . . .	10,823	12,591	7,765	7,063	( <sup>1</sup> )	-34.7
Other industrial wood . . . . .	553	644	593	593	( <sup>1</sup> )	7.2
Total industrial wood . . . . .	21,387	24,880	19,382	19,788	( <sup>1</sup> )	-7.5
Residual wood <sup>2</sup> . . . . .	9,972	10,356	10,767	10,773	( <sup>1</sup> )	8.0
Total wood . . . . .	31,359	35,236	30,149	30,561	( <sup>1</sup> )	-2.5
Lumber . . . . .	3,364	3,802	4,140	4,661	( <sup>1</sup> )	38.6
Wood panels:						
Veneer sheets . . . . .	46	69	88	97	( <sup>1</sup> )	110.9
Plywood . . . . .	64	73	69	65	( <sup>1</sup> )	1.6
Particleboard . . . . .	299	348	379	425	( <sup>1</sup> )	42.1
Fiberboard . . . . .	309	329	391	464	( <sup>1</sup> )	50.2
Insulating board . . . . .	4	15	15	15	( <sup>1</sup> )	275.0
Total wood panels . . . . .	722	834	942	1,066	( <sup>1</sup> )	47.6
1,000 metric tons						
Pulp:						
Bleached sulfate . . . . .	1,120	1,200	1,550	1,350	1,550	38.4
Unbleached sulfate . . . . .	250	250	270	270	260	4.0
Mechanical pulp . . . . .	150	176	240	240	270	80.0
Other . . . . .	20	20	0	0	0	-100.0
Total pulp . . . . .	1,540	1,646	2,060	1,860	2,079	35.0
Paper and paperboard:						
Newsprint . . . . .	190	220	300	280	310	63.2
Printing and writing . . . . .	103	116	120	125	135	31.1
Corrugating materials . . . . .	72	80	80	80	80	11.1
Other wrapping papers . . . . .	18	23	25	25	28	55.6
Tissue . . . . .	72	75	70	110	130	80.6
Other paper . . . . .	0	0	0	0	0	( <sup>3</sup> )
Board . . . . .	32	43	43	45	45	40.6
Total paper and paperboard . . . . .	487	557	638	665	728	49.5
Wastepaper . . . . .	226	40	50	50	55	-75.7

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-9**  
**Chile: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood .....	14,859	16,335	13,118	13,616	( <sup>1</sup> )	-8.4
Residual wood <sup>2</sup> .....	9,973	10,357	10,768	10,773	( <sup>1</sup> )	8.0
Total wood .....	24,832	26,692	23,886	24,389	( <sup>1</sup> )	-1.8
Lumber .....	2,407	2,589	3,077	3,442	( <sup>1</sup> )	43.0
Wood panels:						
Veneer sheet .....	25	49	37	34	( <sup>1</sup> )	36.0
Plywood .....	55	69	65	60	( <sup>1</sup> )	9.1
Particleboard .....	270	292	333	378	( <sup>1</sup> )	40.0
Fiberboard .....	130	108	89	116	( <sup>1</sup> )	-10.8
Insulating board .....	0	4	4	15	( <sup>1</sup> )	( <sup>3</sup> )
Total wood panels .....	480	522	528	603	( <sup>1</sup> )	25.6
1,000 metric tons						
Pulp:						
Bleached sulfate .....	320	350	415	350	450	40.6
Unbleached sulfate .....	70	60	270	170	140	100.0
Mechanical pulp .....	150	176	35	240	270	80.0
Other .....	20	20	0	0	0	-100.0
Total pulp .....	560	606	720	760	860	53.6
Paper and paperboard:						
Newsprint .....	60	80	140	100	100	66.7
Printing and writing .....	182	191	200	205	215	18.1
Corrugating materials .....	143	147	80	80	80	-44.1
Other wrapping papers .....	22	27	25	25	28	27.3
Tissue .....	57	55	45	80	95	66.7
Other paper .....	3	3	0	0	0	-100.0
Board .....	17	20	43	45	45	164.7
Total paper and paperboard .....	484	523	533	535	563	16.3
Wastepaper .....	226	40	50	50	55	-75.7

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

Table E-10

## Chile: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change
						during the period
<i>Million dollars</i>						<i>Percent</i>
Sector trade:						
Chile exports:						
EU-15 .....	274	558	315	300	323	17.9
United States .....	148	187	200	276	308	108.1
Japan .....	358	482	346	361	253	-29.3
Taiwan .....	86	115	92	92	65	-24.4
Korea .....	182	254	228	205	48	-73.6
All other .....	453	704	539	512	556	22.7
Total .....	1,502	2,300	1,720	1,746	1,552	3.3
Chile imports:						
EU-15 .....	88	141	120	154	141	60.2
United States .....	68	133	129	132	106	55.9
Brazil .....	49	79	46	52	60	22.4
Canada .....	12	16	21	25	47	291.7
Argentina .....	8	26	18	22	23	187.5
All other .....	30	49	47	59	62	106.7
Total .....	255	444	381	444	439	72.2
Subsector profiles:						
Wood and wood products: <sup>1</sup>						
Chile exports .....	655	839	780	891	696	6.3
Major markets:						
Japan .....	259	339	277	300	198	-23.6
United States .....	131	160	174	251	280	113.7
Korea .....	116	149	175	171	20	-82.8
Chile imports .....	18	27	36	48	50	177.8
Major suppliers:						
EU-15 .....	5	8	11	16	17	240.0
United States .....	4	8	8	10	11	175.0
Brazil .....	1	2	2	3	2	100.0
Pulp and wastepaper: <sup>2</sup>						
Chile exports .....	720	1,274	765	690	694	-3.6
Major markets:						
EU-15 .....	240	509	288	266	208	-13.3
Taiwan .....	59	85	67	70	57	-3.4
Japan .....	99	144	68	61	54	-45.5
Chile imports .....	2	13	4	5	5	150.0
Major suppliers:						
United States .....	1	7	4	3	5	400.0
Canada .....	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	1	( <sup>3</sup> )	( <sup>4</sup> )
Paper and paper products: <sup>5</sup>						
Chile exports .....	127	187	174	165	163	28.3
Major markets:						
Argentina .....	38	54	51	58	64	68.4
Brazil .....	13	36	26	17	10	-23.1
Paraguay .....	15	20	10	8	9	-40.0
Chile imports .....	235	404	341	391	385	63.8
Major suppliers:						
EU-15 .....	82	132	109	139	124	51.2
United States .....	62	119	117	119	90	45.2
Brazil .....	48	73	44	49	58	20.8

<sup>1</sup> Wood and wood products included in Chapter 44 of the *Harmonized Tariff Schedules of the United States (HTS)*.

<sup>2</sup> Items included in Chapter 47 of the HTS.

<sup>3</sup> No data reported.

<sup>4</sup> Not applicable.

<sup>5</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

Table E-11

## Chile: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper,

**1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Chips and particles .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Wood residue .....	2	3	2	2	( <sup>1</sup> )	0.0
Total industrial wood .....	2	3	2	2	( <sup>1</sup> )	0.0
Residual wood <sup>3</sup> .....	1	1	1	0	( <sup>1</sup> )	-100.0
Total wood .....	3	4	3	2	( <sup>1</sup> )	-33.3
Lumber .....	11	25	24	24	( <sup>1</sup> )	118.2
Wood panels:						
Veneer .....	2	3	2	2	( <sup>1</sup> )	0.0
Plywood .....	4	4	0	0	( <sup>1</sup> )	-100.0
Particleboard .....	11	12	16	16	( <sup>1</sup> )	45.5
Fiberboard .....	1	1	3	3	( <sup>1</sup> )	200.0
Insulating board .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Total wood panels .....	18	20	21	21	( <sup>1</sup> )	16.7
<i>1,000 metric tons</i>						
Pulp:						
Bleached sulfate .....	0	0	0	0	0	( <sup>2</sup> )
Unbleached sulfate .....	0	0	0	0	0	( <sup>2</sup> )
Mechanical pulp .....	0	0	0	0	0	( <sup>2</sup> )
Other .....	0	0	0	0	0	( <sup>2</sup> )
Total pulp .....	0	0	0	0	0	( <sup>2</sup> )
Paper and paperboard:						
Newsprint .....	0	0	0	0	0	( <sup>2</sup> )
Printing and writing .....	85	85	80	80	80	-5.9
Corrugating materials .....	72	85	0	0	0	-100.0
Other wrapping papers .....	4	4	0	0	0	-100.0
Tissue .....	0	0	0	0	0	( <sup>2</sup> )
Other paper .....	3	3	0	0	0	-100.0
Board .....	0	0	0	0	0	( <sup>2</sup> )
Total paper and paperboard .....	164	177	80	80	80	-51.2
Wastepaper .....	0	0	0	0	0	( <sup>2</sup> )

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

Table E-12

## Chile: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	1,842	2,226	1,616	1,729	( <sup>1</sup> )	-6.1
Chips and particles .....	4,685	6,319	4,650	4,445	( <sup>1</sup> )	-5.1
Wood residue .....	4	3	0	0	( <sup>1</sup> )	-100.0
Total industrial wood .....	6,531	8,548	6,266	6,174	( <sup>1</sup> )	-5.5
Residual wood <sup>2</sup> .....	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Total wood .....	6,531	8,548	6,266	6,174	( <sup>1</sup> )	-5.5
Lumber .....	968	1,238	1,087	1,243	( <sup>1</sup> )	28.4
Wood panels:						
Veneer .....	23	23	53	65	( <sup>1</sup> )	182.6
Plywood .....	12	8	4	5	( <sup>1</sup> )	-58.3
Particleboard .....	40	68	62	63	( <sup>1</sup> )	57.5
Fiberboard .....	180	222	305	350	( <sup>1</sup> )	94.4
Insulating board .....	4	11	11	0	( <sup>1</sup> )	-100.0
Total wood panels .....	259	332	435	483	( <sup>1</sup> )	86.5
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	800	850	1,135	1,000	1,100	37.5
Unbleached sulfate .....	180	190	0	100	120	-33.3
Mechanical pulp .....	0	0	205	0	0	( <sup>3</sup> )
Other .....	0	0	0	0	0	( <sup>3</sup> )
Total pulp .....	980	1,040	1,340	1,100	1,220	24.5
Paper and paperboard:						
Newsprint .....	130	140	160	180	210	61.5
Printing and writing .....	6	10	0	0	0	-100.0
Corrugating materials .....	1	1	0	0	0	-100.0
Other wrapping papers .....	0	0	0	0	0	( <sup>3</sup> )
Tissue .....	15	20	25	30	35	133.3
Other paper .....	0	0	0	0	0	( <sup>3</sup> )
Board .....	15	23	0	0	0	-100.0
Total paper and paperboard .....	167	194	185	210	245	46.7
Wastepaper .....	0	0	0	0	0	( <sup>3</sup> )

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.<sup>3</sup> Not applicable.Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-13**  
**Mexico: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	59	59	58	58	55
Pulp .....	10	10	8	8	8
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	3,812	3,903	4,106	4,191	4,251
Pulp .....	975	956	965	776	750
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	75	78	78	84	87
Pulp .....	28	44	53	57	70
	<i>1,000 persons</i>				
Employment .....	26	25	25	25	28

Source: Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-14**  
**Mexico: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	4,904	4,728	5,097	5,921	( <sup>1</sup> )	20.7
Pulpwood and particles . . . . .	1,006	1,190	1,259	1,217	( <sup>1</sup> )	21.0
Other industrial wood . . . . .	139	142	188	175	( <sup>1</sup> )	25.9
Total industrial wood . . . . .	6,049	6,060	6,544	7,313	( <sup>1</sup> )	20.9
Residual wood <sup>2</sup> . . . . .	15,254	15,319	15,592	15,900	( <sup>1</sup> )	4.2
Total wood . . . . .	21,303	21,379	22,136	23,213	( <sup>1</sup> )	9.0
Lumber . . . . .	2,693	2,329	2,543	2,961	( <sup>1</sup> )	10.0
Wood panels:						
Veneer sheets . . . . .	49	49	49	49	( <sup>1</sup> )	0.0
Plywood . . . . .	397	397	397	397	( <sup>1</sup> )	0.0
Particleboard . . . . .	132	132	132	132	( <sup>1</sup> )	0.0
Fiberboard . . . . .	28	28	28	28	( <sup>1</sup> )	0.0
Insulating board . . . . .	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Total wood panels . . . . .	606	606	606	606	( <sup>1</sup> )	0.0
	1,000 metric tons					
Pulp:						
Bleached sulfate . . . . .	85	192	211	209	216	154.1
Unbleached sulfate . . . . .	74	87	113	93	114	54.1
Nonwood pulp . . . . .	117	123	154	134	182	55.6
Other . . . . .	0	19	33	6	14	( <sup>3</sup> )
Total pulp . . . . .	276	421	511	442	526	90.6
Paper and paperboard:						
Newsprint . . . . .	218	265	270	286	311	42.7
Printing and writing . . . . .	435	509	539	630	620	42.5
Corrugating materials . . . . .	1,192	1,256	1,316	1,392	1,483	24.4
Other wrapping papers . . . . .	246	253	293	294	289	17.5
Tissue . . . . .	463	477	493	595	621	34.1
Other paper . . . . .	25	24	27	23	23	-8.0
Board . . . . .	280	263	281	271	322	15.0
Total paper and paperboard . . . . .	2,859	3,047	3,219	3,491	3,700	29.4
Wastepaper . . . . .	1,519	1,632	1,696	1,870	1,963	29.2

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; and Pulp & Paper International, *Annual Review*, 1995-99.

Table E-15

**Mexico: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood .....	5,982	6,053	6,544	7,377	( <sup>1</sup> )	23.3
Residual wood <sup>2</sup> .....	15,191	15,214	15,458	15,766	( <sup>1</sup> )	3.8
Total wood .....	21,173	21,267	22,002	23,143	( <sup>1</sup> )	9.3
Lumber .....	3,506	2,736	2,816	4,028	( <sup>1</sup> )	14.9
Wood panels:						
Veneer sheet .....	56	65	55	61	( <sup>1</sup> )	8.9
Plywood .....	634	484	488	577	( <sup>1</sup> )	-9.0
Particleboard .....	128	64	179	83	( <sup>1</sup> )	-35.2
Fiberboard .....	40	41	34	79	( <sup>1</sup> )	97.5
Insulating board .....	13	20	8	5	( <sup>1</sup> )	-61.5
Total wood panels .....	871	674	764	805	( <sup>1</sup> )	-7.6
Pulp:						
Bleached sulfate .....	576	612	540	491	469	-18.6
Unbleached sulfate .....	77	87	118	97	118	53.2
Nonwood pulp .....	117	123	154	134	182	55.6
Other .....	80	71	66	75	52	-35.0
Total pulp .....	850	893	878	797	821	-3.4
	1,000 metric tons					
Paper and paperboard:						
Newsprint .....	446	290	295	364	353	-20.9
Printing and writing .....	792	627	721	877	863	9.0
Corrugating materials .....	1,251	1,192	1,412	1,604	1,776	42.0
Other wrapping papers .....	281	281	344	362	382	35.9
Tissue .....	478	448	467	540	578	20.9
Other paper .....	204	181	171	205	229	12.3
Board .....	333	285	329	372	408	22.5
Total paper and paperboard .....	3,785	3,304	3,739	4,324	4,620	22.1
Wastepaper .....	2,547	2,740	2,848	3,276	3,395	33.3

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; and Pulp & Paper International, *Annual Review*, 1995-99.

Table E-16

## Mexico: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change during the period
	----- Million dollars -----					Percent
Sector trade:						
Mexico exports:						
United States .....	750	974	1,059	1,161	( <sup>1</sup> )	54.8
EU-15 .....	6	8	12	29	( <sup>1</sup> )	383.3
Chile .....	2	4	8	13	( <sup>1</sup> )	550.0
Argentina .....	5	2	11	11	( <sup>1</sup> )	120.0
Brazil .....	1	4	5	9	( <sup>1</sup> )	800.0
All other .....	26	57	83	111	( <sup>1</sup> )	326.9
Total .....	790	1,049	1,178	1,334	( <sup>1</sup> )	68.9
Mexico imports:						
United States .....	2,620	2,583	2,694	3,105	( <sup>1</sup> )	18.5
EU-15 .....	161	127	125	163	( <sup>1</sup> )	1.2
Canada .....	129	106	62	97	( <sup>1</sup> )	-24.8
Korea .....	2	4	6	18	( <sup>1</sup> )	800.0
Brazil .....	57	23	13	16	( <sup>1</sup> )	-71.9
All other .....	178	103	94	105	( <sup>1</sup> )	-41.0
Total .....	3,147	2,946	2,994	3,504	( <sup>1</sup> )	11.3
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
Mexico exports .....	372	369	498	545	( <sup>1</sup> )	46.5
Major markets:						
United States .....	367	361	481	523	( <sup>1</sup> )	42.5
EU-15 .....	2	1	2	5	( <sup>1</sup> )	150.0
Canada .....	( <sup>1</sup> )	3	2	2	( <sup>1</sup> )	( <sup>3</sup> )
Mexico imports .....	584	335	382	444	( <sup>1</sup> )	-24.0
Major suppliers:						
United States .....	443	282	312	379	( <sup>1</sup> )	-14.4
Indonesia .....	34	9	26	15	( <sup>1</sup> )	-55.9
Canada .....	4	4	4	8	( <sup>1</sup> )	100.0
Pulp and wastepaper: <sup>4</sup>						
Mexico exports .....	29	26	37	35	( <sup>1</sup> )	20.7
Major markets:						
United States .....	29	25	33	34	( <sup>1</sup> )	17.2
Mexico imports .....	484	677	406	513	( <sup>1</sup> )	6.0
Major suppliers:						
United States .....	417	603	371	460	( <sup>1</sup> )	10.3
Canada .....	51	55	24	41	( <sup>1</sup> )	-19.6
Brazil .....	6	5	6	6	( <sup>1</sup> )	0.0
Paper and paper products: <sup>5</sup>						
Mexico exports .....	389	654	643	754	( <sup>1</sup> )	93.8
Major markets:						
United States .....	355	587	544	604	( <sup>1</sup> )	70.1
EU-15 .....	5	7	6	24	( <sup>1</sup> )	380.0
Chile .....	2	4	8	12	( <sup>1</sup> )	500.0
Mexico imports .....	2,079	1,934	2,217	2,547	( <sup>1</sup> )	22.5
Major suppliers:						
United States .....	1,760	1,698	2,010	2,267	( <sup>1</sup> )	28.8
EU-15 .....	153	120	118	155	( <sup>1</sup> )	1.3
Canada .....	73	47	34	47	( <sup>1</sup> )	-35.6

<sup>1</sup> Not available.<sup>2</sup> Wood and wood products included in Chapter 44 of the *Harmonized Tariff Schedules of the United States (HTS)*.<sup>3</sup> Not applicable.<sup>4</sup> Items included in Chapter 47 of the HTS.<sup>5</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.



**Table E-17**  
**Mexico: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	66	44	25	74	( <sup>1</sup> )	12.1
Chips and particles .....	0	1	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Wood residue .....	14	4	2	2	( <sup>1</sup> )	-85.7
Total industrial wood .....	80	49	27	76	( <sup>1</sup> )	-5.0
Residual wood <sup>3</sup> .....	15	9	2	2	( <sup>1</sup> )	-86.7
Total wood .....	95	58	29	78	( <sup>1</sup> )	-17.9
Lumber .....	998	669	690	1,485	( <sup>1</sup> )	48.8
Wood panels:						
Veneer .....	8	21	8	14	( <sup>1</sup> )	75.0
Plywood .....	239	108	107	190	( <sup>1</sup> )	-20.5
Particleboard .....	16	63	129	33	( <sup>1</sup> )	106.3
Fiberboard .....	15	13	17	62	( <sup>1</sup> )	313.3
Insulating board .....	16	21	10	10	( <sup>1</sup> )	-37.5
Total wood panels .....	294	226	271	309	( <sup>1</sup> )	5.1
Pulp:						
	<i>1,000 metric tons</i>					
Bleached sulfate .....						
Unbleached sulfate .....	491	425	347	283	253	-48.5
Nonwood pulp .....	3	0	5	4	4	33.3
Other .....	0	0	0	0	0	( <sup>2</sup> )
Total pulp .....	80	52	33	69	38	-52.5
	574	477	385	356	295	-48.6
Paper and paperboard:						
Newsprint .....	228	81	61	108	106	-53.5
Printing and writing .....	358	168	200	262	267	-25.4
Corrugating materials .....	140	93	156	232	307	119.3
Other wrapping papers .....	37	72	82	89	105	183.8
Tissue .....	46	23	37	21	37	-19.6
Other paper .....	180	159	146	184	209	16.1
Board .....	71	48	76	127	118	66.2
Total paper and paperboard .....	1,060	644	758	1,023	1,149	8.4
Wastepaper .....	1,028	1,108	1,152	1,406	1,432	39.3

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization. *Yearbook of Forest Products*, 1997; and Pulp & Paper International, *Annual Review*, 1995-99.

**Table E-18**  
**Mexico: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
<b>Wood:</b>						
Industrial wood:						
Logs .....	6	23	7	1	( <sup>1</sup> )	-83.3
Chips and particles .....	80	4	2	1	( <sup>1</sup> )	-98.8
Wood residue .....	61	30	19	10	( <sup>1</sup> )	-83.6
Total industrial wood .....	147	57	28	12	( <sup>1</sup> )	-91.8
Residual wood <sup>2</sup> .....	78	114	136	136	( <sup>1</sup> )	74.4
Total wood .....	225	171	164	148	( <sup>1</sup> )	-34.2
Lumber .....	186	262	417	418	( <sup>1</sup> )	124.7
<b>Wood panels:</b>						
Veneer .....	0	5	2	2	( <sup>1</sup> )	( <sup>3</sup> )
Plywood .....	2	21	17	10	( <sup>1</sup> )	400.0
Particleboard .....	20	131	81	82	( <sup>1</sup> )	310.0
Fiberboard .....	3	0	11	11	( <sup>1</sup> )	266.7
Insulating board .....	3	1	1	5	( <sup>1</sup> )	66.7
Total wood panels .....	28	158	112	110	( <sup>1</sup> )	292.9
<b>Pulp:</b>						
1,000 metric tons						
Bleached sulfate .....	0	5	18	1	0	( <sup>3</sup> )
Unbleached sulfate .....	0	0	0	0	0	( <sup>3</sup> )
Nonwood pulp .....	0	0	0	0	0	( <sup>3</sup> )
Other .....	0	0	0	0	0	( <sup>3</sup> )
Total pulp .....	0	0	0	0	0	( <sup>3</sup> )
<b>Paper and paperboard:</b>						
Newsprint .....	0	56	36	30	64	( <sup>3</sup> )
Printing and writing .....	1	50	18	15	24	2300.0
Corrugating materials .....	81	157	60	20	14	-82.7
Other wrapping papers .....	2	44	31	21	12	500.0
Tissue .....	31	52	63	76	80	158.1
Other paper .....	1	2	2	2	3	200.0
Board .....	18	26	28	26	32	77.8
Total paper and paperboard .....	134	387	238	190	229	70.9
Wastepaper .....	0	0	0	0	0	( <sup>3</sup> )

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; and Pulp & Paper International, *Annual Review*, 1995-99.

**APPENDIX F**  
**ASIA TABLES**

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**Table F-1**  
**Japan: Wood consumption, by source and by wood product type, 1992-96**

(1,000 m<sup>3</sup>)

Year	Domestic wood		Wood products								Share of imported wood (percent)
	Total	Domestic wood	Total	Log	Subtotal	Sawn wood	Veneer and plywood	Chip	Pulp	Other	
1992 ...	108,530	27,165	81,365	30,350	51,015	12,424	4,899	22,518	10,405	769	75.0
1993 ...	108,383	25,597	82,786	27,714	55,072	14,445	6,642	21,829	10,972	1,184	76.4
1994 ...	109,500	24,477	85,023	26,915	58,108	14,610	6,498	23,162	12,389	1,449	77.6
1995 ...	111,930	22,915	89,015	25,874	63,143	15,982	6,993	26,410	11,993	1,765	79.5
1996 ...	112,325	22,483	89,842	25,126	64,715	16,188	8,415	26,361	11,248	2,503	80.0

Note: Figures are on a log basis.

Source: Japan Wood-Products Information and Research Center.

**Table F-2**  
**Japan: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

Product	1994	1995	1996	1997	1998
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	442	441	440	440	482
Pulp .....	49	49	48	46	45
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	32,567	31,682	32,225	33,271	33,957
Pulp .....	15,143	14,944	15,053	15,029	15,792
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	88	94	93	93	88
Pulp .....	70	74	74	76	69
	<i>1,000 persons</i>				
Employment .....	55	53	52	51	49

Source: Pulp & Paper International, *Annual Review*, 1995-99.

**Table F-3**  
**Japan: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	17,693	16,480	16,382	15,631	( <sup>1</sup> )	-11.7
Pulpwood and particles . . . . .	6,282	5,971	5,658	5,517	( <sup>1</sup> )	-12.2
Other industrial wood . . . . .	481	446	429	397	( <sup>1</sup> )	-17.5
Total industrial wood . . . . .	24,456	22,897	22,469	21,545	( <sup>1</sup> )	-11.9
Residual wood <sup>2</sup> . . . . .	522	722	971	971	( <sup>1</sup> )	86.0
Total wood . . . . .	24,978	23,619	23,440	22,516	( <sup>1</sup> )	-9.9
Lumber . . . . .	25,906	24,493	23,844	21,698	19,179	-26.0
Wood panels:						
Veneer sheets . . . . .	242	242	242	242	( <sup>1</sup> )	0.0
Plywood . . . . .	4,865	4,421	4,311	3,830	2,995	-38.4
Particleboard . . . . .	1,299	1,310	1,332	1,249	( <sup>1</sup> )	-3.8
Fiberboard . . . . .	448	453	510	528	( <sup>1</sup> )	17.9
Insulating board . . . . .	640	617	605	586	( <sup>1</sup> )	-8.4
Total wood panels . . . . .	7,494	7,043	7,000	6,435	( <sup>1</sup> )	-14.1
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate . . . . .	6,928	7,390	7,529	7,853	7,607	9.8
Unbleached sulfate . . . . .	1,638	1,688	1,616	1,623	1,459	-10.9
Mechanical pulp . . . . .	1,636	1,673	1,705	1,674	1,598	-2.3
Other . . . . .	376	369	349	340	256	-31.9
Total pulp . . . . .	10,578	11,120	11,199	11,490	10,919	3.2
Paper and paperboard:						
Newsprint . . . . .	2,972	3,098	3,140	3,192	3,265	9.9
Printing and writing . . . . .	9,805	10,565	10,811	11,112	10,903	11.2
Corrugating materials . . . . .	8,754	9,019	9,048	9,425	8,964	2.4
Other wrapping papers . . . . .	1,067	1,089	1,086	1,108	1,043	-2.2
Tissue . . . . .	1,548	1,558	1,648	1,716	1,659	7.2
Other paper . . . . .	1,214	1,157	1,082	1,160	985	-18.9
Board . . . . .	3,167	3,174	3,197	3,322	3,070	-3.1
Total paper and paperboard . . . . .	28,527	29,660	30,012	31,035	29,888	4.8
Wastepaper . . . . .	14,908	15,475	15,916	16,546	16,211	8.7

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99; Japan Wood-Products Information and Research Center.

**Table F-4**  
**Japan: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard,**  
**and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the
	1,000 cubic meters					period
						Percent
Wood:						
Industrial wood .....	70,030	71,351	70,329	68,860	( <sup>1</sup> )	-1.7
Residual wood <sup>2</sup> .....	815	1,023	1,565	1,595	( <sup>1</sup> )	95.7
Total wood .....	70,845	72,374	71,894	70,455	( <sup>1</sup> )	-0.6
Lumber .....	36,614	36,247	36,098	34,275	26,944	-26.4
Wood panels:						
Veneer sheet .....	947	861	816	730	( <sup>1</sup> )	-22.9
Plywood .....	8,935	8,849	9,671	9,242	6,942	-22.3
Particleboard .....	1,646	1,671	1,885	1,921	( <sup>1</sup> )	16.7
Fiberboard .....	909	992	1,147	1,257	( <sup>1</sup> )	38.3
Insulating board .....	642	673	641	613	( <sup>1</sup> )	-4.5
Total wood panels .....	13,079	13,046	14,160	13,763	( <sup>1</sup> )	5.2
1,000 metric tons						
Pulp:						
Bleached sulfate .....	9,773	9,997	9,993	10,366	9,964	2.0
Unbleached sulfate .....	1,757	1,822	1,736	1,742	1,557	-11.4
Mechanical pulp .....	2,034	2,082	2,147	2,099	1,991	-2.1
Other .....	713	733	662	670	571	-19.9
Total pulp .....	14,277	14,634	14,538	14,877	14,081	-1.4
Paper and paperboard:						
Newsprint .....	3,474	3,578	3,747	3,792	3,795	9.2
Printing and writing .....	9,720	10,584	11,099	10,987	10,619	9.2
Corrugating materials .....	8,795	9,025	9,175	9,503	8,978	2.1
Other wrapping papers .....	1,031	1,061	1,050	1,053	973	-5.6
Tissue .....	1,548	1,558	1,648	1,716	1,659	7.2
Other paper .....	1,189	1,122	1,058	1,140	1,001	-15.8
Board .....	3,075	3,088	3,080	3,205	2,965	-3.6
Total paper and paperboard .....	28,832	30,016	30,857	31,396	29,989	4.0
Wastepaper .....	15,239	15,912	16,326	16,876	15,944	4.6

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99; Japan Wood-Products Information and Research Center.

**Table F-5**  
**Japan: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change during the period
	----- Million dollars -----					Percent
Sector trade:						
Japan exports:						
United States .....	332	379	327	379	430	29.5
Hong Kong .....	437	486	411	430	359	-17.8
China .....	128	166	186	256	256	100.0
Taiwan .....	374	350	246	257	219	-41.4
EU-15 .....	184	205	169	168	172	-6.5
All other .....	875	1,071	838	838	677	-22.6
Total .....	2,330	2,657	2,177	2,328	2,113	-9.3
Japan imports:						
United States .....	5,368	6,138	5,769	4,792	3,364	-37.3
Canada .....	3,396	4,105	3,572	3,318	2,247	-33.8
Indonesia .....	2,080	2,066	2,285	2,222	1,188	-42.9
Malaysia .....	1,957	1,993	1,987	1,895	946	-51.7
EU-15 .....	766	1,116	1,313	1,275	838	9.4
All other .....	4,486	5,409	5,295	5,277	3,823	-14.8
Total .....	18,053	20,827	20,221	18,779	12,406	-31.3
Subsector profiles:						
Wood and wood products: <sup>1</sup>						
Japan exports .....	99	106	118	97	67	-32.3
Major markets:						
Taiwan .....	23	22	14	12	11	-52.2
United States .....	9	8	7	8	10	11.1
Korea .....	22	25	32	28	9	-59.1
Japan imports .....	14,518	15,804	15,954	15,095	9,176	-36.8
Major suppliers:						
United States .....	3,947	4,176	4,141	3,319	2,103	-46.7
Canada .....	2,347	2,558	2,519	2,370	1,421	-39.5
Indonesia .....	2,067	2,016	2,197	2,117	1,038	-49.8
Pulp and wastepaper: <sup>2</sup>						
Japan exports .....	19	70	44	51	51	168.4
Major markets:						
Korea .....	3	9	19	19	22	633.3
Taiwan .....	11	12	5	14	11	0.0
Indonesia .....	3	8	10	11	6	100.0
Japan imports .....	1,963	2,984	2,010	1,859	1,619	-17.5
Major suppliers:						
Canada .....	793	1,234	768	733	629	-20.7
United States .....	664	1,037	692	645	538	-19.0
Brazil .....	169	233	174	159	153	-9.5
Paper and paper products: <sup>3</sup>						
Japan exports .....	2,211	2,482	2,015	2,180	1,995	-9.8
Major markets:						
United States .....	323	371	319	371	421	30.3
Hong Kong .....	433	482	403	425	354	-18.2
China .....	123	151	176	244	249	102.4
Japan imports .....	1,571	2,039	2,257	1,825	1,611	2.5
Major suppliers:						
United States .....	757	925	936	828	723	-4.5
EU-15 .....	346	460	629	385	318	-8.1
Canada .....	255	313	286	215	197	-22.7

<sup>1</sup> Wood and wood products included in Chapter 44 of the *Harmonized Tariff Schedules of the United States (HTS)*.

<sup>2</sup> Items included in Chapter 47 of the HTS.

<sup>3</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.

Note.—Because of rounding, figures may not add to totals shown.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.



**Table F-6**  
**Japan: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
						Percent
						1,000 cubic meters
Wood:						
Industrial wood:						
Logs .....	22,386	21,944	21,335	20,407	15,190	-32.1
Chips and particles .....	23,194	26,510	26,525	26,905	( <sup>1</sup> )	16.0
Wood residue .....	7	7	9	9	( <sup>1</sup> )	28.6
Total industrial wood .....	45,587	48,461	47,869	47,321	( <sup>1</sup> )	3.8
Residual wood <sup>3</sup> .....	302	310	600	630	( <sup>1</sup> )	108.6
Total wood .....	45,889	48,771	48,469	47,951	( <sup>1</sup> )	4.5
Lumber .....	10,717	11,765	12,281	12,590	7,765	-27.5
Wood panels:						
Veneer .....	731	642	600	520	( <sup>1</sup> )	-28.9
Plywood .....	4,074	4,437	5,381	5,422	3,947	-3.1
Particleboard .....	347	361	553	673	( <sup>1</sup> )	93.9
Fiberboard .....	461	539	646	736	( <sup>1</sup> )	59.7
Insulating board .....	11	58	37	28	( <sup>1</sup> )	154.5
Total wood panels .....	5,624	6,037	7,217	7,379	( <sup>1</sup> )	31.2
						1,000 metric tons
Pulp:						
Bleached sulfate .....	2,857	2,669	2,538	2,572	2,394	-16.2
Unbleached sulfate .....	120	134	121	120	102	-15.0
Mechanical pulp .....	398	409	442	425	393	-1.3
Other .....	338	371	319	333	316	-6.5
Total pulp .....	3,713	3,583	3,420	3,450	3,204	-13.7
Paper and paperboard:						
Newsprint .....	536	580	638	629	620	15.7
Printing and writing .....	360	420	626	387	286	-20.6
Corrugating materials .....	146	123	167	162	118	-19.2
Other wrapping papers .....	28	34	28	25	14	-50.0
Tissue .....	0	0	0	0	0	( <sup>3</sup> )
Other paper .....	28	24	26	30	24	-14.3
Board .....	76	82	74	91	107	40.8
Total paper and paperboard ..	1,174	1,263	1,559	1,324	1,169	-0.4
Wastepaper .....	404	479	431	362	294	-27.2

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99; Japan Wood-Products Information and Research Center.

**Table F-7**  
**Japan: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
<b>Wood:</b>						
Industrial wood:						
Logs .....	7	5	9	5	( <sup>1</sup> )	-28.6
Chips and particles .....	0	1	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Wood residue .....	5	1	0	0	( <sup>1</sup> )	-100.0
Total industrial wood .....	12	7	9	5	( <sup>1</sup> )	-58.3
Residual wood <sup>3</sup> .....	9	9	6	6	( <sup>1</sup> )	-33.3
Total wood .....	21	16	15	11	( <sup>1</sup> )	-47.6
Lumber .....	9	10	26	13	( <sup>1</sup> )	44.4
<b>Wood panels:</b>						
Veneer .....	26	23	27	33	( <sup>1</sup> )	26.9
Plywood .....	4	9	21	10	( <sup>1</sup> )	150.0
Particleboard .....	0	1	1	1	( <sup>1</sup> )	( <sup>2</sup> )
Fiberboard .....	1	0	9	7	( <sup>1</sup> )	600.0
Insulating board .....	8	2	1	1	( <sup>1</sup> )	-87.5
Total wood panels .....	39	35	59	52	( <sup>1</sup> )	33.3
<b>Pulp:</b>						
1,000 metric tons						
Bleached sulfate .....	12	62	74	59	37	208.3
Unbleached sulfate .....	1	0	1	1	4	300.0
Mechanical pulp .....	0	0	0	0	0	( <sup>2</sup> )
Other .....	1	7	6	3	1	0.0
Total pulp .....	14	69	81	63	42	200.0
<b>Paper and paperboard:</b>						
Newsprint .....	34	100	31	29	90	164.7
Printing and writing .....	445	401	338	512	570	28.1
Corrugating materials .....	105	117	40	84	104	-1.0
Other wrapping papers .....	64	62	64	80	84	31.3
Tissue .....	0	0	0	0	0	( <sup>2</sup> )
Other paper .....	53	59	50	50	8	-84.9
Board .....	168	168	191	208	212	26.2
Total paper and paperboard .....	869	907	714	963	1,068	22.9
Wastepaper .....	73	42	21	32	561	668.5

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table F-8**  
**Indonesia: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	53	61	74	76	84
Pulp .....	13	15	13	17	14
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	3,750	4,628	5,856	7,233	10,700
Pulp .....	2,821	2,788	2,986	3,906	4,300
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	81	74	70	68	51
Pulp .....	47	73	86	76	80
	<i>1,000 persons</i>				
Employment .....	( <sup>1</sup> )	71	80	96	50

<sup>1</sup> Not available.

Source: Pulp & Paper International, *Annual Review*, 1995-99; U.S. Department of Commerce, International Trade Administration, Indonesia Pulp & Paper, Nov. 1998.

**Table F-9**  
**Indonesia: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	32,119	31,399	32,583	32,583	( <sup>1</sup> )	1.4
Pulpwood and particles . . . . .	7,477	8,738	11,547	11,547	( <sup>1</sup> )	54.4
Other industrial wood . . . . .	3,020	3,066	3,113	3,159	( <sup>1</sup> )	4.6
Total industrial wood . . . . .	42,616	43,203	47,243	47,289	( <sup>1</sup> )	11.0
Residual wood <sup>2</sup> . . . . .	148,837	151,095	153,385	155,700	( <sup>1</sup> )	4.6
Total wood . . . . .	191,453	194,298	200,628	202,989	( <sup>1</sup> )	6.0
Lumber . . . . .	6,838	6,638	7,338	7,238	( <sup>1</sup> )	5.8
Wood panels:						
Veneer sheets . . . . .	50	50	50	50	( <sup>1</sup> )	0.0
Plywood . . . . .	9,836	9,500	9,575	9,600	( <sup>1</sup> )	-2.4
Particleboard . . . . .	330	296	430	440	( <sup>1</sup> )	33.3
Fiberboard . . . . .	13	23	23	23	( <sup>1</sup> )	76.9
Insulating board . . . . .	50	50	50	50	( <sup>1</sup> )	0.0
Total wood panels . . . . .	10,279	9,919	10,128	10,163	( <sup>1</sup> )	-1.1
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate . . . . .	1,040	1,723	2,126	2,544	( <sup>1</sup> )	144.6
Unbleached sulfate . . . . .	135	130	140	140	( <sup>1</sup> )	3.7
Mechanical pulp . . . . .	69	89	79	79	( <sup>1</sup> )	14.5
Other . . . . .	71	80	216	216	( <sup>1</sup> )	204.2
Total pulp . . . . .	1,315	2,022	2,561	2,979	3,430	160.8
Paper and paperboard:						
Newsprint . . . . .	254	243	267	390	478	88.2
Printing and writing . . . . .	975	1,061	1,236	1,510	1,855	90.3
Corrugating materials . . . . .	849	1,060	1,211	1,401	1,585	86.7
Other wrapping papers . . . . .	159	158	167	64	40	-74.8
Tissue . . . . .	45	54	92	89	111	146.7
Other paper . . . . .	51	84	119	242	212	315.7
Board . . . . .	722	766	1,029	1,125	1,206	67.0
Total paper and paperboard . . . . .	3,055	3,426	4,121	4,821	5,487	79.6
Wastepaper . . . . .	630	700	980	1,224	1,355	115.1

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table F-10**  
**Indonesia: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood .....	42,173	42,760	46,737	46,783	( <sup>1</sup> )	10.9
Residual wood <sup>2</sup> .....	147,851	150,188	152,346	154,661	( <sup>1</sup> )	4.6
Total wood .....	190,024	192,948	199,083	201,444	( <sup>1</sup> )	6.0
Lumber .....	6,198	6,274	6,941	6,852	( <sup>1</sup> )	10.6
Wood panels:						
Veneer sheet .....	27	31	52	52	( <sup>1</sup> )	92.6
Plywood .....	1,616	1,126	1,014	1,100	( <sup>1</sup> )	-31.9
Particleboard .....	17	35	157	205	( <sup>1</sup> )	1105.9
Fiberboard .....	25	15	32	32	( <sup>1</sup> )	28.0
Insulating board .....	32	41	54	54	( <sup>1</sup> )	68.8
Total wood panels .....	1,717	1,248	1,309	1,443	( <sup>1</sup> )	-16.0
1,000 metric tons						
Pulp:						
Bleached sulfate .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Unbleached sulfate .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Nonwood pulp .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Semichemical pulp .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Total pulp .....	1,759	1,958	2,270	2,737	2,613	48.6
Paper and paperboard:						
Newsprint .....	192	192	241	266	131	-31.8
Printing and writing .....	602	645	718	721	368	-38.9
Corrugating materials .....	840	906	1,041	1,131	1,073	27.7
Other wrapping papers .....	146	165	178	74	50	-65.8
Tissue .....	37	43	82	84	83	124.3
Other paper .....	90	120	128	261	239	165.6
Board .....	493	571	732	745	840	70.4
Total paper and paperboard .....	2,400	2,642	3,120	3,282	2,784	16.0
Wastepaper .....	1,640	1,754	2,277	2,607	3,389	106.6

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table F-11**  
**Indonesia: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
	----- Million dollars -----					Percent
Sector trade:						
Indonesia exports:						
Japan .....	1,767	1,814	2,114	1,757	843	-52.3
EU-15 .....	696	854	801	826	830	19.3
China .....	487	499	478	619	753	54.6
United States .....	505	461	528	488	489	-3.2
Hong Kong .....	393	430	427	406	333	-15.3
All other .....	2,107	2,415	2,196	2,055	1,790	-15.0
Total .....	5,955	6,473	6,544	6,151	5,038	-15.4
Indonesia imports:						
United States .....	261	331	284	259	233	-10.7
EU-15 .....	183	240	224	235	206	12.6
Canada .....	81	155	127	122	117	44.4
South Africa .....	0	0	42	52	77	( <sup>1</sup> )
Brazil .....	46	39	33	69	65	41.3
All other .....	375	545	397	351	256	-31.7
Total .....	946	1,310	1,107	1,088	954	0.8
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
Indonesia exports .....	5,222	5,026	5,169	4,734	2,933	-43.8
Major markets:						
Japan .....	1,754	1,764	2,035	1,683	724	-58.7
EU-15 .....	654	699	685	704	488	-25.4
United States .....	484	429	481	454	381	-21.3
Indonesia imports .....	71	96	100	114	89	25.4
Major suppliers:						
United States .....	27	41	42	48	46	70.4
China .....	2	5	6	10	7	250.0
EU-15 .....	6	7	9	11	7	16.7
Pulp and wastepaper: <sup>3</sup>						
Indonesia exports .....	138	513	432	490	690	400.0
Major markets:						
China .....	26	69	85	165	227	773.1
Singapore .....	2	2	3	1	140	6900.0
EU-15 .....	12	108	74	79	103	758.3
Indonesia imports .....	614	882	705	616	613	-0.2
Major suppliers:						
United States .....	204	256	184	152	145	-28.9
Canada .....	73	146	106	89	106	45.2
EU-15 .....	64	75	111	110	101	57.8
Paper and paper products: <sup>4</sup>						
Indonesia exports .....	595	934	944	927	1,415	137.8
Major markets:						
EU-15 .....	31	48	43	43	239	671.0
China .....	77	69	134	161	219	184.4
Hong Kong .....	77	129	156	159	146	89.6
Indonesia imports .....	261	332	303	357	253	-3.1
Major suppliers:						
EU-15 .....	114	158	104	113	98	-14.0
United States .....	30	35	59	59	41	36.7
Japan .....	37	39	31	41	27	-27.0

<sup>1</sup> Not applicable.

<sup>2</sup> Wood and wood products included in Chapter 44 of the *Harmonized Tariff Schedules of the United States (HTS)*.

<sup>3</sup> Items included in Chapter 47 of the HTS.

<sup>4</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.

Note.—Because of rounding, figures may not add to totals shown.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table F-12**  
**Indonesia: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Logs .....	89	145	178	178	( <sup>1</sup> )	100.0
Chips and particles .....	51	0	0	0	( <sup>1</sup> )	-100.0
Wood residue .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Total industrial wood .....	140	145	178	178	( <sup>1</sup> )	27.1
Residual wood <sup>3</sup> .....	1	0	0	0	( <sup>1</sup> )	-100.0
Total wood .....	141	145	178	178	( <sup>1</sup> )	26.2
Lumber .....	13	33	33	33	( <sup>1</sup> )	153.8
Wood panels:						
Veneer .....	2	2	5	5	( <sup>1</sup> )	150.0
Plywood .....	3	2	3	0	( <sup>1</sup> )	-100.0
Particleboard .....	7	4	10	10	( <sup>1</sup> )	42.9
Fiberboard .....	21	17	23	23	( <sup>1</sup> )	9.5
Insulating board .....	1	2	6	6	( <sup>1</sup> )	500.0
Total wood panels .....	34	27	47	44	( <sup>1</sup> )	29.4
----- 1,000 metric tons						
Pulp:						
Bleached sulfate .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Unbleached sulfate .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Nonwood pulp .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Semichemical pulp .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Total pulp .....	687	512	836	944	840	22.3
Paper and paperboard:						
Newsprint .....	4	4	38	65	4	0.0
Printing and writing .....	41	26	38	75	30	-26.8
Corrugating materials .....	30	25	40	23	19	-36.7
Other wrapping papers .....	19	17	23	15	12	-36.8
Tissue .....	1	1	1	1	1	0.0
Other paper .....	74	62	51	76	52	-29.7
Board .....	2	5	7	6	13	550.0
Total paper and paperboard .....	171	140	198	261	131	-23.4
Wastepaper .....	1,010	1,054	1,297	1,383	2,034	101.4

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table F-13**  
**Indonesia: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Logs .....	44	30	20	20	( <sup>1</sup> )	-54.5
Chips and particles .....	536	555	648	648	( <sup>1</sup> )	20.9
Wood residue .....	2	3	15	15	( <sup>1</sup> )	650.0
Total industrial wood .....	582	588	683	683	( <sup>1</sup> )	17.4
Residual wood <sup>3</sup> .....	987	907	1,039	1,039	( <sup>1</sup> )	5.3
Total wood .....	1,569	1,495	1,722	1,722	( <sup>1</sup> )	9.8
Lumber .....	653	397	429	418	( <sup>1</sup> )	-36.0
Wood panels:						
Veneer .....	25	22	3	3	( <sup>1</sup> )	-88.0
Plywood .....	8,223	8,376	8,564	8,500	( <sup>1</sup> )	3.4
Particleboard .....	320	265	283	245	( <sup>1</sup> )	-23.4
Fiberboard .....	9	25	14	14	( <sup>1</sup> )	55.6
Insulating board .....	19	11	2	2	( <sup>1</sup> )	-89.5
Total wood panels .....	8,596	8,699	8,866	8,764	( <sup>1</sup> )	2.0
1,000 metric tons						
Pulp:						
Bleached sulfate .....	243	576	1,127	1,186	( <sup>1</sup> )	388.1
Unbleached sulfate .....	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Nonwood pulp .....	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Semichemical pulp .....	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Total pulp .....	243	576	1,127	1,186	1,657	581.9
Paper and paperboard:						
Newsprint .....	66	55	64	189	351	431.8
Printing and writing .....	414	442	556	864	1,517	266.4
Corrugating materials .....	39	179	210	293	531	1261.5
Other wrapping papers .....	32	10	12	5	2	-93.8
Tissue .....	9	12	11	6	29	222.2
Other paper .....	35	26	42	57	25	-28.6
Board .....	231	200	304	386	379	64.1
Total paper and paperboard .....	826	924	1,199	1,800	2,834	243.1
Wastepaper .....	0	0	0	0	0	( <sup>3</sup> )

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table F-14**  
**Malaysia: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	18	18	18	18	18
Pulp .....	1	1	1	1	1
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	731	765	765	800	1,173
Pulp .....	145	180	150	160	145
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	81	89	100	100	68
Pulp .....	100	81	100	100	100
	<i>1,000 persons</i>				
<b>Employment .....</b>	<b>3</b>	<b>(<sup>1</sup>)</b>	<b>(<sup>1</sup>)</b>	<b>4</b>	<b>3</b>

<sup>1</sup> Not available.

Source: Pulp & Paper International, *Annual Review*, 1995-99; Pulp & Paper International, *International Fact and Price Book*, 1999.

**Table F-15**  
**Malaysia: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	35,672	31,572	30,140	30,280	( <sup>1</sup> )	-15.1
Pulpwood and particles . . . . .	788	788	788	788	( <sup>1</sup> )	0.0
Other industrial wood . . . . .	762	779	796	813	( <sup>1</sup> )	6.7
Total industrial wood . . . . .	37,222	33,139	31,724	31,881	( <sup>1</sup> )	-14.3
Residual wood <sup>2</sup> . . . . .	9,602	9,819	10,035	10,243	( <sup>1</sup> )	6.7
Total wood . . . . .	46,824	42,958	41,759	42,124	( <sup>1</sup> )	-10.0
Lumber . . . . .	8,703	9,287	7,493	7,176	( <sup>1</sup> )	-17.5
Wood panels:						
Veneer sheets . . . . .	2,072	1,423	1,131	1,165	( <sup>1</sup> )	-43.8
Plywood . . . . .	3,515	3,754	4,175	4,425	( <sup>1</sup> )	25.9
Particleboard . . . . .	150	500	500	500	( <sup>1</sup> )	233.3
Fiberboard . . . . .	200	260	370	600	( <sup>1</sup> )	200.0
Insulating board . . . . .	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Total wood panels . . . . .	5,937	5,937	6,176	6,690	( <sup>1</sup> )	12.7
	1,000 metric tons					
Pulp:						
Bleached sulfate . . . . .	145	145	165	170	145	0.0
Unbleached sulfate . . . . .	0	0	0	0	0	( <sup>3</sup> )
Nonwood pulp . . . . .	0	0	0	0	0	( <sup>3</sup> )
Other . . . . .	0	0	0	0	0	( <sup>3</sup> )
Total pulp . . . . .	145	145	165	170	145	0.0
Paper and paperboard:						
Newsprint . . . . .	2	2	3	3	3	50.0
Printing and writing . . . . .	170	178	178	185	165	-2.9
Corrugating materials . . . . .	323	390	478	480	505	56.3
Other wrapping papers . . . . .	0	0	0	0	0	( <sup>3</sup> )
Tissue . . . . .	75	84	113	115	115	53.3
Other paper . . . . .	15	15	15	15	15	0.0
Board . . . . .	10	10	50	50	0	-100.0
Total paper and paperboard . . . . .	595	679	837	848	803	35.0
Wastepaper . . . . .	400	425	350	380	541	35.3

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99; Pulp & Paper International, *International Fact and Price Book*, 1999; U.S. Department of Agriculture, Foreign Agricultural Service.

**Table F-16**  
**Malaysia: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood	28,800	25,305	24,874	25,410	( <sup>1</sup> )	-11.8
Residual wood <sup>2</sup>	9,491	9,672	9,807	10,082	( <sup>1</sup> )	6.2
Total wood	38,291	34,977	34,681	35,492	( <sup>1</sup> )	-7.3
Lumber	4,389	5,400	4,119	4,396	( <sup>1</sup> )	0.2
Wood panels:						
Veneer sheet	1,467	853	509	436	( <sup>1</sup> )	-70.3
Plywood	525	305	113	636	( <sup>1</sup> )	21.1
Particleboard	257	582	503	447	( <sup>1</sup> )	73.9
Fiberboard	21	12	7	13	( <sup>1</sup> )	-38.1
Insulating board	6	0	0	12	( <sup>1</sup> )	100.0
Total wood panels	2,276	1,752	1,132	1,544	( <sup>1</sup> )	-32.2
1,000 metric tons						
Pulp:						
Bleached sulfate	188	234	177	185	( <sup>1</sup> )	-1.6
Unbleached sulfate	7	14	0	0	( <sup>1</sup> )	-100.0
Nonwood pulp	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Other	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Total pulp	195	248	177	185	203	4.1
Paper and paperboard:						
Newsprint	256	344	240	264	329	28.5
Printing and writing	447	588	617	675	500	11.9
Corrugating materials	730	963	868	800	895	22.6
Other wrapping papers	0	0	0	0	0	( <sup>3</sup> )
Tissue	56	64	127	125	85	51.8
Other paper	15	16	15	25	21	40.0
Board	10	10	50	50	0	-100.0
Total paper and paperboard	1,514	1,985	1,917	1,939	1,830	20.9
Wastepaper	400	575	370	418	561	40.3

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99; Pulp & Paper International, *International Fact and Price Book*, 1999; U.S. Department of Agriculture, Foreign Agricultural Service.

Table F-17

## Malaysia: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change
						during the period
	----- Million dollars -----					Percent
Sector trade:						
Malaysia exports:						
Japan .....	1,275	1,460	1,641	1,442	765	-40.0
EU-15 .....	557	469	424	452	446	-19.9
Hong Kong .....	224	268	318	378	315	40.6
China .....	664	561	559	421	287	-56.8
Taiwan .....	510	424	407	411	255	-50.0
All other .....	1,753	1,854	1,816	1,633	1,061	-39.5
Total .....	4,983	5,036	5,165	4,737	3,129	-37.2
Malaysia imports:						
United States .....	205	285	263	245	169	-17.6
Indonesia .....	129	199	191	164	152	17.8
EU-15 .....	217	304	263	264	144	-33.6
Japan .....	177	231	145	141	96	-45.8
All other .....	377	582	503	522	376	-0.3
Total .....	1,105	1,601	1,365	1,336	937	-15.2
Subsector profiles:						
Wood and wood products: <sup>1</sup>						
Malaysia exports .....	4,738	4,719	4,881	4,467	2,880	-39.2
Major markets:						
Japan .....	1,266	1,449	1,628	1,428	742	-41.4
EU-15 .....	550	463	417	443	434	-21.1
Hong Kong .....	187	215	268	339	285	52.4
Malaysia imports .....	139	185	199	188	159	14.4
Major suppliers:						
Indonesia .....	63	88	92	61	53	-15.9
United States .....	19	31	38	34	29	52.6
EU-15 .....	8	8	12	13	14	75.0
Pulp and wastepaper: <sup>2</sup>						
Malaysia exports .....	3	11	2	3	2	-33.3
Major markets:						
Singapore .....	2	2	1	1	1	-50.0
Malaysia imports .....	39	46	47	43	44	12.8
Major suppliers:						
United States .....	4	6	11	11	15	275.0
New Zealand .....	7	11	11	13	7	0.0
Chile .....	15	6	10	7	5	-66.7
Paper and paper products: <sup>3</sup>						
Malaysia exports .....	242	306	282	267	247	2.1
Major markets:						
Singapore .....	109	132	134	114	96	-11.9
Hong Kong .....	37	54	50	39	30	-18.9
Japan .....	9	11	12	14	23	155.6
Malaysia imports .....	927	1,370	1,119	1,105	734	-20.8
Major suppliers:						
EU-15 .....	207	295	248	248	128	-38.2
United States .....	181	248	215	199	125	-30.9
Indonesia .....	62	98	94	98	97	56.5

<sup>1</sup> Wood and wood products included in Chapter 44 of the *Harmonized Tariff Schedules of the United States (HTS)*.

<sup>2</sup> Items included in Chapter 47 of the HTS.

<sup>3</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.

Note.—Because of rounding, figures may not add to totals shown.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table F-18**  
**Malaysia: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Logs .....	245	215	309	309	( <sup>1</sup> )	26.1
Chips and particles .....	0	0	5	1	( <sup>1</sup> )	( <sup>2</sup> )
Wood residue .....	12	10	1	2	( <sup>1</sup> )	-83.3
Total industrial wood .....	257	225	315	312	( <sup>1</sup> )	21.4
Residual wood <sup>3</sup> .....	20	39	26	50	( <sup>1</sup> )	150.0
Total wood .....	277	264	341	362	( <sup>1</sup> )	30.7
Lumber .....	328	409	342	329	( <sup>1</sup> )	0.3
Wood panels:						
Veneer .....	8	17	27	18	( <sup>1</sup> )	125.0
Plywood .....	14	13	6	36	( <sup>1</sup> )	157.1
Particleboard .....	142	143	103	70	( <sup>1</sup> )	-50.7
Fiberboard .....	7	3	5	3	( <sup>1</sup> )	-57.1
Insulating board .....	6	0	0	12	( <sup>1</sup> )	100.0
Total wood panels .....	177	176	141	139	( <sup>1</sup> )	-21.5
1,000 metric tons						
Pulp:						
Bleached sulfate .....	43	89	12	15	( <sup>1</sup> )	-65.1
Unbleached sulfate .....	7	14	0	0	( <sup>1</sup> )	-100.0
Nonwood pulp .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Other .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Total pulp .....	50	103	12	15	58	16.0
Paper and paperboard:						
Newsprint .....	254	345	238	261	326	28.3
Printing and writing .....	277	487	440	490	410	48.0
Corrugating materials .....	407	618	413	360	410	0.7
Other wrapping papers .....	0	0	0	0	0	( <sup>2</sup> )
Tissue .....	4	5	14	10	18	350.0
Other paper .....	2	2	0	10	6	200.0
Board .....	0	0	0	0	0	( <sup>2</sup> )
Total paper and paperboard .....	944	1,457	1,105	1,131	1,170	23.9
Wastepaper .....	0	150	30	50	50	( <sup>2</sup> )

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99; Pulp & Paper International, *International Fact and Price Book*, 1999.

**Table F-19**  
**Malaysia: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	8,632	7,961	7,070	6,680	( <sup>1</sup> )	-22.6
Chips and particles .....	35	77	47	55	( <sup>1</sup> )	57.1
Wood residue .....	12	21	48	48	( <sup>1</sup> )	300.0
Total industrial wood .....	8,679	8,059	7,165	6,783	( <sup>1</sup> )	-21.8
Residual wood <sup>3</sup> .....	131	186	254	211	( <sup>1</sup> )	61.1
Total wood .....	8,810	8,245	7,419	6,994	( <sup>1</sup> )	-20.6
Lumber .....	4,642	4,296	3,716	3,109	( <sup>1</sup> )	-33.0
Wood panels:						
Veneer .....	613	587	649	747	( <sup>1</sup> )	21.9
Plywood .....	3,004	3,462	4,068	3,825	( <sup>1</sup> )	27.3
Particleboard .....	35	61	100	123	( <sup>1</sup> )	251.4
Fiberboard .....	187	251	368	590	( <sup>1</sup> )	215.5
Insulating board .....	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Total wood panels .....	3,839	4,361	5,185	5,285	( <sup>1</sup> )	37.7
<i>1,000 metric tons</i>						
Pulp:						
Bleached sulfate .....	0	0	0	0	0	( <sup>3</sup> )
Unbleached sulfate .....	0	0	0	0	0	( <sup>3</sup> )
Nonwood pulp .....	0	0	0	0	0	( <sup>3</sup> )
Other .....	0	0	0	0	0	( <sup>3</sup> )
Total pulp .....	0	0	0	0	0	( <sup>3</sup> )
Paper and paperboard:						
Newsprint .....	0	3	1	0	0	( <sup>3</sup> )
Printing and writing .....	0	77	1	0	75	( <sup>3</sup> )
Corrugating materials .....	0	45	23	40	20	( <sup>3</sup> )
Other wrapping papers .....	0	0	0	0	0	( <sup>3</sup> )
Tissue .....	23	25	0	0	48	108.7
Other paper .....	2	1	0	0	0	-100.0
Board .....	0	0	0	0	0	( <sup>3</sup> )
Total paper and paperboard .....	25	151	25	40	143	472.0
Wastepaper .....	0	0	10	12	30	( <sup>3</sup> )

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99; Pulp & Paper International, *International Fact and Price Book*, 1999.

**Table F-20****China: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	10,000	6,000	4,748	4,748	4,748
Pulp .....	8,000	8,000	5,000	5,000	5,000
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	25,000	30,000	30,000	31,182	31,182
Pulp .....	20,000	24,500	24,500	19,750	19,750
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	86	80	88	88	89
Pulp .....	63	89	78	88	84
	<i>1,000 persons</i>				
Employment .....	1,500	1,500	1,500	( <sup>1</sup> )	( <sup>1</sup> )

<sup>1</sup> Not available.

Source: Pulp & Paper International, *Annual Review*, 1995-99; Pulp & Paper International, *International Fact and Price Book*, 1999.

**Table F-21**  
**China: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
<b>Wood:</b>						
<b>Industrial wood:</b>						
Sawlogs and veneer logs . . . . .	52,423	56,523	60,423	61,801	( <sup>1</sup> )	17.9
Pulpwood and particles . . . . .	7,887	7,297	7,751	7,751	( <sup>1</sup> )	-1.7
Other industrial wood . . . . .	39,072	37,810	40,544	40,544	( <sup>1</sup> )	3.8
Total industrial wood . . . . .	99,382	101,630	108,718	110,096	( <sup>1</sup> )	10.8
Residual wood <sup>2</sup> . . . . .	204,119	204,179	204,239	204,299	( <sup>1</sup> )	0.1
Total wood . . . . .	303,501	305,809	312,957	314,395	( <sup>1</sup> )	3.6
Lumber . . . . .	25,162	25,162	26,969	27,514	( <sup>1</sup> )	9.3
<b>Wood panels:<sup>3</sup></b>						
Veneer sheets . . . . .	82	86	86	86	( <sup>1</sup> )	4.9
Plywood . . . . .	3,123	8,103	5,413	8,093	( <sup>1</sup> )	159.1
Particleboard . . . . .	1,723	4,393	3,423	3,643	( <sup>1</sup> )	111.4
Fiberboard . . . . .	1,967	1,709	1,957	2,657	( <sup>1</sup> )	35.1
Insulating board . . . . .	8	120	80	20	( <sup>1</sup> )	150.0
Total wood panels . . . . .	6,903	14,411	10,959	14,499	( <sup>1</sup> )	110.0
————— 1,000 metric tons —————						
<b>Pulp:</b>						
Sulfate pulp <sup>4</sup> . . . . .	894	1,230	1,442	1,210	1,310	46.5
Semichemical pulp . . . . .	0	0	1,600	1,400	1,410	( <sup>5</sup> )
Nonwood pulp . . . . .	4,734	9,100	13,018	12,238	11,400	140.8
Other <sup>6</sup> . . . . .	6,917	11,470	2,970	2,532	2,400	-65.3
Total pulp . . . . .	12,545	21,800	19,030	17,380	16,520	31.7
<b>Paper and paperboard:</b>						
Newsprint . . . . .	733	776	900	730	740	1.0
Printing and writing . . . . .	3,844	3,986	5,600	5,242	5,284	37.5
Corrugating materials . . . . .	2,249	8,700	7,650	7,750	7,871	250.0
Other wrapping papers . . . . .	1,240	1,280	3,870	3,980	4,030	225.0
Tissue . . . . .	1,358	1,800	2,300	2,280	2,310	70.1
Other paper . . . . .	6,020	2,778	2,980	2,886	2,920	-51.5
Board . . . . .	5,939	4,680	3,130	4,569	4,645	-21.8
Total paper and paperboard . . . . .	21,383	24,000	26,430	27,437	27,800	30.0
Wastepaper . . . . .	7,340	7,200	8,534	8,760	8,880	21.0

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Production data for wood panels in 1994 are not comparable with production data in 1995-97. Data for 1994 include production only from state-owned enterprises; data for 1995-97 include production from state-owned enterprises and from non state-owned enterprises.

<sup>4</sup> In 1998 includes production of sulfite pulp.

<sup>5</sup> Not applicable.

<sup>6</sup> In 1994 and 1995, other pulp production may include some production of sulfate pulp, semichemical pulp, and nonwood pulp.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International,

**Table F-22**  
**China: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood .....	104,209	105,575	112,751	114,877	( <sup>1</sup> )	10.2
Residual wood <sup>2</sup> .....	204,213	204,239	204,211	204,190	( <sup>1</sup> )	0.0
Total wood .....	308,422	309,814	316,962	319,067	( <sup>1</sup> )	3.5
Lumber .....	27,113	27,455	28,835	29,986	( <sup>1</sup> )	10.6
Wood panels:						
Veneer sheet .....	549	571	599	680	( <sup>1</sup> )	23.9
Plywood .....	5,925	10,873	7,644	9,733	( <sup>1</sup> )	64.3
Particleboard .....	1,918	4,516	3,744	3,998	( <sup>1</sup> )	108.4
Fiberboard .....	2,188	2,109	2,337	3,082	( <sup>1</sup> )	40.9
Insulating board .....	168	456	506	911	( <sup>1</sup> )	442.3
Total wood panels .....	10,748	18,525	14,830	18,404	( <sup>1</sup> )	71.2
1,000 metric tons						
Pulp:						
Sulfate pulp .....	1,446	1,856	2,466	2,064	( <sup>1</sup> )	42.7
Semichemical pulp .....	20	0	1,636	1,412	( <sup>1</sup> )	6960.0
Nonwood pulp .....	4,734	9,100	13,018	12,246	( <sup>1</sup> )	158.7
Other .....	7,143	11,629	3,361	2,677	( <sup>1</sup> )	-62.5
Total pulp .....	13,343	22,585	20,481	18,399	18,699	40.1
Paper and paperboard:						
Newsprint .....	819	724	1,254	1,180	( <sup>1</sup> )	44.1
Printing and writing .....	4,326	4,471	6,432	6,259	( <sup>1</sup> )	44.7
Corrugating materials .....	3,364	9,556	9,311	9,840	( <sup>1</sup> )	192.5
Other wrapping papers .....	1,773	1,719	4,370	4,611	( <sup>1</sup> )	160.1
Tissue .....	1,331	1,771	2,272	2,245	( <sup>1</sup> )	68.7
Other paper .....	6,144	2,919	2,971	2,882	( <sup>1</sup> )	-53.1
Board .....	6,540	5,339	4,097	5,676	( <sup>1</sup> )	-13.2
Total paper and paperboard .....	24,297	26,499	30,707	32,693	32,892	35.4
Wastepaper .....	8,036	8,090	9,901	10,726	10,795	34.3

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99; U.S. Department of Agriculture, Foreign Agricultural Service.

Table F-23

## China: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change during the period
	----- Million dollars -----					Percent
Sector trade:						
China exports:						
Hong Kong .....	422	510	558	754	( <sup>1</sup> )	78.7
Japan .....	456	649	711	754	( <sup>1</sup> )	65.4
United States .....	182	218	226	289	( <sup>1</sup> )	58.8
EU-15 .....	187	252	213	225	( <sup>1</sup> )	20.3
Korea .....	64	129	133	158	( <sup>1</sup> )	146.9
All other .....	339	601	389	451	( <sup>1</sup> )	33.0
Total .....	1,650	2,359	2,230	2,631	( <sup>1</sup> )	59.5
China imports:						
United States .....	624	735	967	1,059	( <sup>1</sup> )	69.7
Indonesia .....	583	692	591	827	( <sup>1</sup> )	41.9
Korea .....	287	411	537	690	( <sup>1</sup> )	140.4
Malaysia .....	501	487	476	523	( <sup>1</sup> )	4.4
Taiwan .....	450	502	520	507	( <sup>1</sup> )	12.7
All other .....	1,726	1,902	2,407	2,755	( <sup>1</sup> )	59.6
Total .....	4,171	4,729	5,498	6,361	( <sup>1</sup> )	52.5
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
China exports .....	1,030	1,407	1,411	1,619	( <sup>1</sup> )	57.2
Major markets:						
Japan .....	411	582	630	653	( <sup>1</sup> )	58.9
Hong Kong .....	153	181	198	280	( <sup>1</sup> )	83.0
United States .....	120	136	134	178	( <sup>1</sup> )	48.3
EU-15 .....	141	191	157	160	( <sup>1</sup> )	13.5
China imports .....	1,630	1,564	1,559	1,972	( <sup>1</sup> )	21.0
Major suppliers:						
Malaysia .....	495	480	465	512	( <sup>1</sup> )	3.4
Indonesia .....	504	511	364	437	( <sup>1</sup> )	-13.3
Gabon .....	38	66	149	218	( <sup>1</sup> )	473.7
Pulp and wastepaper: <sup>3</sup>						
China exports .....	6	29	12	12	( <sup>1</sup> )	100.0
Major markets:						
Hong Kong .....	1	2	( <sup>4</sup> )	3	( <sup>1</sup> )	200.0
Taiwan .....	( <sup>4</sup> )	12	8	2	( <sup>1</sup> )	( <sup>5</sup> )
United States .....	( <sup>4</sup> )	( <sup>4</sup> )	( <sup>4</sup> )	1	( <sup>1</sup> )	( <sup>5</sup> )
China imports .....	494	845	968	924	( <sup>1</sup> )	87.0
Major suppliers:						
United States .....	161	271	299	250	( <sup>1</sup> )	55.3
Canada .....	170	262	291	231	( <sup>1</sup> )	35.9
Indonesia .....	15	77	92	140	( <sup>1</sup> )	833.3
Paper and paper products: <sup>6</sup>						
China exports .....	614	923	807	1,001	( <sup>1</sup> )	63.0
Major markets:						
Hong Kong .....	269	328	360	471	( <sup>1</sup> )	75.1
United States .....	62	81	92	110	( <sup>1</sup> )	77.4
Japan .....	43	64	79	99	( <sup>1</sup> )	130.2
China imports .....	2,047	2,320	2,972	3,466	( <sup>1</sup> )	69.3
Major suppliers:						
United States .....	357	399	583	669	( <sup>1</sup> )	87.4
Korea .....	247	351	467	644	( <sup>1</sup> )	160.7
Taiwan .....	405	447	462	455	( <sup>1</sup> )	12.3

<sup>1</sup> Not available.<sup>2</sup> Wood and wood products included in Chapter 44 of the *Harmonized Tariff Schedules of the United States (HTS)*.<sup>3</sup> Items included in Chapter 47 of the HTS.<sup>4</sup> Less than \$500,000.<sup>5</sup> Not applicable.<sup>6</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.

Note.—Because of rounding, figures may not add to totals shown.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

Table F-24

## China: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs	5,810	5,518	5,010	6,049	( <sup>1</sup> )	4.1
Chips and particles	1,445	2,057	1,921	1,826	( <sup>1</sup> )	26.4
Wood residue	118	130	131	74	( <sup>1</sup> )	-37.3
Total industrial wood	7,373	7,705	7,062	7,949	( <sup>1</sup> )	7.8
Residual wood <sup>2</sup>	232	245	182	189	( <sup>1</sup> )	-18.5
Total wood	7,605	7,950	7,244	8,138	( <sup>1</sup> )	7.0
Lumber	2,394	2,908	2,629	2,974	( <sup>1</sup> )	24.2
Wood panels:						
Veneer	494	522	546	635	( <sup>1</sup> )	28.5
Plywood	3,110	3,055	2,569	2,401	( <sup>1</sup> )	-22.8
Particleboard	207	133	333	375	( <sup>1</sup> )	81.2
Fiberboard	256	443	435	451	( <sup>1</sup> )	76.2
Insulating board	196	381	484	925	( <sup>1</sup> )	371.9
Total wood panels	4,263	4,534	4,367	4,787	( <sup>1</sup> )	12.3
	<i>1,000 metric tons</i>					
Pulp:						
Sulfate pulp <sup>3</sup>	558	647	1,035	865	1,863	233.9
Semichemical pulp	20	0	36	12	9	-55.0
Nonwood pulp	0	0	0	8	20	( <sup>4</sup> )
Other	231	177	397	156	308	33.3
Total pulp	809	824	1,468	1,041	2,200	171.9
Paper and paperboard:						
Newsprint	92	47	356	453	236	156.5
Printing and writing	547	653	872	1,068	1,777	224.9
Corrugating materials	1,181	941	1,701	2,134	1,730	46.5
Other wrapping papers	558	502	517	648	594	6.5
Tissue	12	17	21	20	29	141.7
Other paper	177	184	19	27	0	-100.0
Board	617	685	1,008	1,175	1,056	71.2
Total paper and paperboard	3,184	3,029	4,494	5,525	5,422	70.3
Wastepaper	711	906	1,372	1,970	1,915	169.3

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.<sup>3</sup> In 1997 and 1998 includes imports of sulfite pulp.<sup>4</sup> Not applicable.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table F-25**  
**China: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Logs	683	667	201	182	( <sup>1</sup> )	-73.4
Chips and particles	1,833	3,070	2,801	2,960	( <sup>1</sup> )	61.5
Wood residue	30	22	27	26	( <sup>1</sup> )	-13.3
Total industrial wood	2,546	3,759	3,029	3,168	( <sup>1</sup> )	24.4
Residual wood <sup>2</sup>	137	185	210	298	( <sup>1</sup> )	117.5
Total wood	2,683	3,944	3,239	3,466	( <sup>1</sup> )	29.2
Lumber	443	615	764	502	( <sup>1</sup> )	13.3
Wood panels:						
Veneer	27	37	32	42	( <sup>1</sup> )	55.6
Plywood	308	285	338	761	( <sup>1</sup> )	147.1
Particleboard	13	10	13	20	( <sup>1</sup> )	53.8
Fiberboard	35	43	56	27	( <sup>1</sup> )	-22.9
Insulating board	37	45	58	33	( <sup>1</sup> )	-10.8
Total wood panels	420	420	497	883	( <sup>1</sup> )	110.2
1,000 metric tons						
Pulp:						
Sulfate pulp	6	21	11	11	( <sup>1</sup> )	83.3
Semichemical pulp	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Nonwood pulp	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Other	5	18	6	11	( <sup>1</sup> )	120.0
Total pulp	11	39	17	22	20	81.8
Paper and paperboard:						
Newsprint	6	99	2	3	( <sup>1</sup> )	-50.0
Printing and writing	65	168	40	51	( <sup>1</sup> )	-21.5
Corrugating materials	66	85	40	44	( <sup>1</sup> )	-33.3
Other wrapping papers	25	63	17	17	( <sup>1</sup> )	-32.0
Tissue	39	46	49	55	( <sup>1</sup> )	41.0
Other paper	53	43	28	31	( <sup>1</sup> )	-41.5
Board	16	26	41	68	( <sup>1</sup> )	325.0
Total paper and paperboard	270	530	217	269	330	22.2
Wastepaper	15	16	5	4	0	-100.0

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Note.—Because of rounding, figures may not add to totals shown.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-99.

**Table F-26****Korea: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	136	137	134	122	109
Pulp .....	5	5	4	4	4
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	6,833	7,285	9,120	10,289	10,549
Pulp .....	721	736	728	836	836
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	94	94	84	81	73
Pulp .....	74	75	85	71	50
	<i>1,000 persons</i>				
Employment .....	60	66	63	63	48

<sup>1</sup> Not available.Source: Pulp & Paper International, *Annual Review*, 1995-98.

Table F-27

**Korea: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	612	511	372	330	( <sup>1</sup> )	-46.1
Pulpwood and particles . . . . .	385	405	392	367	( <sup>1</sup> )	-4.7
Other industrial wood . . . . .	176	450	431	365	( <sup>1</sup> )	107.4
Total industrial wood . . . . .	1,173	1,366	1,195	1,062	( <sup>1</sup> )	-9.5
Residual wood <sup>2</sup> . . . . .	571	400	398	399	( <sup>1</sup> )	-30.1
Total wood . . . . .	1,744	1,766	1,593	1,461	( <sup>1</sup> )	-16.2
Lumber . . . . .	3,862	3,440	4,291	4,759	( <sup>1</sup> )	23.2
Wood panels: <sup>3</sup>						
Plywood . . . . .	886	974	896	1,014	( <sup>1</sup> )	14.4
Particleboard . . . . .	524	548	659	721	( <sup>1</sup> )	37.6
Fiberboard . . . . .	506	614	744	750	( <sup>1</sup> )	48.2
Total wood panels . . . . .	1,916	2,136	2,299	2,485	( <sup>1</sup> )	29.7
1,000 metric tons						
Pulp:						
Bleached sulfate . . . . .	361	373	396	394	249	-31.0
Unbleached sulfate . . . . .	0	0	0	0	0	( <sup>4</sup> )
Mechanical pulp . . . . .	171	181	222	197	169	-1.2
Other . . . . .	0	0	0	0	0	( <sup>4</sup> )
Total pulp . . . . .	532	554	618	591	418	-21.4
Paper and paperboard:						
Newsprint . . . . .	874	948	1,305	1,592	1,700	94.5
Printing and writing . . . . .	1,561	1,609	1,802	2,005	1,748	12.0
Corrugating materials . . . . .	1,896	2,122	2,281	2,498	2,198	15.9
Other wrapping papers . . . . .	271	289	284	232	229	-15.5
Tissue . . . . .	317	318	308	332	272	-14.2
Other paper . . . . .	331	413	443	398	320	-3.3
Board . . . . .	1,184	1,178	1,258	1,307	1,283	8.4
Total paper and paperboard . . . . .	6,434	6,877	7,681	8,364	7,750	20.5
Wastepaper . . . . .	3,305	3,662	3,944	4,530	3,869	17.1

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Wood veneer excluded.

<sup>4</sup> Not applicable.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-98.

Table F-28

**Korea: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood .....	9,984	10,741	10,259	10,532	( <sup>1</sup> )	5.5
Residual wood <sup>2</sup> .....	838	758	794	853	( <sup>1</sup> )	1.8
Total wood .....	10,822	11,499	11,053	11,385	( <sup>1</sup> )	5.2
Lumber .....	4,713	4,424	5,428	5,724	( <sup>1</sup> )	21.5
Wood panels: <sup>3</sup>						
Plywood .....	1,828	2,177	1,888	1,940	( <sup>1</sup> )	6.1
Particleboard .....	924	1,032	1,066	1,013	( <sup>1</sup> )	9.6
Fiberboard .....	638	660	765	739	( <sup>1</sup> )	15.8
Total wood panels .....	3,390	3,869	3,719	3,692	( <sup>1</sup> )	8.9
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	1,749	1,803	2,138	1,899	1,657	-5.3
Unbleached sulfate .....	271	267	271	246	193	-28.8
Mechanical pulp .....	175	184	228	205	173	-1.1
Other .....	168	196	222	201	140	-16.7
Total pulp .....	2,363	2,450	2,859	2,551	2,163	-8.5
Paper and paperboard:						
Newsprint .....	980	1,113	1,327	1,327	892	-9.0
Printing and writing .....	1,323	1,362	1,490	1,451	907	-31.4
Corrugating materials .....	1,981	2,166	2,281	2,277	1,955	-1.3
Other wrapping papers .....	278	287	294	237	231	-16.9
Tissue .....	314	315	305	328	268	-14.7
Other paper .....	452	553	591	534	399	-11.7
Board .....	716	784	685	681	590	-17.6
Total paper and paperboard .....	6,044	6,580	6,973	6,835	5,242	-13.3
Wastepaper .....	4,696	4,979	5,369	5,982	5,832	24.2

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.<sup>3</sup> Wood veneer excluded.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-98.

Table F-29

## Korea: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change,1998
						over 1994
	<i>Million dollars</i>					<i>Percent</i>
Sector trade:						
Korea exports:						
China .....	241	346	428	492	543	125.3
Hong Kong .....	325	393	403	435	364	12.0
United States .....	81	94	73	115	233	187.7
Japan .....	64	84	86	92	83	29.7
EU-15 .....	58	63	53	33	71	22.4
All other .....	236	398	382	480	559	136.9
Total .....	1,005	1,378	1,425	1,647	1,853	84.4
Korea imports:						
United States .....	1,124	1,509	1,324	1,099	657	-41.5
Indonesia .....	596	741	726	543	328	-45.0
Canada .....	381	659	476	387	248	-34.9
New Zealand .....	250	353	351	321	171	-31.6
EU-15 .....	242	301	337	281	156	-35.5
All other .....	1,482	1,804	1,698	1,594	703	-52.6
Total .....	4,075	5,367	4,912	4,225	2,263	-44.5
Subsector profiles:						
Wood and wood products: <sup>1</sup>						
Korea exports .....						
Korea exports .....	124	132	129	115	126	1.6
Major markets:						
EU-15 .....	34	24	21	15	37	8.8
China .....	37	47	56	34	35	-5.4
Japan .....	33	34	31	38	23	-30.3
Korea imports .....	2,413	2,606	2,568	2,376	912	-62.2
Major suppliers:						
Indonesia .....	545	571	553	433	177	-67.5
New Zealand .....	224	318	326	304	146	-34.8
Malaysia .....	477	506	446	403	132	-72.3
United States .....	395	390	349	325	118	-70.1
China .....	68	125	149	174	87	27.9
Pulp and wastepaper: <sup>2</sup>						
Korea exports .....						
Korea exports .....	16	15	1	1	1	-93.8
Major markets:						
Taiwan .....	3	5	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>4</sup> )
China .....	1	6	( <sup>3</sup> )	1	( <sup>3</sup> )	( <sup>4</sup> )
Korea imports .....	1,044	1,858	1,473	1,161	974	-6.7
Major suppliers:						
United States .....	534	837	675	553	403	-24.5
Canada .....	267	497	318	279	216	-19.1
Indonesia .....	15	141	144	99	147	880.0
Paper and paper products: <sup>5</sup>						
Korea exports .....						
Korea exports .....	865	1,203	1,295	1,531	1,726	99.5
Major markets:						
China .....	203	295	372	457	508	150.2
Hong Kong .....	320	390	400	429	356	11.3
United States .....	73	84	67	112	227	211.0
Korea imports .....	671	903	870	688	378	-43.7
Major suppliers:						
United States .....	195	282	299	241	136	-30.3
Japan .....	132	188	150	144	98	-25.8
EU-15 .....	156	224	229	194	96	-38.5

<sup>1</sup> Wood and wood products included in Chapter 44 of the *Harmonized Tariff Schedules of the United States (HTS)*.

<sup>2</sup> Items included in Chapter 47 of the HTS.

<sup>3</sup> Less than \$500,000.

<sup>4</sup> Not applicable.

<sup>5</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table F-30**  
**Korea: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	7,807	8,328	8,030	8,266	( <sup>1</sup> )	5.9
Chips and particles .....	1,007	1,049	1,032	1,202	( <sup>1</sup> )	19.4
Wood residue .....	0	0	4	2	( <sup>1</sup> )	( <sup>2</sup> )
Total industrial wood .....	8,814	9,377	9,066	9,470	( <sup>1</sup> )	7.4
Residual wood <sup>3</sup> .....	269	358	396	454	( <sup>1</sup> )	68.8
Total wood .....	9,083	9,735	9,462	9,924	( <sup>1</sup> )	9.3
Lumber .....	886	1,016	1,161	985	( <sup>1</sup> )	11.2
Wood panels: <sup>4</sup>						
Plywood .....	1,003	1,307	1,081	970	( <sup>1</sup> )	-3.3
Particleboard .....	401	485	408	293	( <sup>1</sup> )	-26.9
Fiberboard .....	139	65	46	53	( <sup>1</sup> )	-61.9
Total wood panels .....	1,543	1,857	1,535	1,316	( <sup>1</sup> )	-14.7
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	1,416	1,444	1,742	1,505	1,408	-0.6
Unbleached sulfate .....	271	271	271	246	193	-28.8
Mechanical pulp .....	4	3	6	8	4	0.0
Other .....	169	196	222	201	140	-17.2
Total pulp .....	1,860	1,914	2,241	1,960	1,745	-6.2
Paper and paperboard:						
Newsprint .....	135	177	83	14	0	-100.0
Printing and writing .....	70	124	158	112	25	-64.3
Corrugating materials .....	153	166	193	189	81	-47.1
Other wrapping papers .....	8	9	10	5	4	-50.0
Tissue .....	0	0	0	0	0	( <sup>2</sup> )
Other paper .....	178	200	207	200	133	-25.3
Board .....	18	21	25	27	15	-16.7
Total paper and paperboard .....	562	697	676	547	258	-54.1
Wastepaper .....	1,391	1,317	1,425	1,452	1,963	41.1

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>4</sup> Wood veneer excluded.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-98.

**Table F-31**  
**Korea: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
<b>Wood:</b>						
Industrial wood:						
Logs	3	2	2	0	( <sup>1</sup> )	-100.0
Chips and particles	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Wood residue	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Total industrial wood	3	2	2	0	( <sup>1</sup> )	-100.0
Residual wood <sup>3</sup>	2	0	0	0	( <sup>1</sup> )	-100.0
Total wood	5	2	2	0	( <sup>1</sup> )	-100.0
Lumber	35	32	24	20	( <sup>1</sup> )	-42.9
<b>Wood panels:<sup>4</sup></b>						
Plywood	61	104	89	44	( <sup>1</sup> )	-27.9
Particleboard	1	1	1	1	( <sup>1</sup> )	0.0
Fiberboard	7	19	25	64	( <sup>1</sup> )	814.3
Total wood panels	69	124	115	109	( <sup>1</sup> )	58.0
<b>Pulp:</b>						
1,000 tons						
Bleached sulfate	28	14	0	0	0	( <sup>2</sup> )
Unbleached sulfate	0	4	0	0	0	( <sup>2</sup> )
Mechanical pulp	0	0	0	0	0	( <sup>2</sup> )
Other	1	0	0	0	0	( <sup>2</sup> )
Total pulp	29	18	0	0	0	( <sup>2</sup> )
<b>Paper and paperboard:</b>						
Newsprint	29	12	61	279	808	2686.2
Printing and writing	308	371	470	666	866	181.2
Corrugating materials	68	122	193	410	324	376.5
Other wrapping papers	1	11	0	0	2	100.0
Tissue	3	3	3	4	4	33.3
Other paper	57	60	59	64	54	-5.3
Board	486	415	598	653	708	45.7
Total paper and paperboard	952	994	1,384	2,076	2,766	190.5
Wastepaper	0	0	0	0	0	( <sup>2</sup> )

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>4</sup> Wood veneer excluded.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997; Pulp & Paper International, *Annual Review*, 1995-98.

**Table F-32****Taiwan: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	156	153	147	143	129
Pulp .....	2	2	2	2	2
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	4,700	4,800	5,006	5,250	5,250
Pulp .....	420	420	420	420	420
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	89	88	87	86	80
Pulp .....	86	86	78	82	81
	<i>1,000 persons</i>				
<b>Employment .....</b>	<b>18</b>	<b>18</b>	<b>21</b>	<b>21</b>	<b>21</b>

<sup>1</sup> Not available.Source: Pulp & Paper International, *Annual Review*, 1995-98.

**Table F-33**  
**Taiwan: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
<b>Logs:</b>						
Softwood logs .....	30	32	33	33	( <sup>1</sup> )	10.0
Temperate hardwood logs .....	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Tropical hardwood logs .....	8	4	3	3	( <sup>1</sup> )	-62.5
Total logs .....	38	36	36	36	( <sup>1</sup> )	-5.3
<b>Lumber:</b>						
Softwood lumber .....	46	50	52	52	50	8.7
Temperate hardwood lumber .....	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	0	2	( <sup>2</sup> )
Tropical hardwood lumber .....	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	45	40	-11.1
Total lumber .....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	97	92	-5.2
<b>Veneer:</b>						
Hardwood veneer .....	550	500	100	100	100	-81.8
<b>Plywood:</b>						
Softwood plywood .....	0	0	0	0	0	( <sup>2</sup> )
Tropical hardwood plywood .....	870	827	826	820	820	-5.7
Total plywood .....	870	827	826	820	820	-5.7
	<i>1,000 metric tons</i>					
<b>Pulp:</b>						
Bleached sulfate .....	306	365	326	346	339	10.8
Dissolving pulp .....	0	0	0	0	0	( <sup>2</sup> )
Unbleached sulfate .....	0	0	0	0	0	( <sup>2</sup> )
Other .....	0	0	0	0	0	( <sup>2</sup> )
Total pulp .....	306	365	326	346	339	10.8
<b>Paper and paperboard:</b>						
Newsprint .....	81	95	55	63	84	3.7
Printing and writing .....	683	691	627	739	725	6.1
Corrugating materials .....	2,036	1,989	2,204	2,239	2,069	1.6
Other wrapping papers .....	88	89	77	74	73	-17.0
Tissue .....	190	224	250	267	262	37.9
Other paper .....	112	116	114	111	104	-7.1
Board .....	1,009	1,039	1,010	1,014	906	-10.2
Total paper and paperboard .....	4,199	4,243	4,337	4,507	4,223	0.6
Wastepaper .....	2,538	2,607	2,465	2,789	2,790	9.9

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Due to a reclassification of the commodity definition for lumber in 1997, statistics from 1994-96 are not comparable.

Source: FAS, USDA, *Taiwan Forest Products Annual*, various years; Pulp & Paper International, *Annual Review*, 1995-98.

**Table F-34****Taiwan: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
<b>Logs:</b>						
Softwood logs	119	130	135	141	( <sup>1</sup> )	18.5
Temperate hardwood logs	162	104	63	90	( <sup>1</sup> )	-44.4
Tropical hardwood logs	1,789	1,545	1,566	1,593	( <sup>1</sup> )	-11.0
Total logs	2,070	1,779	1,764	1,824	( <sup>1</sup> )	-11.9
<b>Lumber:</b>						
Softwood lumber	461	543	514	646	514	11.5
Temperate hardwood lumber	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	640	503	-21.4
Tropical hardwood lumber	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	62	46	-25.8
Total lumber	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	1,348	1,063	-21.1
<b>Veneer:</b>						
Hardwood veneer	766	656	269	285	295	-61.5
<b>Plywood:</b>						
Softwood plywood	27	33	27	24	37	37.0
Tropical hardwood plywood	1,807	1,603	1,427	1,138	1,167	-35.4
Total plywood	1,834	1,636	1,454	1,162	1,204	-34.4
<b>Pulp:</b>						
1,000 metric tons						
Bleached sulfate	838	841	819	948	869	3.7
Dissolving pulp	154	157	196	159	144	-6.5
Unbleached sulfate	90	83	79	100	91	1.1
Other	234	183	141	160	189	-19.2
Total pulp	1,316	1,264	1,235	1,367	1,293	-1.7
<b>Paper and paperboard:</b>						
Newsprint	439	437	407	495	491	11.8
Printing and writing	761	785	640	843	801	5.3
Corrugating materials	1,945	1,839	1,936	2,062	1,977	1.6
Other wrapping papers	183	168	144	163	169	-7.7
Tissue	225	238	252	265	256	13.8
Other paper	277	320	322	354	311	12.3
Board	900	911	788	889	832	-7.6
Total paper and paperboard	4,730	4,698	4,489	5,071	4,837	2.3
Wastepaper	4,281	3,923	4,121	4,095	3,789	-11.5

<sup>1</sup> Not available.<sup>2</sup> Due to a reclassification of the commodity definition for lumber in 1997, statistics for 1994-96 are not comparable.<sup>3</sup> Not applicable.Source: FAS, USDA, *Taiwan Forest Products Annual*, various years; Pulp & Paper International, *Annual Review*, 1995-98.

Table F-35

## Taiwan: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Sector trade:						
Taiwan exports:						
China	450	502	520	507	( <sup>1</sup> )	12.7
Hong Kong	302	360	357	305	( <sup>1</sup> )	1.0
United States	277	239	210	217	( <sup>1</sup> )	-21.7
Japan	241	266	247	208	( <sup>1</sup> )	-13.7
All other	407	422	477	383	( <sup>1</sup> )	-5.9
Total	1,677	1,789	1,811	1,620	( <sup>1</sup> )	-3.4
Taiwan imports:						
United States	566	694	535	541	( <sup>1</sup> )	-4.4
Indonesia	587	515	427	437	( <sup>1</sup> )	-25.6
Malaysia	510	424	407	411	( <sup>1</sup> )	-19.4
EU-15	320	375	363	333	( <sup>1</sup> )	4.1
Canada	236	337	230	230	( <sup>1</sup> )	-2.5
All other	891	1,005	779	786	( <sup>1</sup> )	-11.8
Total	3,110	3,350	2,741	2,738	( <sup>1</sup> )	-12.0
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
Taiwan exports	692	683	636	575	( <sup>1</sup> )	-16.9
Major markets:						
United States	210	179	159	164	( <sup>1</sup> )	-21.9
Japan	205	212	177	149	( <sup>1</sup> )	-27.3
Hong Kong	78	105	107	102	( <sup>1</sup> )	30.8
EU-15	82	70	63	51	( <sup>1</sup> )	-37.8
Taiwan imports	1,580	1,417	1,290	1,256	( <sup>1</sup> )	-20.5
Major suppliers:						
Malaysia	498	408	401	403	( <sup>1</sup> )	-19.1
Indonesia	526	427	375	344	( <sup>1</sup> )	-34.6
United States	159	149	126	129	( <sup>1</sup> )	-18.9
China	83	117	91	96	( <sup>1</sup> )	15.7
EU-15	50	49	64	67	( <sup>1</sup> )	34.0
Pulp and waste paper: <sup>3</sup>						
Taiwan exports	21	13	6	5	( <sup>1</sup> )	-76.2
Major markets:						
Korea	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	1	( <sup>1</sup> )	( <sup>1</sup> )
China	1	2	2	1	( <sup>1</sup> )	0.0
India	2	( <sup>5</sup> )	1	1	( <sup>1</sup> )	-50.0
Taiwan imports	557	798	517	461	( <sup>1</sup> )	-17.2
Major suppliers:						
United States	218	311	196	160	( <sup>1</sup> )	-26.6
Canada	117	148	74	102	( <sup>1</sup> )	-12.8
Chile	59	85	67	70	( <sup>1</sup> )	18.6
Paper and paper products: <sup>4</sup>						
Taiwan exports	964	1,094	1,169	1,039	( <sup>1</sup> )	7.8
Major markets:						
China	405	447	462	455	( <sup>1</sup> )	12.3
Hong Kong	224	256	250	203	( <sup>1</sup> )	-9.4
Malaysia	56	77	85	87	( <sup>1</sup> )	55.4
Taiwan imports	972	1,134	934	1,020	( <sup>1</sup> )	4.9
Major suppliers:						
United States	189	234	214	252	( <sup>1</sup> )	33.3
Japan	340	316	227	231	( <sup>1</sup> )	-32.1
EU-15	229	260	241	231	( <sup>1</sup> )	0.9

<sup>1</sup> Not available.<sup>2</sup> Wood and wood products included in Chapter 44 of the *Harmonized Tariff Schedules of the United States (HTS)*.<sup>3</sup> Items included in Chapter 47 of the HTS.<sup>4</sup> Paper, paperboard, and paper articles included in Chapter 48 of the HTS.<sup>5</sup> Less than \$500,000.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table F-36**  
**Taiwan: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
<b>Logs:</b>						
Softwood logs .....	90	100	104	110	( <sup>1</sup> )	22.2
Temperate hardwood logs .....	162	104	63	90	( <sup>1</sup> )	-44.4
Tropical hardwood logs .....	1,788	1,546	1,573	1,600	( <sup>1</sup> )	-10.5
Total logs .....	2,040	1,750	1,740	1,800	( <sup>1</sup> )	-11.8
<b>Lumber:</b>						
Softwood lumber .....	430	509	477	614	481	11.9
Temperate hardwood lumber .....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	658	518	-21.3
Tropical hardwood lumber .....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	20	7	-65.0
Total lumber .....	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	1,292	1,006	-22.1
<b>Veneer:</b>						
Hardwood veneer .....	220	165	172	187	201	-8.6
<b>Plywood:</b>						
Softwood plywood .....	27	33	27	30	38	40.7
Tropical hardwood plywood .....	1,065	935	762	341	360	-66.2
Total plywood .....	1,092	968	789	371	398	-63.6
	<i>1,000 metric tons</i>					
<b>Pulp:</b>						
Bleached sulfate .....	533	487	493	602	531	-0.4
Dissolving pulp .....	154	157	196	159	144	-6.5
Unbleached sulfate .....	90	83	79	100	91	1.1
Other .....	214	183	141	160	189	-11.7
Total pulp .....	991	910	909	1,021	955	-3.6
<b>Paper and paperboard:</b>						
Newsprint .....	358	342	352	432	407	13.7
Printing and writing .....	156	162	111	193	177	13.5
Corrugating materials .....	173	147	131	150	150	-13.3
Other wrapping papers .....	96	82	68	91	99	3.1
Tissue .....	43	36	29	27	26	-39.5
Other paper .....	169	208	212	248	210	24.3
Board .....	251	200	173	217	222	-11.6
Total paper and paperboard .....	1,246	1,177	1,076	1,358	1,291	3.6
Wastepaper .....	1,743	1,316	1,656	1,306	999	-42.7

<sup>1</sup> Not available.

<sup>2</sup> Due to a reclassification of the commodity for lumber in 1997, statistics from 1994-96 are not comparable.

<sup>3</sup> Not applicable.

Source: FAS, USDA, *Taiwan Forest Products Annual*, various years; Pulp & Paper International, *Annual Review*, 1995-98.

**Table F-37**  
**Taiwan: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
<b>Logs:</b>						
Softwood logs . . . . .	1	2	2	2	( <sup>1</sup> )	100.0
Temperate hardwood logs . . . . .	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Tropical hardwood logs . . . . .	7	5	10	10	( <sup>1</sup> )	42.9
Total logs . . . . .	8	7	12	12	( <sup>1</sup> )	50.0
<b>Lumber:</b>						
Softwood lumber . . . . .	15	16	15	20	17	13.3
Temperate hardwood lumber . . . . .	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	18	17	-5.5
Tropical hardwood lumber . . . . .	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	3	1	-66.7
Total lumber . . . . .	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	41	35	-14.6
<b>Veneer:</b>						
Hardwood veneer . . . . .	4	9	3	2	6	50.0
<b>Plywood:</b>						
Softwood plywood . . . . .	0	0	0	6	1	( <sup>2</sup> )
Tropical hardwood plywood . . . . .	128	159	161	23	13	-89.8
Total plywood . . . . .	128	159	161	29	14	-89.1
<b>Pulp:</b>						
1,000 metric tons						
Bleached sulfate . . . . .	1	11	0	3	1	0.0
Dissolving pulp . . . . .	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Unbleached sulfate . . . . .	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Other . . . . .	0	0	0	0	( <sup>1</sup> )	( <sup>2</sup> )
Total pulp . . . . .	1	11	0	3	1	0.0
<b>Paper and paperboard:</b>						
Newsprint . . . . .	0	0	0	0	0	( <sup>2</sup> )
Printing and writing . . . . .	78	68	98	89	101	29.5
Corrugating materials . . . . .	264	297	399	327	242	-8.3
Other wrapping papers . . . . .	1	3	1	2	3	200.0
Tissue . . . . .	8	22	27	29	32	300.0
Other paper . . . . .	4	4	4	5	3	-25.0
Board . . . . .	360	328	395	342	296	-17.8
Total paper and paperboard . . .	715	722	924	794	677	-5.3
Wastepaper . . . . .	0	0	0	0	0	( <sup>2</sup> )

<sup>1</sup> Not available.

<sup>2</sup> Not applicable.

<sup>3</sup> Due to a reclassification in the commodity definition of lumber in 1997, statistics from 1994-96 are not comparable.

Source: FAS, USDA, *Taiwan Forest Products Annual*, various years; Pulp & Paper International, *Annual Review*, 1995-98.

**APPENDIX G**  
**EUROPE TABLES**

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**Table G-1**  
**Europe<sup>1</sup>: Production of industrial wood, pulp, and paper and paperboard, 1998; consumption of pulp, and paper and paperboard, 1998, by country or area and total**

Country/region	Production		Consumption		
	Industrial wood, 1998 <sup>2</sup>	Pulp, 1998	Paper and paperboard, 1998	Pulp, 1998	Paper and paperboard, 1998
	1,000 cubic meters			1,000 metric tons	
Europe:					
EU:					
Sweden . . . . .	55,600	10,541	9,880	8,003	2,368
Finland . . . . .	54,000	11,355	12,703	9,758	1,652
Germany . . . . .	39,135	1,950	16,310	5,444	16,855
France . . . . .	34,050	2,677	9,161	4,214	10,681
Spain . . . . .	11,500	1,620	4,196	1,432	6,072
Austria . . . . .	11,410	1,650	4,009	1,969	1,767
United Kingdom . .	6,990	584	6,476	2,160	12,477
Italy . . . . .	4,220	585	8,245	3,667	9,919
Others . . . . .	15,492	2,289	6,569	2,407	10,340
Total EU . . . . .	232,397	33,251	77,549	39,054	72,131
Russia . . . . .	58,100	3,810	3,540	2,811	1,954
Poland . . . . .	20,480	920	1,711	1,029	1,900
Czech Republic . . . .	12,900	569	785	480	876
Romania . . . . .	8,950	190	295	205	415
Other Europe . . . . .	54,114	3,514	6,367	3,691	5,511
Total Europe . . . . .	386,941	42,254	90,247	47,270	82,787
United States . . . . .	412,048	58,143	85,855	58,557	90,953
World . . . . .	1,522,758	175,531	301,012	175,107	298,524

<sup>1</sup> Europe as defined here includes Albania, Austria, Belarus, Belgium-Luxembourg, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Yugoslavia.

<sup>2</sup> Does not include removals of roundwood for firewood. Use of roundwood for firewood varies by country; UN data reports average European use at about 16 percent of total roundwood removals.

Source: Industrial roundwood production from UNECE Timber Committee, 56<sup>th</sup> session, worksheet N'9 p.-17, *Pulp & Paper International Annual Review, July 1999*, Brussels, Belgium, p. 18, world total industrial roundwood production from UNFAO forest product database.

**Table G-2**  
**Europe<sup>1</sup>: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	224,060	232,036	225,956	234,088	( <sup>2</sup> )	4.5
Pulpwood and particles . . . . .	131,047	143,970	129,545	130,130	( <sup>2</sup> )	-0.7
Other industrial wood . . . . .	28,508	26,226	32,020	29,342	( <sup>2</sup> )	2.9
Total industrial wood . . . . .	383,615	402,232	387,521	393,560	( <sup>2</sup> )	2.6
Residual wood <sup>3</sup> . . . . .	87,105	86,435	81,214	79,087	( <sup>2</sup> )	-9.2
Total wood . . . . .	470,720	488,667	468,735	472,647	( <sup>2</sup> )	0.4
Lumber . . . . .	117,271	116,454	111,245	114,972	( <sup>2</sup> )	-2.0
Wood panels:						
Veneer sheets . . . . .	1,722	1,713	1,905	1,908	( <sup>2</sup> )	10.8
Plywood . . . . .	4,250	4,618	4,655	4,768	( <sup>2</sup> )	12.2
Particleboard . . . . .	31,008	32,481	32,539	34,734	( <sup>2</sup> )	12.0
Fiberboard . . . . .	4,878	5,874	5,849	6,149	( <sup>2</sup> )	26.1
Insulating board . . . . .	814	875	901	750	( <sup>2</sup> )	-7.9
Total wood panels . . . . .	42,672	45,561	45,849	48,309	( <sup>2</sup> )	13.2
	1,000 metric tons					
Pulp:						
Bleached sulfate . . . . .	14,840	15,439	15,075	16,510	( <sup>2</sup> )	11.3
Bleached sulfite . . . . .	3,134	3,221	3,040	3,282	( <sup>2</sup> )	4.7
Mechanical pulp . . . . .	13,265	14,113	12,691	13,607	( <sup>2</sup> )	2.6
Other . . . . .	9,212	9,639	8,550	8,857	( <sup>2</sup> )	-3.9
Total pulp . . . . .	40,451	42,412	39,356	42,256	42,254	4.5
Paper and paperboard:						
Newsprint . . . . .	10,670	11,512	10,774	11,110	( <sup>2</sup> )	4.1
Printing and writing . . . . .	28,751	29,067	29,291	32,476	( <sup>2</sup> )	13.0
Household and sanitary papers . . . . .	4,468	4,543	4,658	5,106	( <sup>2</sup> )	14.3
Other paper and paperboard . . . . .	36,320	36,943	36,800	38,642	( <sup>2</sup> )	6.4
Total paper and paperboard . . . . .	80,209	82,065	81,523	87,334	90,247	12.5
Wastepaper . . . . .	31,441	33,049	33,453	33,888	( <sup>2</sup> )	7.8

<sup>1</sup> Europe as defined here includes Albania, Austria, Belarus, Belgium-Luxembourg, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Yugoslavia.

<sup>2</sup> Not available.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-3**  
**Europe<sup>1</sup>: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	----- 1,000 cubic meters -----					Percent
Wood:						
Industrial wood .....	389,240	403,918	384,943	394,484	( <sup>2</sup> )	1.3
Residual wood <sup>3</sup> .....	87,328	86,713	81,527	78,747	( <sup>2</sup> )	-9.8
Total wood .....	476,568	490,631	466,470	473,231	( <sup>2</sup> )	-0.7
Lumber .....	115,902	107,832	102,919	108,541	( <sup>2</sup> )	-6.4
Wood panels:						
Veneer sheet .....	2,185	1,931	2,149	2,237	( <sup>2</sup> )	2.4
Plywood .....	6,200	6,535	6,036	6,287	( <sup>2</sup> )	1.4
Particleboard .....	29,841	31,328	30,600	32,505	( <sup>2</sup> )	8.9
Fiberboard .....	4,357	5,416	5,314	5,539	( <sup>2</sup> )	27.1
Insulating board .....	826	799	833	653	( <sup>2</sup> )	-20.9
Total wood panels .....	43,409	46,009	44,932	47,221	( <sup>2</sup> )	8.8
	----- 1,000 metric tons -----					
Pulp:						
Bleached sulfate .....	19,774	20,481	20,074	21,649	( <sup>2</sup> )	9.5
Bleached sulfite .....	3,090	3,223	3,046	3,330	( <sup>2</sup> )	7.8
Mechanical pulp .....	13,273	14,114	12,720	13,643	( <sup>2</sup> )	2.8
Other .....	9,704	10,129	9,098	9,516	( <sup>2</sup> )	-1.9
Total pulp .....	45,841	47,947	44,938	48,138	47,270	3.1
Paper and paperboard:						
Newsprint .....	10,156	10,336	9,558	9,433	( <sup>2</sup> )	-7.1
Printing and writing .....	24,077	23,583	24,422	26,476	( <sup>2</sup> )	10.0
Household and sanitary papers .....	4,408	4,551	4,787	5,210	( <sup>2</sup> )	18.2
Other paper and paperboard .....	35,139	34,793	35,431	36,504	( <sup>2</sup> )	3.9
Total paper and paperboard .....	73,780	73,263	74,198	77,623	82,787	12.2
Wastepaper .....	32,081	32,490	33,265	33,288	( <sup>2</sup> )	3.8

<sup>1</sup> Europe as defined here includes Albania, Austria, Belarus, Belgium-Luxembourg, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Yugoslavia.

<sup>2</sup> Not available.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-4**  
**Europe<sup>1</sup>: Forest products sector trade, subsector trade, and major markets and suppliers,**  
**1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Sector trade:						
Europe exports:						
United States . . . . .	1,852	2,392	2,322	2,382	( <sup>2</sup> )	28.6
Japan . . . . .	708	991	1,828	1,568	( <sup>2</sup> )	121.5
Hong Kong . . . . .	500	522	633	706	( <sup>2</sup> )	41.2
Turkey . . . . .	261	435	697	668	( <sup>2</sup> )	155.9
Australia . . . . .	549	638	617	642	( <sup>2</sup> )	16.9
All other . . . . .	7,000	8,987	8,491	7,943	( <sup>2</sup> )	13.5
Total . . . . .	10,870	13,965	14,588	13,909	( <sup>2</sup> )	28.0
Europe imports:						
United States . . . . .	3,921	4,596	4,814	4,414	( <sup>2</sup> )	12.6
Canada . . . . .	2,447	2,828	2,808	2,540	( <sup>2</sup> )	3.8
Brazil . . . . .	1,156	1,388	1,132	1,101	( <sup>2</sup> )	-4.8
Indonesia . . . . .	752	788	922	974	( <sup>2</sup> )	29.5
Malaysia . . . . .	589	526	498	974	( <sup>2</sup> )	65.4
All other . . . . .	4,341	3,949	4,066	3,245	( <sup>2</sup> )	-25.2
Total . . . . .	12,576	14,075	14,241	13,248	( <sup>2</sup> )	5.3
Subsector profiles:						
Wood and wood products: <sup>3</sup>						
Europe exports . . . . .	2,007	2,204	3,062	3,843	( <sup>2</sup> )	91.5
Major markets:						
Japan . . . . .	335	401	1,165	1,152	( <sup>2</sup> )	243.9
United States . . . . .	261	238	415	454	( <sup>2</sup> )	73.9
Egypt . . . . .	216	327	383	432	( <sup>2</sup> )	100.0
Hong Kong . . . . .	39	35	103	194	( <sup>2</sup> )	397.4
Israel . . . . .						
Europe imports . . . . .	6,473	6,334	6,560	6,264	( <sup>2</sup> )	-3.2
Major suppliers:						
United States . . . . .	1,535	1,502	1,657	1,583	( <sup>2</sup> )	3.1
Indonesia . . . . .	714	713	779	861	( <sup>2</sup> )	20.6
Canada . . . . .	663	652	627	631	( <sup>2</sup> )	-4.8
Brazil . . . . .	558	611	538	528	( <sup>2</sup> )	-5.4
Malaysia . . . . .	582	519	490	528	( <sup>2</sup> )	-9.3
Pulp and wastepaper: <sup>4</sup>						
Europe exports . . . . .	3,334	482	581	565	( <sup>2</sup> )	-83.1
Major markets:						
China . . . . .	18	17	88	93	( <sup>2</sup> )	416.7
Indonesia . . . . .	31	47	61	77	( <sup>2</sup> )	148.4
Japan . . . . .	53	95	68	63	( <sup>2</sup> )	18.9
Taiwan . . . . .	53	75	67	43	( <sup>2</sup> )	-18.9
United States . . . . .	26	36	41	39	( <sup>2</sup> )	50.0
Europe imports . . . . .	3,416	4,709	4,113	3,727	( <sup>2</sup> )	9.1
Major suppliers:						
Canada . . . . .	1,292	1,704	1,433	1,324	( <sup>2</sup> )	2.5
United States . . . . .	1,239	1,684	1,527	1,289	( <sup>2</sup> )	4.0
Brazil . . . . .	340	520	437	425	( <sup>2</sup> )	25.0
Chile . . . . .	264	387	328	301	( <sup>2</sup> )	14.0
Indonesia . . . . .	6	30	80	58	( <sup>2</sup> )	866.7

See footnotes at end of table.

**Table G-4—Continued**

**Europe<sup>1</sup>: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Paper and paper products: <sup>5</sup>						
Europe exports .....	8,530	11,280	10,406	9,501	( <sup>2</sup> )	11.4
Major markets:						
United States .....	1,565	2,119	1,865	1,890	( <sup>2</sup> )	20.8
Australia .....	512	598	572	594	( <sup>2</sup> )	16.0
Hong Kong .....	406	483	526	508	( <sup>2</sup> )	25.1
Turkey .....	195	356	539	504	( <sup>2</sup> )	158.5
Japan .....	320	495	595	353	( <sup>2</sup> )	10.3
Europe imports .....	2,687	3,032	3,569	3,257	( <sup>2</sup> )	21.2
Major suppliers:						
United States .....	1,147	1,410	1,631	1,542	( <sup>2</sup> )	34.4
Canada .....	492	472	748	584	( <sup>2</sup> )	18.7
China .....	134	144	176	194	( <sup>2</sup> )	44.8
Japan .....	196	196	195	154	( <sup>2</sup> )	-21.4
Brazil .....	258	257	157	148	( <sup>2</sup> )	-42.6

<sup>1</sup> Europe as defined here includes Albania, Austria, Belarus, Belgium-Luxembourg, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Yugoslavia.

<sup>2</sup> Not available.

<sup>3</sup> Wood and wood products included in chapter 44 of the *Harmonized Tariff Schedule of the United States (HTS)*.

<sup>4</sup> Items included in chapter 47 of the HTS.

<sup>5</sup> Paper, paperboard and paper articles included in chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table G-5**  
**Europe<sup>1</sup>: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the
	1,000 cubic meters					period
						Percent
Wood:						
Industrial wood:						
Logs .....	35,732	45,308	37,771	43,031	( <sup>2</sup> )	20.4
Chips and particles .....	4,528	4,816	4,763	4,637	( <sup>2</sup> )	2.4
Wood residue .....	4,807	4,388	5,479	4,703	( <sup>2</sup> )	-2.2
Total industrial wood .....	45,067	54,512	48,013	52,371	( <sup>2</sup> )	16.2
Residual wood <sup>3</sup> .....	2,333	2,377	2,756	3,435	( <sup>2</sup> )	47.2
Total wood .....	47,400	56,889	50,769	55,806	( <sup>2</sup> )	17.7
Lumber .....	40,000	42,238	41,566	44,441	( <sup>2</sup> )	11.1
Wood panels:						
Veneer .....	486	611	604	564	( <sup>2</sup> )	16.0
Plywood .....	2,618	2,625	2,960	3,101	( <sup>2</sup> )	18.4
Particleboard .....	7,821	8,210	9,010	9,969	( <sup>2</sup> )	27.5
Fiberboard .....	2,387	2,635	3,112	3,738	( <sup>2</sup> )	56.6
Insulating board .....	411	603	625	730	( <sup>2</sup> )	77.6
Total wood panels .....	13,723	14,684	16,311	18,102	( <sup>2</sup> )	31.9
1,000 metric tons						
Pulp:						
Bleached sulfate .....	6,776	6,538	6,967	7,681	( <sup>2</sup> )	13.4
Bleached sulfite .....	1,193	1,062	1,143	1,152	( <sup>2</sup> )	-3.4
Mechanical pulp .....	472	474	370	388	( <sup>2</sup> )	-17.8
Other .....	832	938	798	807	( <sup>2</sup> )	-3.0
Total pulp .....	9,273	9,012	9,278	10,028	( <sup>2</sup> )	8.1
Paper and paperboard:						
Newsprint .....	6,444	6,691	6,722	8,017	( <sup>2</sup> )	24.4
Printing and writing .....	18,877	19,547	18,191	21,503	( <sup>2</sup> )	13.9
Household and sanitary papers .....	721	821	879	954	( <sup>2</sup> )	32.3
Other paper and paperboard .....	15,755	16,476	16,444	18,926	( <sup>2</sup> )	20.1
Total paper and paperboard .....	41,797	43,535	42,236	49,400	( <sup>2</sup> )	18.2
Wastepaper .....	6,367	7,745	7,401	7,614	( <sup>2</sup> )	19.6

<sup>1</sup> Europe as defined here includes Albania, Austria, Belarus, Belgium-Luxembourg, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Yugoslavia.

<sup>2</sup> Not available.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-98.

**Table G-6**  
**Europe<sup>1</sup>: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Logs .....	40,124	45,804	35,067	42,203	( <sup>2</sup> )	5.2
Chips and particles .....	6,284	6,402	6,452	6,943	( <sup>2</sup> )	10.5
Wood residue .....	4,285	3,993	3,916	4,149	( <sup>2</sup> )	-3.2
Total industrial wood .....	50,693	56,199	45,435	53,295	( <sup>2</sup> )	5.1
Residual wood <sup>3</sup> .....	2,556	2,655	3,069	3,095	( <sup>2</sup> )	21.1
Total wood .....	53,249	58,854	48,504	56,390	( <sup>2</sup> )	5.9
Lumber .....	38,640	33,617	33,240	38,009	( <sup>2</sup> )	-1.6
Wood panels:						
Veneer .....	949	930	847	893	( <sup>2</sup> )	-5.9
Plywood .....	4,568	4,542	4,341	4,620	( <sup>2</sup> )	1.1
Particleboard .....	6,654	7,057	7,071	7,740	( <sup>2</sup> )	16.3
Fiberboard .....	1,866	2,176	2,576	3,127	( <sup>2</sup> )	67.6
Insulating board .....	423	528	557	633	( <sup>2</sup> )	49.6
Total wood panels .....	14,460	15,233	15,392	17,013	( <sup>2</sup> )	17.7
	1,000 metric tons					
Pulp:						
Bleached sulfate .....	11,709	11,580	11,966	12,821	( <sup>2</sup> )	9.5
Bleached sulfite .....	1,149	1,065	1,149	1,200	( <sup>2</sup> )	4.4
Mechanical pulp .....	480	474	399	424	( <sup>2</sup> )	-11.7
Other .....	1,324	1,428	1,346	1,466	( <sup>2</sup> )	10.7
Total pulp .....	14,662	14,547	14,860	15,911	( <sup>2</sup> )	8.5
Paper and paperboard:						
Newsprint .....	5,930	5,515	5,506	6,340	( <sup>2</sup> )	6.9
Printing and writing .....	14,203	14,063	13,322	15,503	( <sup>2</sup> )	9.2
Household and sanitary papers .....	660	829	1,008	1,058	( <sup>2</sup> )	60.3
Other paper and paperboard .....	14,574	14,326	15,076	16,788	( <sup>2</sup> )	15.2
Total paper and paperboard .....	35,367	34,733	34,912	39,689	( <sup>2</sup> )	12.2
Wastepaper .....	7,007	7,186	7,212	7,014	( <sup>2</sup> )	0.1

<sup>1</sup> Europe as defined here includes Albania, Austria, Belarus, Belgium-Luxembourg, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Yugoslavia.

<sup>2</sup> Not available.

<sup>3</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-98.

Table G-7

## EU-15: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change
						during the
	<i>Million dollars</i>					<i>Percent</i>
Sector trade:						
EU exports:						
United States .....	1,711	2,203	2,085	2,130	( <sup>1</sup> )	24.5
Switzerland .....	2,191	2,680	2,587	1,962	( <sup>1</sup> )	-10.5
Norway .....	1,166	1,503	1,532	1,465	( <sup>1</sup> )	25.6
Poland .....	557	847	1,076	1,114	( <sup>1</sup> )	100.0
Russia .....	317	533	864	972	( <sup>1</sup> )	206.6
All other .....	10,178	13,006	12,979	11,736	( <sup>1</sup> )	15.3
Total .....	16,120	20,772	21,123	19,380	( <sup>1</sup> )	20.2
EU imports:						
United States .....	3,797	4,407	4,589	4,185	( <sup>1</sup> )	10.2
Canada .....	2,390	2,743	2,713	2,460	( <sup>1</sup> )	2.9
Norway .....	1,525	2,040	1,926	1,591	( <sup>1</sup> )	4.3
Switzerland .....	1,332	1,438	1,644	1,489	( <sup>1</sup> )	11.8
Poland .....	855	1,109	1,082	1,104	( <sup>1</sup> )	29.1
All other .....	9,503	10,369	10,597	9,938	( <sup>1</sup> )	4.6
Total .....	19,402	22,106	22,551	20,767	( <sup>1</sup> )	7.0
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
EU exports .....						
EU exports .....	3,488	3,944	4,567	4,365	( <sup>1</sup> )	25.1
Major markets:						
Norway .....	459	557	585	593	( <sup>1</sup> )	29.2
Switzerland .....	732	788	768	511	( <sup>1</sup> )	-30.2
Japan .....	324	386	570	499	( <sup>1</sup> )	54.0
United States .....	242	219	350	373	( <sup>1</sup> )	54.1
Egypt .....	163	272	229	267	( <sup>1</sup> )	63.8
EU imports .....	10,320	10,578	11,168	10,701	( <sup>1</sup> )	3.7
Major suppliers:						
United States .....	1,491	1,437	1,576	1,499	( <sup>1</sup> )	0.5
Russia .....	808	930	835	857	( <sup>1</sup> )	6.1
Indonesia .....	698	691	752	825	( <sup>1</sup> )	18.2
Poland .....	692	870	803	811	( <sup>1</sup> )	17.2
Canada .....	642	620	592	598	( <sup>1</sup> )	-6.9
Pulp and wastepaper: <sup>3</sup>						
EU exports .....						
EU exports .....	614	1,078	826	763	( <sup>1</sup> )	24.3
Major markets:						
Switzerland .....	135	291	164	140	( <sup>1</sup> )	3.7
Indonesia .....	30	43	52	70	( <sup>1</sup> )	133.3
Japan .....	53	91	67	58	( <sup>1</sup> )	9.4
Norway .....	49	84	56	57	( <sup>1</sup> )	16.3
Taiwan .....	41	65	58	36	( <sup>1</sup> )	-12.2
EU imports .....	3,984	5,462	4,666	4,116	( <sup>1</sup> )	3.3
Major suppliers:						
Canada .....	1,259	1,660	1,396	1,298	( <sup>1</sup> )	3.1
United States .....	1,205	1,626	1,488	1,239	( <sup>1</sup> )	2.8
Brazil .....	325	496	419	406	( <sup>1</sup> )	24.9
Chile .....	248	350	303	276	( <sup>1</sup> )	11.3
Norway .....	258	403	279	222	( <sup>1</sup> )	-14.0

See footnotes at end of table.

**Table G-7—Continued**

**EU-15: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Paper and paper products: <sup>4</sup>						
EU exports .....	12,018	15,749	15,730	14,252	( <sup>1</sup> )	18.6
Major markets:						
United States .....	1,445	1,949	1,705	1,724	( <sup>1</sup> )	19.3
Switzerland .....	1,322	1,602	1,655	1,311	( <sup>1</sup> )	-0.8
Poland .....	478	685	905	907	( <sup>1</sup> )	89.7
Norway .....	658	863	891	815	( <sup>1</sup> )	23.9
Russia .....	196	393	633	719	( <sup>1</sup> )	266.8
EU imports .....	5,098	6,066	6,717	5,950	( <sup>1</sup> )	16.7
Major suppliers:						
United States .....	1,101	1,345	1,524	1,447	( <sup>1</sup> )	31.4
Switzerland .....	896	1,106	1,186	1,079	( <sup>1</sup> )	20.4
Norway .....	891	1,216	1,283	1,034	( <sup>1</sup> )	16.0
Canada .....	488	462	725	565	( <sup>1</sup> )	15.8
Poland .....	142	215	251	268	( <sup>1</sup> )	88.7

<sup>1</sup> Not available.

<sup>2</sup> Wood and wood products included in chapter 44 of the *Harmonized Tariff Schedule of the United States (HTS)*.

<sup>3</sup> Items included in chapter 47 of the HTS.

<sup>4</sup> Paper, paperboard and paper articles included in chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table G-8**

**Sweden: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

Product	1994	1995	1996	1997	1998
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	50	50	50	50	50
Pulp .....	49	46	46	46	46
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	9,556	9,652	1,030	10,581	10,730
Pulp .....	10,449	10,522	10,892	11,363	11,484
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	97	95	90	92	92
Pulp .....	97	97	90	92	92
	<i>1,000 persons</i>				
Employment .....	32	34	34	34	31

Source: Pulp & Paper International, *Annual Review*, 1995-99; Food and Agriculture Organization, *Pulp & Paper Capacities*, 1996-2001.

**Table G-9**  
**Sweden: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	29,300	34,700	30,600	34,100	( <sup>1</sup> )	16.4
Pulpwood and particles . . . . .	22,700	24,600	21,400	21,800	( <sup>1</sup> )	-4.0
Other industrial wood . . . . .	500	500	500	500	( <sup>1</sup> )	0.0
Total industrial wood . . . . .	52,500	59,800	52,500	56,400	( <sup>1</sup> )	7.4
Residual wood <sup>2</sup> . . . . .	3,800	3,800	3,800	3,800	( <sup>1</sup> )	0.0
Total wood . . . . .	56,300	63,600	56,300	60,200	( <sup>1</sup> )	6.9
Lumber . . . . .	13,816	14,944	14,370	15,619	( <sup>1</sup> )	13.1
Wood panels:						
Veneer sheets . . . . .	13	13	13	13	( <sup>1</sup> )	0.0
Plywood . . . . .	85	108	119	113	( <sup>1</sup> )	32.9
Particleboard . . . . .	609	632	577	612	( <sup>1</sup> )	0.5
Fiberboard . . . . .	71	110	106	116	( <sup>1</sup> )	63.4
Insulating board . . . . .	55	116	116	76	( <sup>1</sup> )	38.2
Total wood panels . . . . .	833	979	931	930	( <sup>1</sup> )	11.6
	1,000 metric tons					
Pulp:						
Bleached sulfate . . . . .	4,220	4,163	4,231	4,570	4,583	8.6
Unbleached sulfate . . . . .	2,048	1,978	1,978	1,982	2,016	-1.6
Mechanical pulp . . . . .	2,858	2,753	2,753	2,959	3,018	5.6
Other . . . . .	971	1,293	885	986	924	-4.8
Total pulp . . . . .	10,097	10,187	9,847	10,497	10,541	4.4
Paper and paperboard:						
Newsprint . . . . .	2,415	2,346	2,283	2,411	2,478	2.6
Printing and writing . . . . .	2,061	2,046	2,171	2,458	2,545	23.5
Corrugating materials . . . . .	1,934	1,904	1,910	1,970	1,910	-1.2
Other wrapping papers . . . . .	929	1,082	880	946	955	2.8
Tissue . . . . .	295	293	297	292	299	1.4
Other paper . . . . .	138	140	132	147	128	-7.2
Board . . . . .	1,512	1,358	1,345	1,555	1,565	3.5
Total paper and paperboard . . . . .	9,284	9,169	9,018	9,779	9,880	6.4
Wastepaper . . . . .	989	1,079	1,159	1,323	1,378	39.3

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-10**  
**Sweden: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood .....	58,652	66,143	56,322	63,302	( <sup>1</sup> )	7.9
Residual wood <sup>2</sup> .....	3,810	3,810	3,845	3,891	( <sup>1</sup> )	2.1
Total wood .....	62,462	69,953	60,167	67,193	( <sup>1</sup> )	7.6
Lumber .....	3,598	4,899	2,935	4,923	( <sup>1</sup> )	36.8
Wood panels:						
Veneer sheet .....	33	35	31	30	( <sup>1</sup> )	-9.1
Plywood .....	162	157	142	202	( <sup>1</sup> )	24.7
Particleboard .....	655	792	693	742	( <sup>1</sup> )	13.3
Fiberboard .....	111	180	141	153	( <sup>1</sup> )	37.8
Insulating board .....	11	16	22	21	( <sup>1</sup> )	90.9
Total wood panels .....	972	1,180	1,029	1,148	( <sup>1</sup> )	18.1
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	2,152	2,347	2,318	2,503	2,497	16.0
Unbleached sulfate .....	1,948	1,882	1,862	1,873	1,949	0.1
Mechanical pulp .....	2,653	2,580	2,544	2,743	2,815	6.1
Other .....	737	1,029	708	814	742	0.7
Total pulp .....	7,490	7,838	7,432	7,933	8,003	6.8
Paper and paperboard:						
Newsprint .....	424	382	459	409	451	6.4
Printing and writing .....	448	282	560	629	638	42.4
Corrugating materials .....	363	365	396	444	434	19.6
Other wrapping papers .....	66	207	178	200	183	177.3
Tissue .....	151	161	175	160	159	5.3
Other paper .....	124	97	60	70	93	-25.0
Board .....	72	338	381	502	410	469.4
Total paper and paperboard .....	1,648	1,832	2,209	2,414	2,368	43.7
Wastepaper .....	1,406	1,585	1,504	1,689	1,758	25.0

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-11**  
**Sweden: Forest products sector trade, subsector trade, and major markets and suppliers,**  
**1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
						Percent
						<i>Million dollars</i>
Sector trade:						
Sweden exports:						
Germany . . . . .	2,230	2,839	2,549	2,342	2,067	-7.3
United Kingdom . . . . .	1,751	2,121	2,055	1,914	( <sup>1</sup> )	9.3
Netherlands . . . . .	664	986	1,043	1,014	( <sup>1</sup> )	52.7
Norway . . . . .	724	955	990	937	( <sup>1</sup> )	29.4
Denmark . . . . .	813	1,028	1,000	903	( <sup>1</sup> )	11.1
All other . . . . .	4,100	5,312	4,985	4,721	( <sup>1</sup> )	15.1
Total . . . . .	10,282	13,241	12,622	11,831	( <sup>1</sup> )	15.1
Sweden imports:						
Finland . . . . .	351	417	403	326	( <sup>1</sup> )	-7.1
Germany . . . . .	301	384	262	256	( <sup>1</sup> )	-15.0
Norway . . . . .	186	293	269	255	( <sup>1</sup> )	37.1
Denmark . . . . .	156	213	176	170	( <sup>1</sup> )	9.0
Russian Federation . . . . .	80	107	87	96	( <sup>1</sup> )	20.0
All other . . . . .	655	862	735	850	( <sup>1</sup> )	29.8
Total . . . . .	1,729	2,276	1,932	1,953	( <sup>1</sup> )	13.0
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
Sweden exports . . . . .	3,078	3,524	3,424	3,423	( <sup>1</sup> )	11.2
Major markets:						
United Kingdom . . . . .	632	648	633	640	( <sup>1</sup> )	1.3
Germany . . . . .	631	711	663	588	417	-33.9
Norway . . . . .	321	401	423	419	( <sup>1</sup> )	30.5
Denmark . . . . .	371	420	406	412	( <sup>1</sup> )	11.1
Netherlands . . . . .	231	246	250	235	( <sup>1</sup> )	1.7
Sweden imports . . . . .	749	979	777	875	( <sup>1</sup> )	16.8
Major suppliers:						
Latvia . . . . .	68	138	81	123	( <sup>1</sup> )	80.9
Estonia . . . . .	41	63	74	112	( <sup>1</sup> )	173.2
Finland . . . . .	123	132	118	105	( <sup>1</sup> )	-14.6
Russian Federation . . . . .	73	106	77	90	( <sup>1</sup> )	23.3
Norway . . . . .	67	90	79	79	( <sup>1</sup> )	17.9
Pulp and wastepaper: <sup>3</sup>						
Sweden exports . . . . .	1,345	2,048	1,444	1,454	( <sup>1</sup> )	8.1
Major markets:						
Germany . . . . .	480	667	488	495	413	-14.0
Netherlands . . . . .	88	157	158	196	( <sup>1</sup> )	122.7
France . . . . .	161	263	167	142	164	1.9
Italy . . . . .	133	188	113	111	( <sup>1</sup> )	-16.5
Sweden imports . . . . .	158	305	167	168	( <sup>1</sup> )	6.3
Major suppliers:						
Norway . . . . .	49	84	52	46	( <sup>1</sup> )	-6.1
Finland . . . . .	20	25	13	19	( <sup>1</sup> )	-5.0
Germany . . . . .	21	56	16	16	( <sup>1</sup> )	-23.8
Denmark . . . . .	18	42	18	13	( <sup>1</sup> )	-27.8

See footnotes at end of table.

**Table G-11—Continued**

**Sweden: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	Million dollars			1998	Change during the period
			1996	1997	1998		Percent
Paper and paper products: <sup>4</sup>							
Sweden exports .....	5,859	7,669	7,754	6,954	( <sup>1</sup> )		18.7
Major markets:							
Germany .....	1,119	1,460	1,400	1,259	1,237		10.5
United Kingdom .....	1,022	1,310	1,324	1,186	( <sup>1</sup> )		16.0
Netherlands .....	345	583	634	582	( <sup>1</sup> )		68.7
Denmark .....	433	588	583	475	( <sup>1</sup> )		9.7
Norway .....	359	484	519	470	( <sup>1</sup> )		30.9
Sweden imports .....	822	992	988	910	( <sup>1</sup> )		10.7
Major suppliers:							
Finland .....	208	261	273	203	( <sup>1</sup> )		-2.4
Germany .....	181	219	179	174	( <sup>1</sup> )		-3.9
Norway .....	69	119	138	131	( <sup>1</sup> )		89.9
Denmark .....	79	91	91	87	( <sup>1</sup> )		10.1

<sup>1</sup> Not available.

<sup>2</sup> Wood and wood products included in chapter 44 of the *Harmonized Tariff Schedule of the United States (HTS)*.

<sup>3</sup> Items included in chapter 47 of the HTS.

<sup>4</sup> Paper, paperboard and paper articles included in chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table G-12**  
**Sweden: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	6,666	7,653	4,976	7,648	( <sup>1</sup> )	14.7
Chips and particles .....	710	622	687	789	( <sup>1</sup> )	11.1
Wood residue .....	65	64	90	132	( <sup>1</sup> )	103.1
Total industrial wood .....	7,441	8,339	5,753	8,569	( <sup>1</sup> )	15.2
Residual wood <sup>2</sup> .....	24	23	53	102	( <sup>1</sup> )	325.0
Total wood .....	7,465	8,362	5,806	8,671	( <sup>1</sup> )	16.2
Lumber .....	248	294	214	224	( <sup>1</sup> )	-9.7
Wood panels:						
Veneer .....	31	34	30	29	( <sup>1</sup> )	-6.5
Plywood .....	126	112	135	184	( <sup>1</sup> )	46.0
Particleboard .....	186	293	263	287	( <sup>1</sup> )	54.3
Fiberboard .....	89	115	83	87	( <sup>1</sup> )	-2.2
Insulating board .....	12	12	10	16	( <sup>1</sup> )	33.3
Total wood panels .....	444	566	521	603	( <sup>1</sup> )	35.8
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	148	143	148	172	192	29.7
Unbleached sulfate .....	1	1	1	0	0	-100.0
Mechanical pulp .....	3	6	10	9	4	33.3
Other .....	78	58	54	57	53	-32.1
Total pulp .....	230	208	213	238	249	8.3
Paper and paperboard:						
Newsprint .....	39	19	38	38	44	12.8
Printing and writing .....	139	139	145	156	174	25.2
Corrugating materials .....	38	86	100	112	107	181.6
Other wrapping papers .....	39	19	21	25	28	-28.2
Tissue .....	20	21	30	31	25	25.0
Other paper .....	56	31	29	66	62	10.7
Board .....	116	87	103	78	83	-28.4
Total paper and paperboard .....	447	402	466	507	522	16.8
Wastepaper .....	583	690	523	559	549	-5.8

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-13**  
**Sweden: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	1,054	1,725	1,620	1,416	( <sup>1</sup> )	34.3
Chips and particles .....	196	254	271	214	( <sup>1</sup> )	9.2
Wood residue .....	39	17	40	37	( <sup>1</sup> )	-5.1
Total industrial wood .....	1,289	1,996	1,931	1,667	( <sup>1</sup> )	29.3
Residual wood <sup>2</sup> .....	14	13	8	11	( <sup>1</sup> )	-21.4
Total wood .....	1,303	2,009	1,939	1,678	( <sup>1</sup> )	28.8
Lumber .....	10,466	10,399	11,649	10,920	( <sup>1</sup> )	4.3
Wood panels:						
Veneer .....	11	12	12	12	( <sup>1</sup> )	9.1
Plywood .....	49	63	112	95	( <sup>1</sup> )	93.9
Particleboard .....	140	133	147	157	( <sup>1</sup> )	12.1
Fiberboard .....	49	45	48	50	( <sup>1</sup> )	2.0
Insulating board .....	56	112	104	71	( <sup>1</sup> )	26.8
Total wood panels .....	305	365	423	385	( <sup>1</sup> )	26.2
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	2,216	1,959	2,061	2,239	2,278	2.8
Unbleached sulfate .....	101	97	117	109	67	-33.7
Mechanical pulp .....	208	179	219	225	207	-0.5
Other .....	312	322	231	229	235	-24.7
Total pulp .....	2,837	2,557	2,628	2,802	2,787	-1.8
Paper and paperboard:						
Newsprint .....	2,030	1,983	1,862	2,040	2,071	2.0
Printing and writing .....	1,752	1,903	1,756	1,984	2,081	18.8
Corrugating materials .....	1,609	1,625	1,614	1,639	1,583	-1.6
Other wrapping papers .....	902	894	723	772	800	-11.3
Tissue .....	164	153	152	163	165	0.6
Other paper .....	70	74	101	107	97	38.6
Board .....	1,556	1,107	1,067	1,165	1,238	-20.4
Total paper and paperboard .....	8,083	7,739	7,275	7,870	8,034	-0.6
Wastepaper .....	166	184	178	193	169	1.8

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-14**  
**Finland: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	————— <i>Mills</i> —————				
Number of mills:					
Paper and paperboard . . . . .	44	44	43	43	43
Pulp . . . . .	43	43	45	45	45
	————— <i>1,000 tons</i> —————				
Production capacity:					
Paper and paperboard . . . . .	11,610	11,895	12,245	12,980	13,715
Pulp . . . . .	11,255	11,460	12,190	12,765	13,235
	————— <i>Percent</i> —————				
Capacity utilization:					
Paper and paperboard . . . . .	94	92	85	95	94
Pulp . . . . .	89	88	80	89	87
	————— <i>1,000 persons</i> —————				
Employment . . . . .	37	37	37	38	37

Source: Pulp & Paper International, *Annual Review*, 1995-99; Food and Agriculture Organization, *Pulp & Paper Capacities*, 1996-2001.

**Table G-15**  
**Finland: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change,
						1997 over 1994
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	23,095	22,831	21,210	24,550	( <sup>1</sup> )	6.3
Pulpwood and particles . . . . .	21,224	22,968	20,968	22,312	( <sup>1</sup> )	5.1
Other industrial wood . . . . .	325	325	325	325	( <sup>1</sup> )	0.0
Total industrial wood . . . . .	44,644	46,124	42,503	47,187	( <sup>1</sup> )	5.7
Residual wood <sup>2</sup> . . . . .	4,101	4,095	4,094	4,094	( <sup>1</sup> )	-0.2
Total wood . . . . .	48,745	50,219	46,597	51,281	( <sup>1</sup> )	5.2
Lumber . . . . .	9,748	9,480	9,370	10,670	( <sup>1</sup> )	9.5
Wood panels:						
Veneer . . . . .	74	74	74	74	( <sup>1</sup> )	0.0
Plywood . . . . .	700	778	869	987	( <sup>1</sup> )	41.0
Particleboard . . . . .	477	475	605	603	( <sup>1</sup> )	26.4
Fiberboard . . . . .	81	80	80	80	( <sup>1</sup> )	-1.2
Insulating board . . . . .	37	37	40	40	( <sup>1</sup> )	8.1
Total wood panels . . . . .	1,369	1,444	1,668	1,784	( <sup>1</sup> )	30.3
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate . . . . .	5,157	5,102	5,097	5,957	6,065	17.6
Unbleached sulfate . . . . .	687	680	639	663	653	-4.9
Mechanical pulp . . . . .	4,118	4,306	3,957	4,469	4,637	12.6
Total pulp . . . . .	9,962	10,088	9,693	11,089	11,355	14.0
Paper and paperboard:						
Newsprint . . . . .	1,446	1,425	1,327	1,470	1,483	2.6
Printing and writing . . . . .	6,097	6,314	5,837	7,121	7,700	26.3
Other paper . . . . .	1,003	856	859	952	934	-6.9
Board . . . . .	2,363	2,346	2,419	2,606	2,586	9.4
Total paper and paperboard . . . .	10,909	10,941	10,442	12,149	12,703	16.4
Wastepaper . . . . .	474	517	563	607	665	40.3

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-16**  
**Finland: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood	50,433	54,707	49,095	54,068	( <sup>1</sup> )	7.2
Residual wood <sup>2</sup>	4,128	4,132	4,133	4,135	( <sup>1</sup> )	0.2
Total wood	54,561	58,839	53,228	58,203	( <sup>1</sup> )	6.7
Lumber	2,756	2,284	2,483	3,377	( <sup>1</sup> )	22.5
Wood panels:						
Veneer sheet	12	22	22	10	( <sup>1</sup> )	-16.7
Plywood	92	133	95	149	( <sup>1</sup> )	62.0
Particleboard	287	273	380	442	( <sup>1</sup> )	54.0
Fiberboard	44	52	55	63	( <sup>1</sup> )	43.2
Insulating board	45	42	53	53	( <sup>1</sup> )	17.8
Total wood panels	480	522	605	717	( <sup>1</sup> )	49.4
1,000 metric tons						
Pulp:						
Bleached sulfate	3,827	3,957	3,667	4,356	4,564	19.3
Unbleached sulfate	662	661	621	645	636	-3.9
Mechanical pulp	4,057	4,271	3,896	4,390	4,556	12.3
Other	5	2	3	2	2	-60.0
Total pulp	8,551	8,891	8,187	9,393	9,758	14.1
Paper and paperboard:						
Newsprint	211	344	307	298	321	52.1
Printing and writing	298	357	382	380	392	31.5
Other paper	425	327	356	367	349	-17.9
Board	1,025	513	584	661	590	-42.4
Total paper and paperboard	1,959	1,541	1,629	1,706	1,652	-15.7
Wastepaper	566	548	612	609	633	11.8

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

Table G-17

## Finland: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change
						during the
	<i>Million dollars</i>					<i>period</i>
						<i>Percent</i>
Sector trade:						
Finland exports:						
Germany . . . . .	1,816	1,599	2,121	2,102	2,043	12.5
United Kingdom . . . . .	1,639	2,105	1,991	2,001	( <sup>1</sup> )	22.1
France . . . . .	888	992	894	806	1,157	30.3
Netherlands . . . . .	668	682	591	668	( <sup>1</sup> )	0.0
United States . . . . .	500	738	558	596	735	47.0
All other . . . . .	4,683	7,497	5,611	5,726	( <sup>1</sup> )	22.3
Total . . . . .	10,194	13,613	11,766	11,901	( <sup>1</sup> )	16.7
Finland imports:						
Russian Federation . . . . .	233	426	312	299	( <sup>1</sup> )	28.3
Sweden . . . . .	176	245	231	226	( <sup>1</sup> )	28.4
Germany . . . . .	123	164	117	114	( <sup>1</sup> )	-7.3
Netherlands . . . . .	23	39	33	36	( <sup>1</sup> )	56.5
United Kingdom . . . . .	25	28	33	33	( <sup>1</sup> )	32.0
All other . . . . .	280	428	300	323	( <sup>1</sup> )	15.4
Total . . . . .	860	1,330	1,026	1,031	( <sup>1</sup> )	19.9
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
Finland exports . . . . .	2,488	2,808	2,460	2,663	( <sup>1</sup> )	7.0
Major markets:						
Germany . . . . .	511	558	446	471	433	-15.3
United Kingdom . . . . .	418	435	410	433	( <sup>1</sup> )	3.6
Netherlands . . . . .	231	237	192	204	( <sup>1</sup> )	-11.7
France . . . . .	185	196	183	202	201	8.6
Sweden . . . . .	122	131	123	110	( <sup>1</sup> )	-9.8
Finland imports . . . . .	399	665	472	487	( <sup>1</sup> )	22.1
Major suppliers:						
Russian Federation . . . . .	223	406	286	277	( <sup>1</sup> )	24.2
Estonia . . . . .	28	46	40	55	( <sup>1</sup> )	96.4
Sweden . . . . .	27	26	22	25	( <sup>1</sup> )	-7.4
Germany . . . . .	29	35	20	25	( <sup>1</sup> )	-13.8
United States . . . . .	8	11	11	13	( <sup>1</sup> )	62.5
Pulp and wastepaper: <sup>3</sup>						
Finland exports . . . . .	724	1,043	761	809	( <sup>1</sup> )	11.7
Major markets:						
Germany . . . . .	86	138	72	72	( <sup>1</sup> )	-16.3
United Kingdom . . . . .	22	88	62	58	( <sup>1</sup> )	163.6
France . . . . .	54	106	62	48	( <sup>1</sup> )	-11.1
Italy . . . . .	36	118	33	27	( <sup>1</sup> )	-25.0
Finland imports . . . . .	95	158	68	67	( <sup>1</sup> )	-29.5
Major suppliers:						
Sweden . . . . .	23	47	27	19	( <sup>1</sup> )	-17.4
Canada . . . . .	29	40	16	19	( <sup>1</sup> )	-34.5
Spain . . . . .	7	8	4	4	( <sup>1</sup> )	-42.9
Norway . . . . .	10	19	3	3	( <sup>1</sup> )	-70.0

See footnotes at end of table.

**Table G-17--Continued****Finland: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	Million dollars			1998	Change during the period
							Percent
Paper and paper products: <sup>4</sup>							
Finland exports . . . . .	6,982	9,762	8,544	8,429	( <sup>1</sup> )		20.7
Major markets:							
United Kingdom . . . . .	1,129	1,513	1,445	1,451	( <sup>1</sup> )		28.5
Germany . . . . .	993	1,094	1,112	1,109	1,297		30.6
United States . . . . .	470	707	526	560	695		47.9
France . . . . .	622	676	631	528	903		45.2
Belgium . . . . .	230	685	496	482	( <sup>1</sup> )		109.6
Finland imports . . . . .	366	507	486	477	( <sup>1</sup> )		30.3
Major suppliers:							
Sweden . . . . .	125	172	182	181	( <sup>1</sup> )		44.8
Germany . . . . .	90	128	95	87	( <sup>1</sup> )		-3.3
Netherlands . . . . .	23	37	32	34	( <sup>1</sup> )		47.8
United Kingdom . . . . .	22	27	33	32	( <sup>1</sup> )		45.5
France . . . . .	17	21	22	22	( <sup>1</sup> )		29.4

<sup>1</sup> Not available.<sup>2</sup> Wood and wood products included in chapter 44 of the *Harmonized Tariff Schedule of the United States (HTS)*.<sup>3</sup> Items included in chapter 47 of the HTS.<sup>4</sup> Paper, paperboard and paper articles included in chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table G-18**  
**Finland: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
<b>Wood:</b>						
Industrial wood:						
Logs	6,763	9,010	6,583	6,739	( <sup>1</sup> )	-0.4
Chips and particles	449	369	391	505	( <sup>1</sup> )	12.5
Wood residue	197	220	349	438	( <sup>1</sup> )	122.3
Total industrial wood	7,409	9,599	7,323	7,682	( <sup>1</sup> )	3.7
Residual wood <sup>2</sup>	28	38	42	45	( <sup>1</sup> )	60.7
Total wood	7,437	9,637	7,365	7,727	( <sup>1</sup> )	3.9
Lumber	215	181	149	242	( <sup>1</sup> )	12.6
<b>Wood panels:</b>						
Veneer	6	9	8	13	( <sup>1</sup> )	116.7
Plywood	18	22	21	23	( <sup>1</sup> )	27.8
Particleboard	10	22	13	35	( <sup>1</sup> )	250.0
Fiberboard	35	38	35	14	( <sup>1</sup> )	-60.0
Insulating board	11	8	16	17	( <sup>1</sup> )	54.5
Total wood panels	80	99	93	102	( <sup>1</sup> )	27.5
<b>Pulp:</b>						
1,000 metric tons						
Bleached sulfate	53	43	23	20	30	-43.4
Unbleached sulfate	11	10	10	12	7	-36.4
Mechanical pulp	12	32	8	9	6	-50.0
Other	6	4	3	2	2	-66.7
Total pulp	82	89	44	43	45	-45.1
<b>Paper and paperboard:</b>						
Newsprint	17	18	31	39	37	117.6
Printing and writing	34	36	43	55	52	52.9
Other paper	33	65	69	82	81	145.5
Board	35	85	107	132	122	248.6
Total paper and paperboard	119	204	250	308	292	145.4
Wastepaper	122	66	89	72	59	-51.6

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-19**  
**Finland: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change, during the period
						Percent
	<i>1,000 cubic meters</i>					
Wood:						
Industrial wood:						
Logs .....	1,460	871	579	640	( <sup>1</sup> )	-56.2
Chips and particles .....	156	140	147	152	( <sup>1</sup> )	-2.6
Wood residue .....	4	5	5	9	( <sup>1</sup> )	125.0
Total industrial wood .....	1,620	1,016	731	801	( <sup>1</sup> )	-50.6
Residual wood <sup>2</sup> .....	1	1	3	4	( <sup>1</sup> )	300.0
Total wood .....	1,621	1,017	734	805	( <sup>1</sup> )	-50.3
Lumber .....	7,207	7,377	7,036	7,535	( <sup>1</sup> )	4.6
Wood panels:						
Veneer .....	68	61	60	77	( <sup>1</sup> )	13.2
Plywood .....	626	667	795	861	( <sup>1</sup> )	37.5
Particleboard .....	200	224	238	196	( <sup>1</sup> )	-2.0
Fiberboard .....	72	66	60	61	( <sup>1</sup> )	-15.3
Insulating board .....	3	3	3	4	( <sup>1</sup> )	33.3
Total wood panels .....	969	1,021	1,156	1,199	( <sup>1</sup> )	23.7
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	1,383	1,188	1,453	1,621	1,531	10.7
Unbleached sulfate .....	36	29	28	30	24	-33.3
Mechanical pulp .....	73	67	69	88	87	19.2
Other .....	1	2	0	0	0	-100.0
Total pulp .....	1,493	1,286	1,550	1,739	1,642	10.0
Paper and paperboard:						
Newsprint .....	1,252	1,099	1,051	1,211	1,199	-4.2
Printing and writing .....	5,833	5,993	5,498	6,795	7,360	26.2
Other paper .....	611	594	572	667	666	9.0
Board .....	1,373	1,918	1,942	2,076	2,118	54.3
Total paper and paperboard .....	9,069	9,604	9,063	10,749	11,343	25.1
Wastepaper .....	30	35	40	49	91	203.3

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-20**  
**Germany: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

Product	1994	1995	1996	1997	1998
	Mills				
Number of mills:					
Paper and paperboard .....	222	224	220	216	178
Pulp .....	19	19	20	19	13
	1,000 tons				
Production capacity:					
Paper and paperboard .....	15,100	16,110	15,890	16,893	17,251
Pulp .....	2,000	2,113	1,943	1,987	2,350
	Percent				
Capacity utilization:					
Paper and paperboard .....	95	92	93	94	95
Pulp .....	97	94	93	98	100
	Percent				
Employment .....	48	48	47	46	46

Source: Pulp & Paper International, *Annual Review*, 1995-99; Food and Agriculture Organization, *Pulp & Paper Capacities*, 1996-2001.

**Table G-21**  
**Germany: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	22,935	24,292	23,175	23,175	( <sup>1</sup> )	1.0
Pulpwood and particles . . . . .	11,683	11,738	10,241	10,241	( <sup>1</sup> )	-12.3
Other industrial wood . . . . .	1,400	884	1,122	1,122	( <sup>1</sup> )	-19.9
Total industrial wood . . . . .	36,018	36,914	34,538	34,538	( <sup>1</sup> )	-4.1
Residual wood <sup>2</sup> . . . . .	3,795	2,429	2,476	2,476	( <sup>1</sup> )	-34.8
Total wood . . . . .	39,813	39,343	37,014	37,014	( <sup>1</sup> )	-7.0
Lumber . . . . .	13,567	14,105	14,267	14,849	( <sup>1</sup> )	9.4
Wood panels:						
Veneer sheets . . . . .	392	392	392	392	( <sup>1</sup> )	0.0
Plywood . . . . .	397	498	512	392	( <sup>1</sup> )	-1.3
Particleboard . . . . .	8,639	8,902	8,584	9,190	( <sup>1</sup> )	6.4
Fiberboard . . . . .	804	804	850	850	( <sup>1</sup> )	5.7
Insulating board . . . . .	50	50	50	50	( <sup>1</sup> )	0.0
Total wood panels . . . . .	10,282	10,646	10,388	10,874	( <sup>1</sup> )	5.8
<i>1,000 metric tons</i>						
Pulp:						
Sulfite pulp . . . . .	698	684	683	738	759	8.7
Mechanical pulp . . . . .	1,236	1,266	1,133	1,220	1,191	-3.6
Total pulp . . . . .	1,934	1,950	1,816	1,958	1,950	0.8
Paper and paperboard:						
Newsprint . . . . .	1,499	1,726	1,572	1,618	1,630	8.7
Printing and writing . . . . .	5,520	5,728	5,553	6,226	6,452	16.9
Packaging P&B . . . . .	5,568	5,480	5,694	6,110	6,142	10.3
Tissue . . . . .	863	877	886	890	931	7.9
Other paper and board . . . . .	1,007	1,016	1,028	1,109	1,155	14.7
Total paper and paperboard . . . . .	14,457	14,827	14,733	15,953	16,310	12.8
Wastepaper . . . . .	9,690	10,670	10,912	11,279	11,913	22.9

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-22**

**Germany: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood .....	30,613	32,171	30,542	31,006	( <sup>1</sup> )	1.3
Residual wood <sup>2</sup> .....	3,862	2,479	2,550	2,575	( <sup>1</sup> )	-33.3
Total wood .....	34,475	34,650	33,092	33,581	( <sup>1</sup> )	-2.6
Lumber .....	17,702	17,494	17,372	18,030	( <sup>1</sup> )	1.9
Wood panels:						
Veneer sheet .....	558	363	354	425	( <sup>1</sup> )	-23.8
Plywood .....	1,269	1,526	1,352	1,340	( <sup>1</sup> )	5.6
Particleboard .....	9,032	9,412	8,847	9,252	( <sup>1</sup> )	2.4
Fiberboard .....	780	887	736	606	( <sup>1</sup> )	-22.3
Insulating board .....	153	138	139	119	( <sup>1</sup> )	-22.2
Total wood panels .....	11,792	12,326	11,428	11,742	( <sup>1</sup> )	-0.4
	<i>1,000 metric tons</i>					
Pulp:						
Sulfate pulp .....	3,347	3,254	3,176	3,361	3,394	1.4
Sulfite pulp .....	723	735	680	691	721	-0.3
Mechanical pulp .....	1,326	1,320	1,177	1,262	1,220	-8.0
Other .....	67	38	72	91	109	62.7
Total pulp .....	5,463	5,347	5,105	5,405	5,444	-0.3
Paper and paperboard:						
Newsprint .....	2,215	2,348	2,098	2,143	2,385	7.7
Printing and writing .....	5,793	5,291	5,237	5,423	6,037	4.2
Packaging P&B .....	6,458	6,302	6,104	6,199	6,377	-1.3
Tissue .....	858	881	904	910	935	9.0
Other paper and board .....	1,011	1,017	1,003	1,081	1,121	10.9
Total paper and paperboard .....	16,335	15,839	15,346	15,756	16,855	3.2
Wastepaper .....	8,161	8,738	8,888	9,458	9,917	21.5

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

Table G-23

## Germany: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Sector trade:						
Germany exports:						
France .....	1,764	2,357	2,062	1,747	2,053	16.4
Austria .....	1,058	1,301	1,115	954	1,086	2.6
Italy .....	866	1,177	1,061	977	1,088	25.6
Netherlands .....	1,260	1,671	1,496	1,326	1,501	19.1
United Kingdom .....	1,062	1,238	1,237	1,243	1,312	23.5
All other .....	6,270	8,830	7,623	7,624	8,001	27.6
Total .....	12,280	16,574	14,594	13,871	15,041	22.5
Germany imports:						
Sweden .....	2,347	2,646	2,216	1,903	2,067	-11.9
Finland .....	1,915	2,483	1,877	1,816	2,043	6.7
France .....	1,255	1,797	1,418	1,203	1,200	-4.4
Netherlands .....	1,484	1,387	1,101	962	883	-40.5
Italy .....	924	1,228	968	956	870	-5.8
All other .....	7,518	10,233	8,458	8,059	8,697	15.7
Total .....	15,443	19,774	16,038	14,899	15,760	2.1
Subsector profiles:						
Wood and wood products: <sup>1</sup>						
Germany exports .....	2,368	2,853	2,620	2,787	3,222	36.1
Major markets:						
Austria .....	451	450	384	365	418	-7.3
Netherlands .....	271	327	286	278	310	14.4
France .....	254	339	291	262	300	18.1
Switzerland .....	254	308	278	251	277	9.1
Italy .....	177	230	232	217	241	36.2
Germany imports .....	5,616	6,207	5,178	5,214	5,182	-7.7
Major suppliers:						
Poland .....	415	554	481	511	571	37.6
Sweden .....	689	563	518	462	417	-39.5
Finland .....	553	590	421	455	433	-21.7
United States .....	437	484	373	424	373	-14.6
Austria .....	630	424	347	346	359	-43.0
Pulp and wastepaper: <sup>2</sup>						
Germany exports .....	369	857	475	424	378	2.4
Major markets:						
Italy .....	86	138	72	72	77	-10.5
Switzerland .....	22	88	62	58	41	86.4
Austria .....	54	106	62	48	46	-14.8
Netherlands .....	36	118	33	27	32	-11.1
Germany imports .....	2,343	3,595	2,363	2,197	2,177	-7.1
Major suppliers:						
Canada .....	474	711	486	464	444	-6.3
Sweden .....	527	636	467	428	413	-21.6
Finland .....	296	480	342	345	313	5.7
United States .....	275	470	330	269	277	0.7

See footnotes at end of table.

**Table G-23—Continued**

**Germany: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change during the period
	Million dollars					Percent
Paper and paper products: <sup>3</sup>						
Germany exports .....	9,543	12,864	11,498	10,660	11,442	19.9
Major markets:						
France .....	1,476	1,910	1,738	1,463	1,734	17.5
United Kingdom .....	993	1,094	1,112	1,109	1,160	16.8
Netherlands .....	954	1,226	1,177	1,021	1,158	21.4
Switzerland .....	499	723	730	657	696	39.5
Germany imports .....	7,484	9,932	8,498	7,489	8,401	12.3
Major suppliers:						
Finland .....	1,095	1,413	1,114	1,026	1,297	18.4
Sweden .....	1,132	1,447	1,231	1,013	1,237	9.3
France .....	922	1,260	1,036	866	882	-4.3
Netherlands .....	623	884	729	647	690	10.8
Italy .....	542	788	749	628	641	18.3

<sup>1</sup> Wood and wood products included in chapter 44 of the *Harmonized Tariff Schedule of the United States (HTS)*.

<sup>2</sup> Items included in chapter 47 of the HTS.

<sup>3</sup> Paper, paperboard and paper articles included in chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table G-24**  
**Germany: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	1,575	1,743	1,263	1,653	( <sup>1</sup> )	5.0
Chips and particles .....	186	210	101	183	( <sup>1</sup> )	-1.6
Wood residue .....	580	579	619	597	( <sup>1</sup> )	2.9
Total industrial wood .....	2,341	2,532	1,983	2,433	( <sup>1</sup> )	3.9
Residual wood <sup>2</sup> .....	112	116	128	130	( <sup>1</sup> )	16.1
Total wood .....	2,453	2,648	2,111	2,563	( <sup>1</sup> )	4.5
Lumber .....	5,999	5,296	5,043	5,245	( <sup>1</sup> )	-12.6
Wood panels:						
Veneer .....	312	227	192	202	( <sup>1</sup> )	-35.3
Plywood .....	1,003	1,177	975	1,083	( <sup>1</sup> )	8.0
Particleboard .....	1,713	1,755	1,559	1,546	( <sup>1</sup> )	-9.7
Fiberboard .....	267	309	365	421	( <sup>1</sup> )	57.7
Insulating board .....	136	132	132	122	( <sup>1</sup> )	-10.3
Total wood panels .....	3,431	3,600	3,223	3,374	( <sup>1</sup> )	-1.7
	<i>1,000 metric tons</i>					
Pulp:						
Sulfate pulp .....	3,365	3,342	3,322	3,510	3,529	4.9
Sulfite pulp .....	186	199	174	170	156	-16.1
Mechanical pulp .....	98	73	53	54	37	-62.2
Other .....	72	72	88	108	114	58.3
Total pulp .....	3,721	3,686	3,637	3,842	3,836	3.1
Paper and paperboard:						
Newsprint .....	1,291	1,183	1,095	1,162	1,316	1.9
Printing and writing .....	3,220	3,024	3,057	3,167	3,716	15.4
Packaging P&B .....	2,856	2,722	2,551	2,642	2,730	-4.4
Tissue .....	109	111	117	126	111	1.8
Other paper and board .....	117	128	115	133	120	2.6
Total paper and paperboard .....	7,593	7,168	6,935	7,230	7,993	5.3
Wastepaper .....	719	1,054	934	918	1,007	40.1

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-25**  
**Germany: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	4,714	4,948	2,992	3,517	( <sup>1</sup> )	-25.4
Chips and particles .....	1,596	1,543	1,257	1,304	( <sup>1</sup> )	-18.3
Wood residue .....	1,436	784	1,730	1,144	( <sup>1</sup> )	-20.3
Total industrial wood .....	<u>7,746</u>	<u>7,275</u>	<u>5,979</u>	<u>5,965</u>	( <sup>1</sup> )	-23.0
Residual wood <sup>2</sup> .....	45	66	54	31	( <sup>1</sup> )	-31.1
Total wood .....	<u>7,791</u>	<u>7,341</u>	<u>6,033</u>	<u>5,996</u>	( <sup>1</sup> )	-23.0
Lumber .....	1,864	1,907	1,938	2,064	( <sup>1</sup> )	10.7
Wood panels:						
Veneer .....	146	256	230	169	( <sup>1</sup> )	15.8
Plywood .....	131	149	135	135	( <sup>1</sup> )	3.1
Particleboard .....	1,320	1,245	1,296	1,484	( <sup>1</sup> )	12.4
Fiberboard .....	291	226	479	665	( <sup>1</sup> )	128.5
Insulating board .....	33	44	43	53	( <sup>1</sup> )	60.6
Total wood panels .....	<u>1,921</u>	<u>1,920</u>	<u>2,183</u>	<u>2,506</u>	( <sup>1</sup> )	30.5
	<i>1,000 metric tons</i>					
Pulp:						
Sulfate pulp .....	18	88	146	149	135	650.0
Sulfite pulp .....	161	148	177	217	194	20.5
Mechanical pulp .....	8	19	9	12	8	0.0
Other .....	5	34	16	17	5	0.0
Total pulp .....	<u>192</u>	<u>289</u>	<u>348</u>	<u>395</u>	<u>342</u>	<u>78.1</u>
Paper and paperboard:						
Newsprint .....	575	561	569	637	561	-2.4
Printing and writing .....	2,947	3,461	3,373	3,970	4,131	40.2
Packaging P&B .....	1,966	1,900	2,141	2,553	2,495	26.9
Tissue .....	114	107	99	106	107	-6.1
Other paper and board .....	113	127	140	161	154	36.3
Total paper and paperboard .....	<u>5,715</u>	<u>6,156</u>	<u>6,322</u>	<u>7,427</u>	<u>7,448</u>	<u>30.3</u>
Wastepaper .....	2,248	2,986	2,958	2,739	3,003	33.6

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-26****France: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and paperboard .....	146	141	141	141	137
Pulp .....	20	20	20	20	19
	<i>1,000 tons</i>				
Production capacity:					
Paper and paperboard .....	10,055	10,435	10,775	10,900	10,140
Pulp .....	3,295	3,370	3,327	3,300	3,290
	<i>Percent</i>				
Capacity utilization:					
Paper and paperboard .....	86	83	79	84	( <sup>1</sup> )
Pulp .....	85	84	76	86	( <sup>1</sup> )
	<i>1,000 persons</i>				
<b>Employment .....</b>	<b>27</b>	<b>26</b>	<b>25</b>	<b>25</b>	<b>25</b>

<sup>1</sup> Not available.

Source: Pulp & Paper International, *Annual Review*, 1995-99; Food and Agriculture Organization, *Pulp & Paper Capacities*, 1996-2001.

**Table G-27**  
**France: Production of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	20,945	21,698	20,498	20,498	( <sup>1</sup> )	-2.1
Pulpwood and particles . . . . .	11,011	11,414	9,698	9,698	( <sup>1</sup> )	-11.9
Other industrial wood . . . . .	484	460	447	447	( <sup>1</sup> )	-7.6
Total industrial wood . . . . .	32,440	33,572	30,643	30,643	( <sup>1</sup> )	-5.5
Residual wood <sup>2</sup> . . . . .	15,913	15,913	15,913	15,913	( <sup>1</sup> )	0.0
Total wood . . . . .	48,353	49,485	46,556	46,556	( <sup>1</sup> )	-3.7
Lumber . . . . .	9,649	9,848	9,600	10,000	( <sup>1</sup> )	3.6
Wood panels:						
Veneer . . . . .	154	113	123	139	( <sup>1</sup> )	-9.7
Plywood . . . . .	594	559	537	576	( <sup>1</sup> )	-3.0
Particleboard . . . . .	2,567	2,733	3,030	3,289	( <sup>1</sup> )	28.1
Fiberboard . . . . .	475	469	475	547	( <sup>1</sup> )	15.2
Insulating board . . . . .	8	8	37	37	( <sup>1</sup> )	362.5
Total wood panels . . . . .	3,798	3,882	4,202	4,588	( <sup>1</sup> )	20.8
	<i>1,000 metric tons</i>					
Pulp:						
Sulfate pulp . . . . .	1,519	1,511	1,417	1,578	1,517	-0.1
Sulfite pulp . . . . .	262	263	241	290	276	5.3
Mechanical pulp . . . . .	886	934	757	845	762	-14.0
Other . . . . .	120	111	102	119	122	1.7
Total pulp . . . . .	2,787	2,819	2,517	2,832	2,677	-3.9
Paper and paperboard:						
Newsprint . . . . .	844	890	783	909	923	9.4
Printing and writing . . . . .	3,268	3,186	3,141	3,349	3,101	-5.1
Corrugating materials . . . . .	2,679	2,641	2,724	2,913	3,193	19.2
Other wrapping papers . . . . .	394	389	363	397	386	-2.0
Tissue . . . . .	479	488	508	534	514	7.3
Other paper . . . . .	273	282	282	308	307	12.5
Board . . . . .	745	741	730	733	737	-1.1
Total paper and paperboard . . . . .	8,682	8,617	8,531	9,143	9,161	5.5
Wastepaper . . . . .	3,505	3,705	3,907	4,270	4,670	33.2

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-28****France: Apparent consumption of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood .....	32,132	33,793	29,746	30,146	( <sup>1</sup> )	-6.2
Residual wood <sup>2</sup> .....	15,530	15,458	15,559	15,560	( <sup>1</sup> )	0.2
Total wood .....	47,662	49,251	45,305	45,706	( <sup>1</sup> )	-4.1
Lumber .....	10,687	10,784	10,576	11,242	( <sup>1</sup> )	5.2
Wood panels:						
Veneer sheet .....	184	145	159	175	( <sup>1</sup> )	-4.9
Plywood .....	636	636	579	663	( <sup>1</sup> )	4.2
Particleboard .....	2,390	2,424	2,504	2,650	( <sup>1</sup> )	10.9
Fiberboard .....	345	209	238	340	( <sup>1</sup> )	-1.4
Total wood panels .....	3,555	3,414	3,480	3,828	( <sup>1</sup> )	7.7
1,000 metric tons						
Pulp:						
Sulfate pulp .....	3,041	2,969	3,027	3,182	3,125	2.8
Sulfite pulp .....	203	174	142	187	163	-19.7
Mechanical pulp .....	930	977	777	874	792	-14.8
Other .....	144	154	152	192	229	59.0
Total pulp .....	4,318	4,274	4,098	4,435	4,309	-0.2
Paper and paperboard:						
Newsprint .....	807	794	755	797	805	-0.2
Printing and writing .....	3,744	3,764	3,610	4,163	4,315	15.3
Corrugating materials .....	2,795	2,774	2,788	3,002	3,213	15.0
Other wrapping papers .....	438	391	335	357	378	-13.7
Tissue .....	522	537	555	590	583	11.7
Other paper .....	221	219	223	240	234	5.9
Board .....	1,207	1,155	1,116	1,179	1,153	-4.5
Total paper and paperboard .....	9,734	9,634	9,382	10,328	10,681	9.7
Wastepaper .....	4,063	4,167	4,242	4,518	4,987	22.7

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-29****France: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Sector trade:						
France exports:						
Germany . . . . .	1,663	2,144	1,821	1,591	1,628	-2.1
United Kingdom . . . . .	751	969	889	908	981	30.6
Belgium . . . . .	787	1,006	950	853	912	15.9
Italy . . . . .	795	1,001	867	845	861	8.3
Spain . . . . .	615	868	820	837	943	53.3
All other . . . . .	2,306	2,995	2,843	2,864	2,895	25.5
Total . . . . .	6,917	8,983	8,190	7,898	8,220	18.8
France imports:						
Germany . . . . .	1,872	2,435	2,085	1,979	2,132	13.9
Finland . . . . .	852	1,186	1,015	986	1,157	35.8
Belgium . . . . .	770	1,106	961	872	934	21.3
Sweden . . . . .	791	970	863	810	814	2.9
Italy . . . . .	564	783	844	764	868	53.9
All other . . . . .	3,994	5,162	4,471	4,424	4,601	15.2
Total . . . . .	8,843	11,642	10,239	9,835	10,506	18.8
Subsector profiles:						
Wood and wood products: <sup>1</sup>						
France exports . . . . .	1,734	2,118	2,051	1,987	2,112	21.8
Major markets:						
Germany . . . . .	451	570	496	418	392	-13.1
Belgium . . . . .	252	303	288	265	290	15.1
Italy . . . . .	250	274	281	248	249	-0.4
United Kingdom . . . . .	90	102	103	117	139	54.4
France imports . . . . .	2,028	2,410	2,192	2,173	2,315	14.2
Major suppliers:						
Germany . . . . .	272	353	312	306	347	27.6
Belgium . . . . .	188	252	237	226	263	39.9
Finland . . . . .	200	223	200	208	201	0.5
Sweden . . . . .	142	157	134	120	125	-12.0
Pulp and wastepaper: <sup>2</sup>						
France exports . . . . .	341	542	266	325	322	-5.6
Major markets:						
Italy . . . . .	98	155	69	98	92	-6.1
Germany . . . . .	62	100	49	61	63	1.6
Switzerland . . . . .	16	25	15	14	13	-18.8
Belgium . . . . .	11	18	9	10	16	45.5
France imports . . . . .	1,170	1,831	1,176	1,151	1,085	-7.3
Major suppliers:						
United States . . . . .	206	308	228	221	208	1.0
Canada . . . . .	190	330	301	189	177	-6.8
Sweden . . . . .	195	218	174	176	164	-15.9

See footnotes at end of table.

**Table G-29—Continued**

**France: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
	Million dollars					Percent
Paper and paper products: <sup>3</sup>						
France exports . . . . .	4,842	6,333	5,874	5,586	5,787	19.5
Major markets:						
Germany . . . . .	1,120	1,474	1,276	1,112	1,172	4.6
United Kingdom . . . . .	651	844	782	783	837	28.6
Belgium . . . . .	525	686	654	579	606	15.4
Italy . . . . .	447	573	517	449	520	16.3
Netherlands . . . . .	318	401	378	340	374	17.6
France import . . . . .	6,545	7,401	6,871	6,511	7,105	8.6
Major suppliers:						
Germany . . . . .	1,539	1,969	1,734	1,642	1,752	13.8
Finland . . . . .	649	865	741	698	903	39.1
Italy . . . . .	479	683	737	666	766	59.9
Belgium . . . . .	540	767	677	609	633	17.2
Sweden . . . . .	454	595	555	513	525	15.6

<sup>1</sup> Wood and wood products included in chapter 44 of the *Harmonized Tariff Schedule of the United States (HTS)*.

<sup>2</sup> Items included in chapter 47 of the HTS.

<sup>3</sup> Paper, paperboard and paper articles included in chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table G-30**  
**France: Imports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Logs	2,013	2,345	1,573	1,788	( <sup>1</sup> )	-11.2
Chips and particles	1,043	1,237	782	918	( <sup>1</sup> )	-12.0
Wood residue	251	315	398	433	( <sup>1</sup> )	72.5
Total industrial wood	3,307	3,897	2,753	3,139	( <sup>1</sup> )	-5.1
Residual wood <sup>2</sup>	31	28	28	38	( <sup>1</sup> )	22.6
Total wood	3,338	3,925	2,781	3,177	( <sup>1</sup> )	-4.8
Lumber	2,107	2,105	2,214	2,381	( <sup>1</sup> )	13.0
Wood panels:						
Veneer	88	86	104	98	( <sup>1</sup> )	11.4
Plywood	234	260	256	310	( <sup>1</sup> )	32.5
Particleboard	650	690	680	613	( <sup>1</sup> )	-5.7
Fiberboard	93	132	165	255	( <sup>1</sup> )	174.2
Insulating board	16	24	16	18	( <sup>1</sup> )	12.5
Total wood panels	1,081	1,192	1,221	1,294	( <sup>1</sup> )	19.7
1,000 metric tons						
Pulp:						
Sulfate pulp	1,787	1,678	1,785	1,876	1,872	4.8
Sulfite pulp	118	90	76	65	38	-67.8
Mechanical pulp	44	43	22	29	30	-31.8
Other	45	61	59	78	108	140.0
Total pulp	1,994	1,872	1,942	2,048	2,048	2.7
Paper and paperboard:						
Newsprint	525	535	462	493	460	-12.4
Printing and writing	1,776	1,715	2,355	2,768	3,072	73.0
Corrugating materials	626	584	755	871	876	39.9
Other wrapping papers	219	224	212	251	268	22.4
Tissue	109	124	194	211	248	127.5
Other paper	126	125	63	83	80	-36.5
Board	345	331	731	830	804	133.0
Total paper and paperboard	3,726	3,638	4,772	5,507	5,808	55.9
Wastepaper	670	783	748	998	1,155	72.4

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-31**  
**France: Exports of wood, lumber, wood panels, pulp, paper and paperboard, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	2,493	2,516	2,397	2,443	( <sup>1</sup> )	-2.0
Chips and particles .....	322	349	410	351	( <sup>1</sup> )	9.0
Wood residue .....	800	812	843	843	( <sup>1</sup> )	5.4
Total industrial wood .....	3,615	3,677	3,650	3,637	( <sup>1</sup> )	0.6
Residual wood <sup>2</sup> .....	415	483	382	392	( <sup>1</sup> )	-5.5
Total wood .....	4,030	4,160	4,032	4,029	( <sup>1</sup> )	0.0
Lumber .....	1,069	1,168	1,237	1,139	( <sup>1</sup> )	6.5
Wood panels:						
Veneer .....	59	55	68	62	( <sup>1</sup> )	5.1
Plywood .....	193	183	214	223	( <sup>1</sup> )	15.5
Particleboard .....	827	999	1,206	1,252	( <sup>1</sup> )	51.4
Fiberboard .....	223	393	402	462	( <sup>1</sup> )	107.2
Insulating board .....	88	80	64	75	( <sup>1</sup> )	-14.8
Total wood panels .....	1,390	1,710	1,954	2,074	( <sup>1</sup> )	49.2
	<i>1,000 metric tons</i>					
Pulp:						
Sulfate pulp .....	265	220	175	272	264	-0.4
Sulfite pulp .....	177	179	175	168	151	-14.7
Mechanical pulp .....	0	0	2	0	0	( <sup>3</sup> )
Other .....	21	18	9	5	1	-95.2
Total pulp .....	463	417	361	445	416	-10.2
Paper and paperboard:						
Newsprint .....	525	535	490	605	578	10.1
Printing and writing .....	1,776	1,715	1,886	1,954	1,858	4.6
Corrugating materials .....	626	584	691	782	856	36.7
Other wrapping papers .....	219	224	240	291	276	26.0
Tissue .....	109	124	147	155	179	64.2
Other paper .....	126	125	122	151	153	21.4
Board .....	345	331	345	384	388	12.5
Total paper and paperboard .....	3,726	3,638	3,921	4,322	4,288	15.1
Wastepaper .....	670	783	748	750	838	25.1

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-32****Russia: Pulp and paper industry—Number of mills, production capacity, capacity utilization, and employment, 1994-98**

<b>Product</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
	<i>Mills</i>				
Number of mills:					
Paper and board .....	107	107	108	108	108
Pulp .....	45	45	45	45	45
	<i>1,000 tons</i>				
Production capacity:					
Paper and board .....	8,000	9,100	9,100	9,000	9,000
Pulp .....	10,500	10,500	10,500	9,500	9,500
	<i>Percent</i>				
Capacity utilization:					
Paper and board .....	43	45	36	37	( <sup>1</sup> )
Pulp .....	37	48	36	41	( <sup>1</sup> )
	<i>1,000 persons</i>				
Employment .....	150	150	150	150	150

<sup>1</sup> Not available.

Source: Pulp & Paper International, *Annual Review*, 1995-99; Food and Agriculture Organization, *Pulp & Paper Capacities*, 1996-2001.

**Table G-33****Russia: Production of wood, lumber, wood panels, pulp, paper and board, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	53,570	52,550	43,970	38,060	( <sup>1</sup> )	-29.0
Pulpwood and particles . . . . .	17,420	23,000	18,761	16,240	( <sup>1</sup> )	-6.8
Other industrial wood . . . . .	8,790	7,200	10,274	8,890	( <sup>1</sup> )	1.1
Total industrial wood . . . . .	79,780	82,750	73,005	63,190	( <sup>1</sup> )	-20.8
Residual wood <sup>2</sup> . . . . .	32,416	34,775	23,977	20,778	( <sup>1</sup> )	-35.9
Total wood . . . . .	112,196	117,525	96,982	83,968	( <sup>1</sup> )	-25.2
Lumber . . . . .	30,720	26,500	21,913	19,500	( <sup>1</sup> )	-36.5
Wood panels:						
Veneer . . . . .	65	56	33	33	( <sup>1</sup> )	-49.2
Plywood . . . . .	890	939	972	968	( <sup>1</sup> )	8.8
Particleboard . . . . .	2,626	2,206	1,472	1,483	( <sup>1</sup> )	-43.5
Fiberboard . . . . .	733	715	570	617	( <sup>1</sup> )	-15.8
Insulating board . . . . .	34	33	19	13	( <sup>1</sup> )	-61.8
Total wood panels . . . . .	4,348	3,949	3,066	3,114	( <sup>1</sup> )	-28.4
<i>1,000 metric tons</i>						
Pulp:						
Bleached sulfate . . . . .	1,168	1,514	1,235	1,178	1,205	3.2
Unbleached sulfate . . . . .	867	1,099	774	888	900	3.8
Mechanical pulp . . . . .	915	1,245	976	899	1,000	9.3
Other . . . . .	959	1,209	836	788	705	-26.5
Total pulp . . . . .	3,909	5,067	3,821	3,753	3,810	-2.5
Paper and paperboard:						
Newsprint . . . . .	1,038	1,457	1,245	1,198	1,394	34.3
Printing and writing . . . . .	445	497	438	495	470	5.6
Corrugating materials . . . . .	925	1,059	584	760	741	-19.9
Other wrapping papers . . . . .	427	508	306	284	362	-15.2
Tissue . . . . .	75	82	82	90	115	53.3
Other paper and board . . . . .	502	467	600	505	458	-8.8
Total paper and paperboard . . . . .	3,412	4,070	3,255	3,332	3,540	3.8
Wastepaper . . . . .	600	600	600	615	580	-3.3

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-34****Russia: Apparent consumption of wood, lumber, wood panels, pulp, paper and board, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood .....	69,109	64,794	56,690	44,884	( <sup>1</sup> )	-35.1
Residual wood <sup>2</sup> .....	32,319	34,684	23,885	20,686	( <sup>1</sup> )	-36.0
Total wood .....	101,428	99,478	80,575	65,570	( <sup>1</sup> )	-35.4
Lumber .....	25,367	20,447	17,329	14,736	( <sup>1</sup> )	-41.9
Wood panels:						
Veneer sheet .....	61	56	33	33	( <sup>1</sup> )	-45.9
Plywood .....	327	274	366	363	( <sup>1</sup> )	11.0
Particleboard .....	2,624	2,063	1,346	1,418	( <sup>1</sup> )	-46.0
Fiberboard .....	660	581	397	447	( <sup>1</sup> )	-32.3
Insulating board .....	32	33	19	13	( <sup>1</sup> )	-59.4
Total wood panels .....	3,704	3,007	2,161	2,274	( <sup>1</sup> )	-38.6
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	539	618	486	375	477	-11.5
Unbleached sulfate .....	722	913	614	785	691	-4.3
Mechanical pulp .....	915	1,245	976	985	1,000	9.3
Other .....	799	978	702	816	643	-19.5
Total pulp .....	2,975	3,754	2,778	2,961	2,811	-5.5
Paper and paperboard:						
Newsprint .....	358	433	378	393	380	6.1
Printing and writing .....	224	316	333	357	304	35.7
Corrugating materials .....	925	1,059	498	705	420	-54.6
Other wrapping papers .....	377	508	306	284	379	0.5
Tissue .....	75	115	82	90	117	56.0
Other paper and board .....	110	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	354	221.8
Total paper and paperboard .....	2,069	2,431	1,597	1,829	1,954	-5.6
Wastepaper .....	600	600	600	615	530	-11.7

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-35**

**Russia: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Sector trade:						
Russia exports:						
EU-15 .....	1,098	1,308	973	900	( <sup>1</sup> )	-18.0
Japan .....	638	775	570	622	( <sup>1</sup> )	-2.5
China .....	74	87	169	204	( <sup>1</sup> )	175.7
United States .....	29	54	47	60	( <sup>1</sup> )	106.9
Korea .....	70	129	75	55	( <sup>1</sup> )	-21.4
All other .....	576	1,182	1,258	1,225	( <sup>1</sup> )	112.7
Total .....	2,485	3,535	3,092	3,066	( <sup>1</sup> )	23.4
Russia imports:						
EU-15 .....	317	533	659	804	( <sup>1</sup> )	153.6
China .....	7	19	18	34	( <sup>1</sup> )	385.7
United States .....	11	17	28	32	( <sup>1</sup> )	190.9
Korea .....	8	19	9	13	( <sup>1</sup> )	62.5
Canada .....	2	5	9	8	( <sup>1</sup> )	300.0
All other .....	100	178	288	365	( <sup>1</sup> )	265.0
Total .....	445	771	1,011	1,257	( <sup>1</sup> )	182.5
Subsector profiles:						
Wood and wood products: <sup>2</sup>						
Russia exports .....	1,813	2,177	1,879	2,035	( <sup>1</sup> )	12.2
Major markets:						
EU-15 .....	808	930	690	732	( <sup>1</sup> )	-9.4
Japan .....	633	774	569	619	( <sup>1</sup> )	-2.2
China .....	58	35	60	95	( <sup>1</sup> )	63.8
Russia imports .....	175	233	172	230	( <sup>1</sup> )	31.4
Major suppliers:						
EU-15 .....	120	136	96	131	( <sup>1</sup> )	9.2
United States .....	3	8	5	7	( <sup>1</sup> )	-100.0
Indonesia .....	( <sup>3</sup> )	1	2	2	133	( <sup>4</sup> )
Pulp and wastepaper: <sup>5</sup>						
Russia exports .....	381	665	449	374	( <sup>1</sup> )	-1.8
Major markets:						
EU-15 .....	198	261	136	68	( <sup>1</sup> )	-65.7
China .....	10	50	65	63	( <sup>1</sup> )	530.0
Korea .....	26	55	34	11	( <sup>1</sup> )	-57.7
Russia imports .....	1	10	21	31	( <sup>1</sup> )	3000.0
Major suppliers:						
EU-15 .....	( <sup>3</sup> )	4	16	26	( <sup>1</sup> )	( <sup>4</sup> )
Sweden .....	( <sup>3</sup> )	( <sup>3</sup> )	4	12	( <sup>1</sup> )	( <sup>4</sup> )
South Africa .....	( <sup>3</sup> )	( <sup>3</sup> )	1	3	( <sup>1</sup> )	( <sup>4</sup> )

See footnotes at end of table.

**Table G-35—Continued**

**Russia: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change
						during the period
	<i>Million dollars</i>					<i>Percent</i>
Paper and paper products: <sup>6</sup>						
Russia exports . . . . .	291	693	763	657	( <sup>1</sup> )	125.8
Major markets:						
EU-15 . . . . .	92	117	147	100	( <sup>1</sup> )	8.7
India . . . . .	42	83	43	67	( <sup>1</sup> )	59.5
Ukraine . . . . .	( <sup>3</sup> )	( <sup>3</sup> )	102	66	( <sup>1</sup> )	( <sup>4</sup> )
Russia imports . . . . .	269	528	817	996	( <sup>1</sup> )	270.3
Major suppliers:						
EU-15 . . . . .	196	393	546	645	( <sup>1</sup> )	229.1
Germany . . . . .	68	108	143	182	( <sup>1</sup> )	167.6
Finland . . . . .	57	162	162	168	( <sup>1</sup> )	194.7

<sup>1</sup> Not available.

<sup>2</sup> Wood and wood products included in chapter 44 of the *Harmonized Tariff Schedule of the United States (HTS)*.

<sup>3</sup> No data reported.

<sup>4</sup> Not applicable.

<sup>5</sup> Items included in chapter 47 of the HTS.

<sup>6</sup> Paper, paperboard and paper articles included in chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table G-36**

**Russia: Imports of wood, lumber, wood panels, pulp, paper and board, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change during the period
	1,000 cubic meters					Percent
Wood:						
Industrial wood:						
Logs	961	951	474	325	( <sup>1</sup> )	-66.2
Wood residue	1	0	0	0	( <sup>1</sup> )	-100.0
Total industrial wood	962	951	474	325	( <sup>1</sup> )	-66.2
Residual wood <sup>2</sup>	0	0	0	0	( <sup>1</sup> )	( <sup>3</sup> )
Total wood	962	951	474	325	( <sup>1</sup> )	-66.2
Lumber	50	23	16	36	( <sup>1</sup> )	-28.0
Wood panels:						
Veneer	1	0	0	0	( <sup>1</sup> )	-100.0
Plywood	5	5	6	10	( <sup>1</sup> )	100.0
Particleboard	17	26	54	105	( <sup>1</sup> )	517.6
Fiberboard	5	0	0	0	( <sup>1</sup> )	-100.0
Insulating board	2	0	0	0	( <sup>1</sup> )	-100.0
Total wood panels	30	31	60	115	( <sup>1</sup> )	283.3
1,000 metric tons						
Pulp:						
Bleached sulfate	0	4	22	21	18	( <sup>3</sup> )
Unbleached sulfate	0	2	1	1	1	( <sup>3</sup> )
Other	0	14	12	27	11	( <sup>3</sup> )
Total pulp	0	20	35	49	30	( <sup>3</sup> )
Paper and paperboard:						
Newsprint	0	1	1	1	2	( <sup>3</sup> )
Printing and writing	10	38	39	81	75	650.0
Corrugating materials	0	0	22	14	12	( <sup>3</sup> )
Other wrapping papers	0	0	0	18	17	( <sup>3</sup> )
Tissue	0	37	0	3	2	( <sup>3</sup> )
Other paper and board	17	0	0	57	56	229.4
Total paper and paperboard	27	76	62	174	164	507.4
Wastepaper	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	20	( <sup>3</sup> )

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

<sup>3</sup> Not applicable.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-37****Russia: Exports of wood, lumber, wood panels, pulp, paper and board, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	11,117	18,374	15,895	17,680	( <sup>1</sup> )	59.0
Chips and particles .....	396	386	497	554	( <sup>1</sup> )	39.9
Wood residue .....	120	147	397	397	( <sup>1</sup> )	230.8
Total industrial wood .....	11,633	18,907	16,789	18,631	( <sup>1</sup> )	60.2
Residual wood <sup>2</sup> .....	97	91	92	92	( <sup>1</sup> )	-5.2
Total wood .....	11,730	18,998	16,881	18,723	( <sup>1</sup> )	59.6
Lumber .....	5,403	6,067	4,600	4,800	( <sup>1</sup> )	-11.2
Wood panels:						
Veneer .....	5	0	0	0	( <sup>1</sup> )	-100.0
Plywood .....	568	670	612	615	( <sup>1</sup> )	8.3
Particleboard .....	18	169	180	170	( <sup>1</sup> )	844.4
Fiberboard .....	79	134	173	170	( <sup>1</sup> )	115.2
Insulating board .....	3	0	0	0	( <sup>1</sup> )	-100.0
Total wood panels .....	673	973	965	955	( <sup>1</sup> )	41.9
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	629	900	771	875	746	18.6
Unbleached sulfate .....	145	188	161	0	210	44.8
Other .....	160	245	146	108	73	-54.4
Total pulp .....	934	1,333	1,078	983	1,029	10.2
Paper and paperboard:						
Newsprint .....	680	1,025	868	822	1,016	49.4
Printing and writing .....	231	219	144	183	241	4.3
Corrugating materials .....	0	0	108	302	333	( <sup>3</sup> )
Other wrapping papers .....	50	0	0	0	0	-100.0
Tissue .....	0	4	0	0	0	( <sup>3</sup> )
Other paper and board .....	409	0	0	140	160	-60.9
Total paper and paperboard .....	1,370	1,248	1,120	1,447	1,750	27.7
Wastepaper .....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	70	( <sup>3</sup> )

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.<sup>3</sup> Not applicable.Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-38****EU-15: Production of wood, lumber, wood panels, pulp, paper and board, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Sawlogs and veneer logs . . . . .	127,171	133,830	125,078	132,254	( <sup>1</sup> )	4.0
Pulpwood and particles . . . . .	87,132	90,674	81,860	83,438	( <sup>1</sup> )	-4.2
Other industrial wood . . . . .	6,833	6,014	5,953	6,072	( <sup>1</sup> )	-11.1
Total industrial wood . . . . .	221,136	230,518	212,891	221,764	( <sup>1</sup> )	0.3
Residual wood <sup>2</sup> . . . . .	37,185	36,090	36,709	36,604	( <sup>1</sup> )	-1.6
Total wood . . . . .	258,321	266,608	249,600	258,368	( <sup>1</sup> )	0.0
Lumber . . . . .	66,031	68,493	67,625	71,425	( <sup>1</sup> )	8.2
Wood panels:						
Veneer sheets . . . . .	1,420	1,440	1,625	1,639	( <sup>1</sup> )	15.4
Plywood . . . . .	2,668	2,911	2,888	2,931	( <sup>1</sup> )	9.9
Particleboard . . . . .	23,549	25,110	25,390	26,964	( <sup>1</sup> )	14.5
Fiberboard . . . . .	3,305	4,108	4,186	4,264	( <sup>1</sup> )	29.0
Insulating board . . . . .	280	334	348	306	( <sup>1</sup> )	9.3
Total wood panels . . . . .	31,222	33,903	34,437	36,104	( <sup>1</sup> )	15.6
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate . . . . .	12,965	13,089	13,021	14,478	( <sup>1</sup> )	11.7
Bleached sulfite . . . . .	2,119	2,112	1,977	2,123	( <sup>1</sup> )	0.2
Mechanical pulp . . . . .	10,405	10,783	9,835	10,690	( <sup>1</sup> )	2.7
Other . . . . .	6,198	6,130	5,777	5,810	( <sup>1</sup> )	-6.3
Total pulp . . . . .	31,687	32,114	30,610	33,101	33,251	4.9
Paper and paperboard:						
Newsprint . . . . .	8,071	8,463	8,068	8,518	( <sup>1</sup> )	5.5
Printing and writing . . . . .	26,534	26,538	26,608	29,363	( <sup>1</sup> )	10.7
Household and sanitary paper . . . . .	3,868	3,864	3,938	4,150	( <sup>1</sup> )	7.3
Other paper and paperboard . . . . .	30,662	30,995	31,238	32,943	( <sup>1</sup> )	7.4
Total paper and paperboard . . . . .	69,135	69,860	69,852	74,974	77,549	12.2
Wastepaper . . . . .	28,291	29,336	29,693	30,254	( <sup>1</sup> )	6.9

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

Table G-39

## EU-15: Apparent consumption of wood, lumber, wood panels, pulp, paper and board, and wastepaper, 1994-98

Product	1994	1995	1996	1997	1998	Change
						during the period
1,000 cubic meters						Percent
Wood:						
Industrial wood .....	244,932	257,775	233,707	249,405	( <sup>1</sup> )	1.8
Residual wood <sup>2</sup> .....	38,385	37,220	38,472	38,190	( <sup>1</sup> )	-0.5
Total wood .....	283,317	294,995	272,179	287,595	( <sup>1</sup> )	1.5
Lumber .....	74,168	71,479	69,148	77,112	( <sup>1</sup> )	4.0
Wood panels:						
Veneer sheet .....	1,866	1,648	1,861	1,957	( <sup>1</sup> )	4.9
Plywood .....	5,239	5,460	4,981	5,179	( <sup>1</sup> )	-1.1
Particleboard .....	23,093	24,565	24,120	25,557	( <sup>1</sup> )	10.7
Fiberboard .....	3,060	4,106	4,098	3,993	( <sup>1</sup> )	30.5
Insulating board .....	342	378	447	394	( <sup>1</sup> )	15.2
Total wood panels .....	33,600	36,157	35,507	37,080	( <sup>1</sup> )	10.4
1,000 metric tons						
Pulp:						
Bleached sulfate .....	18,179	18,639	18,245	19,750	( <sup>1</sup> )	8.6
Bleached sulfite .....	2,405	2,404	2,241	2,486	( <sup>1</sup> )	3.4
Mechanical pulp .....	10,611	10,995	10,027	10,897	( <sup>1</sup> )	2.7
Other .....	6,758	6,714	6,253	6,234	( <sup>1</sup> )	-7.8
Total pulp .....	37,953	38,752	36,766	39,367	39,054	2.9
Paper and paperboard:						
Newsprint .....	8,669	8,899	8,213	8,439	( <sup>1</sup> )	-2.7
Printing and writing .....	22,027	21,408	21,744	23,260	( <sup>1</sup> )	5.6
Household and sanitary paper .....	3,793	3,799	3,931	4,072	( <sup>1</sup> )	7.4
Other paper and paperboard .....	30,299	29,817	34,770	31,187	( <sup>1</sup> )	2.9
Total paper and paperboard .....	64,788	63,923	68,658	66,958	72,131	11.3
Wastepaper .....	28,840	28,659	29,418	29,471	( <sup>1</sup> )	2.2

<sup>1</sup> Not available.<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-99.

**Table G-40**

**EU-15: Imports of wood, lumber, wood panels, pulp, paper and board, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	35,248	39,151	29,870	36,358	( <sup>1</sup> )	3.1
Chips and particles .....	5,705	5,716	5,608	6,227	( <sup>1</sup> )	9.2
Wood residue .....	3,645	3,438	3,327	3,492	( <sup>1</sup> )	-4.2
Total industrial wood .....	44,598	48,305	38,805	46,077	( <sup>1</sup> )	3.3
Residual wood <sup>2</sup> .....	2,047	2,092	2,592	2,536	( <sup>1</sup> )	23.9
Total wood .....	46,645	50,397	41,397	48,613	( <sup>1</sup> )	4.2
Lumber .....	35,536	30,567	29,671	34,401	( <sup>1</sup> )	-3.2
Wood panels:						
Veneer .....	866	740	755	759	( <sup>1</sup> )	-12.4
Plywood .....	4,205	4,140	3,922	4,134	( <sup>1</sup> )	-1.7
Particleboard .....	6,010	6,179	5,950	6,264	( <sup>1</sup> )	4.2
Fiberboard .....	1,665	1,933	2,248	2,678	( <sup>1</sup> )	60.8
Insulating board .....	383	474	513	564	( <sup>1</sup> )	47.3
Total wood panels .....	13,129	13,466	13,388	14,399	( <sup>1</sup> )	9.7
	<i>1,000 metric tons</i>					
Pulp:						
Bleached sulfate .....	11,042	10,895	11,083	11,844	( <sup>1</sup> )	7.3
Bleached sulfite .....	994	905	937	1,020	( <sup>1</sup> )	2.6
Mechanical pulp .....	464	451	382	416	( <sup>1</sup> )	-10.3
Other .....	1,174	1,262	1,159	1,237	( <sup>1</sup> )	5.4
Total pulp .....	13,674	13,513	13,561	14,517	( <sup>1</sup> )	6.2
Paper and paperboard:						
Newsprint .....	5,532	5,123	5,500	5,600	( <sup>1</sup> )	1.2
Printing and writing .....	13,142	12,869	11,784	13,589	( <sup>1</sup> )	3.4
Household and sanitary paper .....	557	622	708	692	( <sup>1</sup> )	24.2
Other paper and paperboard .....	13,260	12,917	13,309	14,577	( <sup>1</sup> )	9.9
Total paper and paperboard .....	32,491	31,531	31,301	34,458	( <sup>1</sup> )	6.1
Wastepaper .....	6,408	6,502	6,602	6,286	( <sup>1</sup> )	-1.9

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-98.

**Table G-41**

**EU-15: Exports of wood, lumber, wood panels, pulp, paper and board, and wastepaper, 1994-98**

Product	1994	1995	1996	1997	1998	Change
						during the period
	<i>1,000 cubic meters</i>					<i>Percent</i>
Wood:						
Industrial wood:						
Logs .....	13,171	13,745	10,411	11,711	( <sup>1</sup> )	-11.1
Chips and particles .....	3,607	3,853	3,305	3,157	( <sup>1</sup> )	-12.5
Wood residue .....	4,024	3,450	4,273	3,568	( <sup>1</sup> )	-11.3
Total industrial wood .....	20,802	21,048	17,989	18,436	( <sup>1</sup> )	-11.4
Residual wood <sup>2</sup> .....	847	961	829	950	( <sup>1</sup> )	12.2
Total wood .....	21,649	22,009	18,818	19,386	( <sup>1</sup> )	-10.5
Lumber .....	27,398	27,581	28,148	28,715	( <sup>1</sup> )	4.8
Wood panels:						
Veneer .....	420	532	519	441	( <sup>1</sup> )	5.0
Plywood .....	1,634	1,591	1,829	1,886	( <sup>1</sup> )	15.4
Particleboard .....	6,465	6,724	7,220	7,672	( <sup>1</sup> )	18.7
Fiberboard .....	1,910	1,935	2,336	2,949	( <sup>1</sup> )	54.4
Insulating board .....	321	430	415	476	( <sup>1</sup> )	48.3
Total wood panels .....	10,750	11,212	12,319	13,424	( <sup>1</sup> )	24.9
<i>1,000 metric tons</i>						
Pulp:						
Bleached sulfate .....	5,828	5,345	5,859	6,572	( <sup>1</sup> )	12.8
Bleached sulfite .....	709	613	673	657	( <sup>1</sup> )	-7.3
Mechanical pulp .....	258	239	190	208	( <sup>1</sup> )	-19.4
Other .....	614	678	683	813	( <sup>1</sup> )	32.4
Total pulp .....	7,409	6,875	7,405	8,250	( <sup>1</sup> )	11.4
Paper and paperboard:						
Newsprint .....	4,935	4,687	4,855	5,679	( <sup>1</sup> )	15.1
Printing and writing .....	17,649	17,999	16,648	19,692	( <sup>1</sup> )	11.6
Household and sanitary paper .....	632	687	715	770	( <sup>1</sup> )	21.8
Other paper and paperboard .....	13,623	14,095	14,277	16,332	( <sup>1</sup> )	19.9
Total paper and paperboard .....	36,839	37,468	36,495	42,473	( <sup>1</sup> )	15.3
Wastepaper .....	5,859	7,179	6,877	7,070	( <sup>1</sup> )	20.7

<sup>1</sup> Not available.

<sup>2</sup> Consists mainly of fuelwood and wood for charcoal.

Source: Food and Agriculture Organization, *Yearbook of Forest Products*, 1997, Pulp & Paper International, *Annual Review*, 1995-98.

**APPENDIX H**  
**U.S. TRADE TABLES**

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**Table H-1**  
**United States: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98**

Item	1994	1995	1996	1997	1998	Change,
						1998 over 1994
						Percent
						<i>Million dollars</i>
Sector trade:						
U.S. exports:						
Canada .....	3,585	4,432	4,238	4,801	4,904	37
Japan .....	4,344	5,069	4,696	3,709	2,694	-38
Mexico .....	2,166	2,121	2,025	2,307	2,576	19
Germany .....	696	861	760	811	745	7
United Kingdom .....	655	867	768	848	693	6
Italy .....	551	827	623	693	653	18
China .....	295	353	468	454	532	80
Netherlands .....	377	600	452	487	457	21
All other .....	5,854	8,120	7,262	7,465	6,237	7
Total .....	18,524	23,251	21,294	21,574	19,492	5
U.S. imports:						
Canada .....	15,877	19,269	19,294	19,917	20,358	28
China .....	375	468	528	653	865	131
Mexico .....	464	660	709	812	846	82
Brazil .....	623	917	678	734	795	28
Finland .....	562	744	606	645	735	31
Indonesia .....	495	503	498	520	565	14
Germany .....	351	480	413	457	564	61
Japan .....	273	309	289	370	407	49
All other .....	2,497	2,909	2,954	3,205	3,488	40
Total .....	21,517	26,260	25,969	27,314	28,624	33
Subsector profiles:						
Wood and wood products: <sup>1</sup>						
U.S. exports .....						
Major markets:						
Japan .....	3,100	3,222	3,265	2,438	1,586	-49
Canada .....	1,195	1,296	1,274	1,578	1,538	29
Germany .....	331	344	298	366	281	-15
United Kingdom .....	232	239	244	291	240	4
Mexico .....	410	246	248	291	366	-11
Belgium .....	116	121	104	101	91	-21
Italy .....	203	207	182	223	198	-3
Spain .....	133	139	146	176	202	52
U.S. imports .....	10,049	9,843	11,555	12,828	13,240	32
Major suppliers:						
Canada .....	7,455	7,075	8,596	9,433	9,614	29
China .....	194	226	258	340	459	136
Indonesia .....	474	474	452	482	458	-3
Mexico .....	300	304	393	440	407	36
Brazil .....	334	368	344	407	403	21
Chile .....	135	163	173	253	280	107
Malaysia .....	214	188	217	181	204	-5
Taiwan .....	198	173	151	156	139	-30

See footnotes at end of table.

Table H-1—Continued

## United States: Forest products sector trade, subsector trade, and major markets and suppliers, 1994-98

Item	1994	1995	1996	1997	1998	Change,
						1998 over 1994
						Percent
						Million dollars
Wood pulp and wastepaper: <sup>2</sup>						
U.S. exports .....	3,793	6,208	4,034	3,866	3,435	-9
Major markets:						
Japan .....	570	925	574	522	442	-22
Mexico .....	387	583	327	392	372	-4
Canada .....	357	597	279	308	310	-13
Italy .....	255	472	313	319	304	19
Korea .....	430	657	410	359	256	-40
Germany .....	213	306	259	258	247	16
France .....	150	275	199	185	188	26
China .....	105	183	187	148	156	-49
U.S. imports .....	2,315	3,827	2,648	2,639	2,443	6
Major suppliers:						
Canada .....	1,992	3,226	2,209	2,232	2,000	( <sup>3</sup> )
Brazil .....	238	449	277	270	296	24
South Africa .....	32	50	61	45	42	31
Chile .....	15	25	27	25	30	97
New Zealand .....	3	9	12	9	10	274
Indonesia .....	0	0	7	5	8	( <sup>4</sup> )
Germany .....	4	5	6	9	10	174
Finland .....	6	10	7	7	8	32
Paper and paper products: <sup>5</sup>						
U.S. exports .....	7,635	9,786	10,074	10,613	10,274	35
Major markets:						
Canada .....	2,032	2,540	2,686	2,915	3,057	50
Mexico .....	1,369	1,292	1,450	1,625	1,838	34
Japan .....	673	922	857	749	666	-1
Hong Kong .....	299	390	445	475	346	16
China .....	127	142	250	260	335	165
United Kingdom .....	241	305	319	359	320	33
Netherlands .....	163	241	241	258	264	62
Germany .....	152	211	204	186	216	42
U.S. imports .....	9,153	12,591	11,766	11,846	12,941	41
Major suppliers:						
Canada .....	6,431	8,968	8,489	8,252	8,744	36
Finland .....	535	715	574	612	695	30
Germany .....	309	432	353	383	463	50
Mexico .....	161	351	305	367	433	168
China .....	180	242	270	313	404	124
Japan .....	264	301	282	362	398	51
United Kingdom .....	252	266	282	282	300	19
Korea .....	73	85	67	105	216	198

<sup>1</sup> Wood and wood products included in chapter 44 of the *Harmonized Tariff Schedule of the United States (HTS)*.

<sup>2</sup> Items included in chapter 47 of the HTS.

<sup>3</sup> Less than .5 percent.

<sup>4</sup> Not applicable.

<sup>5</sup> Paper, paperboard and paper articles included in chapter 48 of the HTS.

Source: FAS Global Agricultural Trade System using data from the United Nations Statistical Office.

**Table H-2**  
**Forest products: U.S. exports, by selected product, 1994-98**

Subject	1994	1995	1996	1997	1998	Change,
						1998 over 1994
<i>Million dollars</i>						<i>Percent</i>
Wood and wood products . . . . .	7,096	7,257	7,185	7,095	5,782	-19
Lumber . . . . .	2,484	2,472	2,453	2,553	2,002	-19
Logs . . . . .	2,290	2,299	2,118	1,676	1,217	-47
Wood panels . . . . .	653	685	659	782	565	-13
Pulp and wastepaper . . . . .	3,793	6,208	4,034	3,866	3,435	-9
Chemical pulp . . . . .	2,371	3,949	2,558	2,412	2,019	-15
Paper and paper products . . . . .	7,635	9,786	10,074	10,613	10,274	35
Paper products . . . . .	2,643	3,095	3,480	3,774	3,753	42
Cartons . . . . .	871	1,083	1,204	1,296	1,345	54
Sanitary products . . . . .	684	727	838	830	762	11
Printing and writing paper . . . . .	1,263	1,631	1,611	1,664	1,539	22
Kraft linerboard . . . . .	1,074	1,631	1,499	1,607	1,403	31
Total forest products . . . . .	18,524	23,251	21,294	21,574	19,492	5

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-3**  
**Wood and wood products: U.S. exports, by principal product, 1994-98**

Item	1994	1995	1996	1997	1998	Change,
						1998 over 1994
<i>Million dollars</i>						<i>Percent</i>
Logs:						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	12,215	12,818	11,940	10,863	8,959	-27
Value ( <i>million dollars</i> ) . . . . .	2,290	2,299	2,118	1,676	1,217	-47
Unit value ( <i>dollars per cubic meters</i> ) . . . . .	187	179	177	154	136	-27
Lumber:						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	7,707	7,351	7,219	7,228	5,901	-23
Value ( <i>million dollars</i> ) . . . . .	2,484	2,472	2,453	2,553	2,002	-19
Unit value ( <i>dollars per cubic meters</i> ) . . . . .	322	336	340	353	339	5
Wood panels: <sup>1</sup>						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	2,503	2,617	2,630	2,967	1,983	-21
Value ( <i>million dollars</i> ) . . . . .	653	685	659	782	565	-13
Unit value ( <i>dollars per cubic meters</i> ) . . . . .	261	262	250	263	285	9
Wood veneer:						
Quantity ( <i>thousand square meters</i> ) . . . . .	244,876	255,873	256,250	285,004	272,855	11
Value ( <i>million dollars</i> ) . . . . .	308	333	336	384	355	15
Unit value ( <i>dollars per square meters</i> ) . . . . .	1.26	1.30	1.31	1.35	1.34	7
Wood chips:						
Quantity ( <i>thousand dry metric tons</i> ) . . . . .	5,161	5,504	6,075	6,153	6,009	16
Value ( <i>million dollars</i> ) . . . . .	456	554	560	502	482	6
Unit value ( <i>dollars per ton</i> ) . . . . .	88	101	92	82	80	-9

<sup>1</sup> Wood veneer excluded.

Note.—Unit values calculated from unrounded numbers.

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-4**  
**Pulp, paper and paper products: U.S. exports, by principal product, 1994-98**

Item	1994	1995	1996	1997	1998	Change, 1998 over 1994 <i>Percent</i>
Non-dissolving chemical pulp:						
Quantity ( <i>thousand metric tons</i> ) . . . . .	4,911	5,934	5,151	5,137	4,465	-9
Value ( <i>million dollars</i> ) . . . . .	2,149	3,606	2,363	2,273	1,909	-11
Unit value ( <i>dollars per metric ton</i> ) . . . . .	438	608	459	442	428	-2
Uncoated kraft paper and paperboard:						
Quantity ( <i>thousand metric tons</i> ) . . . . .	3,324	3,840	4,316	4,887	4,301	29
Value ( <i>million dollars</i> ) . . . . .	1,412	2,108	1,952	2,071	1,963	39
Unit value ( <i>dollars per metric ton</i> ) . . . . .	425	549	452	424	457	8
Printing and writing paper:						
Quantity ( <i>thousand metric tons</i> ) . . . . .	1,357	1,371	1,516	1,512	1,401	3
Value ( <i>million dollars</i> ) . . . . .	1,263	1,631	1,611	1,664	1,539	22
Unit value ( <i>dollars per metric ton</i> ) . . . . .	931	1,190	1,063	1,101	1,099	18
Cartons of paper and paperboard:						
Quantity ( <i>thousand metric tons</i> ) . . . . .	728	819	936	1,025	1,064	46
Value ( <i>million dollars</i> ) . . . . .	871	1,083	1,204	1,296	1,345	-13
Unit value ( <i>dollars per metric ton</i> ) . . . . .	1,197	1,322	1,286	1,265	1,263	6
Coated paper and paperboard:						
Quantity ( <i>thousand metric tons</i> ) . . . . .	1,338	1,638	1,735	1,890	1,845	38
Value ( <i>million dollars</i> ) . . . . .	1,055	1,418	1,438	1,576	1,561	48
Unit value ( <i>dollars per metric ton</i> ) . . . . .	788	866	829	834	846	7
Paper articles:						
Quantity ( <i>thousand metric tons</i> ) . . . . .	1,508	1,695	1,925	2,124	2,154	43
Value ( <i>million dollars</i> ) . . . . .	2,643	3,095	3,480	3,774	3,753	42
Unit value ( <i>dollars per metric ton</i> ) . . . . .	1,752	1,825	1,808	1,777	1,740	-1
Tissue stock:						
Quantity ( <i>thousand metric tons</i> ) . . . . .	91	95	98	86	90	-1
Value ( <i>million dollars</i> ) . . . . .	128	141	129	112	110	-14
Unit value ( <i>dollars per metric ton</i> ) . . . . .	1,401	1,474	1,309	1,303	1,216	-13
Wastepaper and paperboard:						
Quantity ( <i>thousand metric tons</i> ) . . . . .	6,989	9,431	6,495	6,809	7,349	5
Value ( <i>million dollars</i> ) . . . . .	875	1,560	745	747	753	-14
Unit value ( <i>dollars per metric ton</i> ) . . . . .	125	165	115	110	102	-18

Note.—Unit values calculated from unrounded numbers.

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-5**  
**Forest products: U.S. exports to Canada, by selected product, 1994-98**

Subject	1994	1995	1996	1997	1998	Change,
						1998 over 1994
<i>Million dollars</i>						<i>Percent</i>
Wood and wood products . . . . .	1,195	1,296	1,274	1,578	1,538	29
Lumber . . . . .	389	394	395	498	427	10
Logs . . . . .	245	362	283	344	374	53
Wood panels . . . . .	219	229	265	303	296	35
Pulp and wastepaper . . . . .	357	597	279	308	310	-13
Recovered paper . . . . .	224	420	156	187	205	-8
Paper and paper products . . . . .	2,032	2,540	2,686	2,915	3,057	50
Paper products . . . . .	920	1,127	1,227	1,308	1,399	52
Cartons . . . . .	225	333	373	383	431	92
Sanitary paper . . . . .	246	343	378	385	420	71
Printing and writing paper . . . . .	548	720	718	784	814	49
Total forest products . . . . .	3,585	4,432	4,238	4,801	4,904	37

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-6**  
**Forest products: U.S. exports to the EU-15, by selected product, 1994-98**

Product	1994	1995	1996	1997	1998	Change,
						1998 over 1994
<i>Million dollars</i>						<i>Percent</i>
Wood and wood products . . . . .	1,248	1,296	1,193	1,438	1,264	1
Softwood lumber . . . . .	218	189	160	179	165	-24
Hardwood lumber . . . . .	431	454	454	557	514	19
Wood panels . . . . .	387	447	400	476	321	-17
Veneer . . . . .	158	182	175	190	187	18
Plywood . . . . .	198	215	164	221	80	-60
Logs . . . . .	93	80	58	73	95	2
Pulp and wastepaper . . . . .	1,101	1,966	1,297	1,279	1,179	7
Chemical pulp other than dissolving . . . . .	828	1,565	947	917	819	-1
Chemical pulp, dissolving grades . . . . .	178	205	232	248	240	35
Paper and paper products . . . . .	926	1,272	1,275	1,392	1,369	48
Kraft linerboard . . . . .	242	412	350	385	373	54
Printing and writing paper . . . . .	90	109	101	122	115	28
Paper products . . . . .	238	258	133	374	311	31
Total forest products . . . . .	3,274	4,534	3,765	4,110	3,811	16

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-7**  
**Forest products: U.S. exports to Japan, by selected product, 1994-98**

Subject	1994	1995	1996	1997	1998	Change,
						1998 over 1994
----- Million dollars -----						Percent
Wood and wood products . . . .	3,100	3,222	3,265	2,438	1,586	-49
Wood chips . . . . .	394	485	500	439	431	9
Logs . . . . .	1,787	1,729	1,697	1,151	743	-58
Softwood logs . . . . .	1,727	1,669	1,640	1,097	707	-59
Lumber . . . . .	761	771	788	588	262	-66
Softwood lumber . . . . .	627	620	652	449	190	-70
Builders' joinery . . . . .	63	123	170	142	82	30
Pulp and wastepaper . . . . .	570	925	574	522	442	-22
Chemical pulp . . . . .	410	685	390	356	300	-27
Paper and paper products . . . .	673	922	857	749	666	-1
Newsprint . . . . .	216	310	295	237	198	-8
Printing and writing paper . .	36	97	58	30	16	-56
Industrial papers . . . . .	326	412	394	384	359	10
Paper products . . . . .	91	97	110	109	96	5
Total forest products . . . . .	4,344	5,069	4,696	3,709	2,694	-38

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-8**  
**Forest products: U.S. exports to Mexico by selected product, 1994-98**

Subject	1994	1995	1996	1997	1998	Change,
						1998 over 1994
----- Million dollars -----						Percent
Wood and wood products . . . .	410	246	248	291	366	-11
Lumber . . . . .	185	113	102	106	124	-33
Logs . . . . .	27	14	7	15	44	63
Plywood . . . . .	57	22	33	37	39	-32
Pulp and wastepaper . . . . .	387	583	327	392	372	-4
Chemical wood pulp . . . . .	210	302	172	205	189	-10
Paper and paper products . . . .	1,369	1,292	1,450	1,625	1,838	34
Paper products . . . . .	830	832	994	1,025	1,166	40
Cartons . . . . .	478	553	585	597	655	37
Sanitary products . . . . .	160	92	106	68	74	-54
Printing & writing paper . . . .	242	168	178	200	204	-16
Total forest products . . . . .	2,166	2,121	2,025	2,307	2,576	19

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-9**  
**Wood and wood products: U.S. imports, by principal product, 1994-98**

Item	1994	1995	1996	1997	1998	Change, 1998 over 1994 <i>Percent</i>
<b>Lumber:</b>						
Total:						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	39,188	41,460	43,490	43,195	45,072	15
Value ( <i>million dollars</i> ) . . . . .	6,065	5,519	6,837	7,368	6,743	11
Unit value ( <i>dollars per cubic meter</i> ) . . . . .	155	133	157	171	150	-3
Softwood lumber:						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	38,287	40,596	42,529	42,065	43,704	14
Value ( <i>million dollars</i> ) . . . . .	5,776	5,226	6,533	7,004	6,332	10
Unit value ( <i>dollars per cubic meter</i> ) . . . . .	151	129	154	166	145	-4
Hardwood lumber:						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	871	836	889	1,065	1,295	49
Value ( <i>million dollars</i> ) . . . . .	283	289	296	357	399	41
Unit value ( <i>dollars per cubic meter</i> ) . . . . .	325	345	333	335	308	-5
<b>Wood panels:</b>						
Total: <sup>1</sup>						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	5,638	6,639	7,874	9,104	10,835	92
Value ( <i>million dollars</i> ) . . . . .	1,546	1,676	1,845	1,913	2,410	56
Unit value ( <i>dollars per cubic meter</i> ) . . . . .	274	252	235	211	222	-19
Wood veneer:						
Quantity ( <i>thousand square meters</i> ) . . . . .	282,109	311,382	281,597	277,055	319,129	13
Value ( <i>million dollars</i> ) . . . . .	274	310	307	336	357	30
Unit value ( <i>dollars per square meter</i> ) . . . . .	0.97	0.99	1.09	1.21	1.11	14
Plywood:						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	1,547	1,769	1,878	1,897	2,189	41
Value ( <i>million dollars</i> ) . . . . .	712	713	779	767	757	6
Unit value ( <i>dollars per cubic meter</i> ) . . . . .	460	403	414	404	346	-25
Particleboard						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	3,557	4,270	5,159	6,043	7,108	100
Value ( <i>million dollars</i> ) . . . . .	720	829	881	896	1,302	81
Unit value ( <i>dollars cubic meter</i> ) . . . . .	203	194	171	148	183	-10
Fiberboard						
Quantity ( <i>thousand cubic meters</i> ) . . . . .	533	602	837	1,164	1,538	189
Value ( <i>million dollars</i> ) . . . . .	114	134	185	251	350	207
Unit value ( <i>dollars cubic meter</i> ) . . . . .	214	223	221	216	228	7
<b>Builders' joinery:</b>						
Quantity . . . . .	( <sup>2</sup> )					
Value ( <i>million dollars</i> ) . . . . .	526	543	675	950	1,176	124
Unit value . . . . .	( <sup>2</sup> )					

<sup>1</sup> Wood veneer excluded.

<sup>2</sup> Not available.

Note.—Unit values calculated from unrounded number.

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-10**  
**Pulp, paper and paper products: U.S. imports, by principal product, 1994-98**

Item	1994	1995	1996	1997	1998	Change,
						1998 over 1994
						Percent
Newsprint:						
Quantity (thousand metric tons) . . . . .	7,150	7,083	6,306	6,503	6,521	-9
Value (million dollars) . . . . .	3,333	4,418	4,063	3,590	3,766	13
Unit value (dollars per metric ton) . . . . .	466	624	644	552	577	24
Non-dissolving chemical pulp:						
Quantity (thousand metric tons) . . . . .	4,629	4,949	4,737	5,310	5,065	9
Value (million dollars) . . . . .	2,076	3,499	2,382	2,346	2,202	6
Unit value (dollars per metric ton) . . . . .	448	707	503	442	435	-3
Printing and writing paper:						
Quantity (thousand metric tons) . . . . .	3,952	4,386	4,009	4,769	5,367	36
Value (million dollars) . . . . .	2,772	4,263	3,620	3,842	4,397	59
Unit value (dollars per metric ton) . . . . .	701	972	903	806	819	17
Paper articles:						
Quantity (thousand metric tons) <sup>1</sup> . . . . .	629	755	792	882	997	59
Value (million dollars) . . . . .	1,691	2,108	2,339	2,518	2,749	63
Unit value (dollars per metric ton) . . . . .	2,688	2,791	2,954	2,854	2,756	3
Cartons of paper and paperboard:						
Quantity (thousand metric tons) . . . . .	191	252	271	296	333	74
Value (million dollars) . . . . .	451	596	658	674	745	-13
Unit value (dollars per metric ton) . . . . .	2,364	2,361	2,241	2,279	2,236	-13

<sup>1</sup> Estimated.

Note.—Unit values calculated from unrounded numbers.

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-11**  
**Forest products: U.S. imports from Canada, by selected product, 1994-98**

Subject	1994	1995	1996	1997	1998	Change,
						1998 over 1994
						Percent
	Million dollars					
Wood and wood products . . . . .	7,455	7,075	8,596	9,433	9,614	29
Softwood lumber . . . . .	5,544	4,952	6,252	6,599	5,923	7
Wood panels . . . . .	983	1,097	1,169	1,263	1,794	83
Builders' joinery . . . . .	336	371	474	682	873	160
Pulp and wastepaper . . . . .	1,992	3,226	2,209	2,232	2,000	( <sup>1</sup> )
Chemical pulp . . . . .	1,802	2,989	2,026	2,012	1,814	1
Paper and paper products . . . . .	6,430	8,968	8,488	8,252	8,744	36
Newsprint . . . . .	3,296	4,371	4,019	3,488	3,517	7
Printing and writing paper . . . . .	1,618	2,545	2,373	2,560	2,814	74
Industrial papers . . . . .	736	1,001	926	951	1,049	43
Paper products . . . . .	726	986	1,122	1,199	1,222	68
Total forest products . . . . .	15,877	19,269	19,294	19,917	20,358	28

<sup>1</sup> Less than .5 percent.

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table H-12**  
**Forest products: U.S. imports from the EU-15, by selected product, 1994-98.**

Items	1994	1995	1996	1997	1998	Change,
						1998 over 1994
	<i>Million dollars</i>					<i>Percent</i>
Wood and wood products . . . . .	249	303	373	467	553	122
Lumber . . . . .	7	6	11	30	52	643
Wood panels . . . . .	96	114	161	205	236	146
Wood articles . . . . .	113	141	145	170	187	65
Pulp and wastepaper . . . . .	28	51	34	34	35	25
Paper and paper products . . . . .	1,642	2,091	1,867	1,929	2,105	28
Printing and writing paper . . . . .	956	1,312	972	985	1,121	17
Industrial papers . . . . .	252	266	314	378	400	59
Paper products . . . . .	351	382	425	427	436	24
<b>Total forest products . . . . .</b>	<b>1,919</b>	<b>2,445</b>	<b>2,273</b>	<b>2,429</b>	<b>2,693</b>	<b>40</b>

<sup>1</sup> Less than .5 percent.

Source: Compiled from official statistics of the U.S. Department of Commerce.

**APPENDIX I**  
**U.S. AND FOREIGN TARIFF RATES**

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**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
4401.10 Fuel wood in logs, etc.	United States	(4)	0%	Free		
	Canada	3	0%	Free		
	Colombia	1	35%	5%		
	Japan	1	0%	Free		
	EU-15	1	0%	Free		
	Mexico		35%	Free		
	<b>Other markets:</b>					
	Brazil			12%	5%	
	Chile			25%	11%	
	China			40%	8%	17%
	Indonesia			40%	0%	
	Malaysia			20%	20%	
	Taiwan			N/A	Free	
	Korea			2%	2%	
Russia			N/A	20%		
4401.21 Coniferous wood chips	United States	(24)	0%	Free		
	Japan	119	N/A	Free		
	Canada	35	0%	Free		
	EU-15	1	0%	0.6%		
	<b>Other markets:</b>					
	Brazil			12%	5%	
	Chile			25%	11%	
	China			20%	1%	17%
	Indonesia			40%	0%	
	Malaysia			20%	20%	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Taiwan		N/A	Free	
	Korea		N/A	2%	
	Mexico		35%	5%	
	Russia		N/A	20%	
4401.22 Non-coniferous wood chips	United States	(6)	0%	Free	
	Japan	312	N/A	Free	
	Canada	9	0%	Free	
	Korea	3	N/A	2%	
	<b>Other markets:</b>				
	Brazil		12%	5%	
	Chile		25%	11%	
	China		20%	1%	17%
	Indonesia		40%	0%	
	Malaysia		20%	20%	
	Taiwan		N/A	Free	
	EU-15		0%	0.6%	
	Mexico		35%	Free	
	Russia		N/A	20%	
4401.30 Sawdust & wood waste	United States	(43)	0%	Free-1.5%	
	Canada	5	0%	Free	
	Japan	3	0%	Free	
	Korea	1	2%	2%	
	<b>Other markets:</b>				
	Brazil		12%	5%	
	Chile		25%	11%	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	China		20%	1%	17%
	Indonesia		40%	0%	
	Malaysia		20%	20%	
	Taiwan		N/A	Free	
	EU-15		0%	Free	
	Mexico		35%	5%	
	Russia		N/A	20%	
4407.10 Wood sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded, or finger-jointed, of a thickness exceeding 6mm, coniferous	United States	(6,332)	0%	Free	
	Japan	190	0%-6% (4.8%)	Free-6.5% (Free)	
	EU-15	165	0%	Free-1% (0.8%)	
	Canada	123	0%	Free	
	Mexico <sup>4</sup>	44	35%	5%-7.5% (5%)	
	Dominican Republic	44	40%	15%	
	Jamaica	26	50%	N/A	
	<b>Other markets:</b>				
	Korea		10%	5%	
	Taiwan		N/A	Free	
4407.91 Wood sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded, or finger-jointed, of the thickness exceeding 6mm, of oak	United States	(11)	0%	Free	
	EU-15	269	0%	Free-1% (0.8%)	
	Canada	143	0%	Free	
	Mexico <sup>5</sup>	40	35%	7.5%	
	Hong Kong	22	0%	Free	
	<b>Other markets:</b>				
	Taiwan		N/A	Free	
	Japan		N/A	Free	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Korea		10%	5%	
	China		20%	3%	17%
4407.99 Wood sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded, or finger-jointed, of a thickness exceeding 6mm (hardwood)	United States	(222)	0%	Free	
	EU-15	236	0%-2.5% (0%)	Free-3% (0.8%)	
	Canada	157	0%	Free	
	Japan	53	0%-6% (0%)	Free-6.8%	
	Mexico <sup>6</sup>	37	35%	Free-7.5% (5%)	
	<b>Other markets:</b>				
	Taiwan		N/A	Free	
	Korea		10%	5%	
	China		9%-35% (20%)	3%-9% (3%)	17%
4408.10 Coniferous veneer sheets & sheets for plywood	United States	(77)	0%	Free	
	Canada	11	0%	Free	
	EU-15	5	0%-4% (3%)	Free-4.4% (3.4%)	
	Japan	1	0%-5% (5%)	Free-5%	
	Korea	1	10%	5%	
	Mexico	1	35%	Free	
	<b>Other markets:</b>				
	Brazil		20%	9%	
	Chile		25%	11%	
	China		20%-35% (35%)	6%-10% (8%)	17%
	Indonesia		40%	5%	
	Malaysia		20%	0%-20%	
	Taiwan		N/A	Free	
	Russia		N/A	20%	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

<b>HS item/product description</b>	<b>United States and major markets</b>	<b>1998 U.S. exports or (imports) (Million dollars)</b>	<b>Final bound WTO tariff</b>	<b>Applied MFN tariff (median tariff)</b>	<b>Other duties</b>
4408.39 Veneer sheets & sheets for plywood (other tropical e.g. teak mahogany)	United States	(22)	N/A	Free	
	Canada	1	N/A	Free	
	Malaysia	1	20%	0%-20%	
	Mexico	1	35%	Free	
	<b>Other markets:</b>				
	China		N/A	5%-8%	17%
	Brazil		20%	9%	
	Chile		25%	11%	
	Indonesia		40%	5%	
	Taiwan		N/A	Free	
	Korea		N/A	2.5%-5%	
	Japan		N/A	5%-6.1%	
	EU-15		N/A	Free-6% (4.4%)	
Russia		N/A	5%		
4408.90 Other plywood sheets and veneer sheets	United States	(250)	0%	Free	
	EU-15	182	0%-4% (3%)	Free-4.4% (3.4%)	
	Canada	83	0%	Free	
	Hong Kong	13	0%	0%	
	Taiwan	10	N/A	Free	
	<b>Other markets:</b>				
	Brazil		20%	9%	
	Chile		25%	11%	
	China		20%-35% (35%)	5%-8% (8%)	17%
	Indonesia		40%	5%	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**  
**Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Malaysia		20%	0%-20%	
	Korea		10%	2.5%-5%	
	Japan		0%-5.6% (5%)	5%-6.1%	
	Mexico		35%	Free	
	Russia		N/A	15%-20%	
4409.10 Coniferous wood continuously shaped	United States	(476)	0%-4.9% (0%)	Free-5.4% (0.5%)	
	Canada	66	0%	Free	
	Mexico	8	35%	Free	
	Japan	4	0%-5% (3.7%)	Free-5.5% (4.5%)	
	EU-15	4	0%	0.6%-0.8% (0.6%)	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	0%	
	Malaysia		20%	20%	
	Taiwan		N/A	Free	
	Korea		13%	8%	
	Russia		N/A	20%	
4409.20 Non-coniferous wood continuously shaped	United States	(187)	0%-4.9% (0%)	Free-5.4% (Free)	
	Canada	63	0%-3.7% (0%)	Free	
	Mexico	15	35%	Free	
	EU-15	7	0%	0.6%-0.8% (0.8%)	
	Japan	7	0%-7.5% (3.6%)	Free-7.5%	
	China	1	35%	15%	17%

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	Indonesia		40%	0%	
	Malaysia		20%	20%	
	Taiwan		N/A	Free	
	Korea		13%	8%	
	Russia		N/A	20%	
4410.11 Particle-board, waferboard	United States	(1,035)	0%	0.8%	
	Canada	20	2.7%	Free	
	Japan	7	5%-6%	5.6%-6.3%	
	Mexico	1	35%	10%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		N/A	18%	17%
	Indonesia		40%	5%	
	Malaysia		N/A	20%	
	Taiwan		N/A	3%	
	Korea		N/A	8%	
	EU-15		N/A	7.6%	
Russia		N/A	20%		
4410.19 Other particleboard	United States	(265)	0%	0.8%	
	Canada	37	2.7%-6.1%	Free	
	Mexico	28	35%	10%	

See footnotes at end of table.

Table I-1

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Wood Products: Major products and markets<sup>3</sup>—Continued

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	EU-15	17	N/A	7.6%	
	Taiwan	4	N/A	3%	
	Japan	3	N/A	5.6%-6.3%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		N/A	18%	17%
	Indonesia		40%	5%	
	Malaysia		N/A	20%	
	Korea		N/A	8%	
	Russia		N/A	20%-30%	
4410.90 Other particleboard of ligneous materials	United States	(3)	0%	Free	
	Saudi Arabia	8	N/A	12%	
	Mexico	8	35%	7.5%-10% (10%)	
	Japan	3	6.6%-7.9%	7.3%-8%	
	Canada	3	2.7%-5.3%	Free	
	EU-15	2	7%	7.6%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		20%	18%	17%
	Indonesia		40%	5%	
	Malaysia		20%	20%	
	Taiwan		N/A	3%	
	Korea		N/A	8%	
Russia		N/A	20%		

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

<b>HS item/product description</b>	<b>United States and major markets</b>	<b>1998 U.S. exports or (imports) (Million dollars)</b>	<b>Final bound WTO tariff</b>	<b>Applied MFN tariff (median tariff)</b>	<b>Other duties</b>
4411.11 Fiberboard of wood, not mechanically worked or surface covered, density exceeding 0.8g/cm <sup>3</sup>	United States	(63)	0%	0.6%	
	Canada	36	4.4%	Free	
	Israel	1	N/A	10% <sup>7</sup>	
	Mexico	1	35%	Free	
	Taiwan	1	N/A	3%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	10%	
	Malaysia		20%	20%	
	Korea		N/A	8%	
	Japan		2.6%	3.1%	
	EU-15		7%	7.6%	
Russia		N/A	20%		
4411.19 Other fiberboard density exceeding 0.8g/cm <sup>3</sup>	United States	(122)	0%-6% (0%)	Free-6% (0.6%)	
	Canada	17	6.1%	Free	
	EU-15	11	7%	7.6%	
	Mexico	1	35%	Free	
	Taiwan	1	N/A	3%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		35%	18%	17%
	Indonesia		40%	5%	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Malaysia		20%	20%	
	Korea		N/A	8%	
	Japan		2.6%	3.1%	
	Russia		N/A	20%	
4411.21 Fiberboard, not mechanically worked or surface covered, density 0.5-0.8g/cm <sup>3</sup>	United States	(65)	0%	0.6%	
	Canada	12	4.4%	Free	
	Mexico	6	35%	Free	
	Taiwan	2	N/A	3%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		20%	18%	17%
	Indonesia		40%	5%	
	Malaysia		20%	20%	
	Korea		N/A	8%	
	Japan		2.6%	2.7%	
	EU-15		7%	7.6%	
	Russia		N/A	20%	
4411.29 Other fiberboard density 0.5-0.8g/cm <sup>3</sup>	United States	(71)	0%-3.9% plus (0-1.9¢/kg)	Free-4.3% plus (0-2.1¢/kg)	
	Canada	2	4.4%	Free	
	Mexico	1	35%	Free	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		35%	18%	17%

See footnotes at end of table.

Table I-1

Forest products: Tariffs on major products by major markets<sup>1,2</sup>

Wood Products: Major products and markets<sup>3</sup>—Continued

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Indonesia		40%	5%	
	Malaysia		20%	20%	
	Taiwan		N/A	3%	
	Korea		N/A	8%	
	Japan		2.6%	2.7%	
	EU-15		7%	7.6%	
	Russia		N/A	20%	
4411.91 Other fiberboard not mechanically worked or surface covered	United States	(9)	0%	Free	
	Canada	2	4.4%	Free	
	Japan	1	2.6%	2.7%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		35%	12%	17%
	Indonesia		40%	10%	
	Malaysia		20%	20%	
	Taiwan		N/A	3%	
	Korea		N/A	8%	
	EU-15		7%	7.6%	
	Mexico		35%	Free	
Russia		N/A	20%		
4411.99 Other fiberboard	United States	(11)	0%	Free	
	EU-15	25	7%	7.6%	
	Korea	4	N/A	8%	
	Mexico	7	35%	Free	

See footnotes at end of the table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Canada	2	4.4%	Free	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		35%	12%	17%
	Indonesia		40%	10%	
	Malaysia		20%	20%	
	Taiwan		N/A	3%	
	Japan		2.6%	2.7%	
	Russia		N/A	20%	
4412.13 Plywood with at least one outer ply of tropical wood, each ply not exceeding 6mm thickness	United States	(331)	N/A	0.6%-8% (8%)	
	Canada	5	N/A	Free	
	Mexico	5	35%	7.5%-10%	
	Jamaica	1	50%	N/A	
	Israel	1	N/A	N/A	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		N/A	15%	17%
	Indonesia		40%	15%	
	Malaysia		N/A	40%	
	Taiwan		N/A	12.5%-20%	
	Korea		N/A	15% <sup>8</sup>	
	Japan		N/A	6.7%-12% (10%)	
EU-15		NA	7.6%-10% (10%)		
Russia		N/A	20%		

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
4412.14 Other plywood with at least one outer ply of nonconiferous wood, each ply not exceeding 6mm	United States	(275)	N/A	0.6%-8% (8%)	
	Canada	19	N/A	Free	
	Mexico	5	35%	7.5%	
	Japan	1	N/A	6.7%-7.8% (7.1%)	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		N/A	15%	17%
	Indonesia		40%	15%	
	Malaysia		N/A	35%-40%	
	Taiwan		N/A	12.5%-20%	
	Korea		N/A	15% <sup>8</sup>	
	EU-15		N/A	7.6%	
	Russia		N/A	20%	
4412.19 Plywood, other (includes metal on faces) each ply not exceeding 6mm thickness	United States	(53)	0%-8% (5.1%)	1%-10.4% (5.7%)	
	EU-15 <sup>9</sup>	76	7%	7.6%	
	Canada	30	6.1%-9.7%	Free	
	Mexico	24	35%	7.5%-10% (7.5%)	
	Dominican Republic	8	40%	5%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	15%	
	Malaysia		35%	40%	

See footnotes at end of tables.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Taiwan		N/A	7.5%-10%	
	Korea		N/A	15% <sup>8</sup>	
	Japan		6%	6.8%-7.1% (7.1%)	
	Russia		N/A	20%	
4412.29 Other plywood with at least one outer ply of non-coniferous wood	United States	(45)	0%-8% (8%)	0.6%-8% (8%)	
	Canada	4	5.3%-6.1%	Free	
	Japan	1	6%	7%-7.8%	
	EU-15	1	6%	10%	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	15%	
	Malaysia		25%	25%-35%	
	Taiwan		N/A	12.5%-20%	
	Korea		N/A	15% <sup>8</sup>	
	Mexico		35%	10%	
Russia		N/A	20%		
4412.93 Other plywood with at least one layer of particle board	United States	(0.5)	N/A	0.8%	
	Canada	4	N/A	Free	
	<b>Other markets:</b>				
	Brazil		20%	13%	
	Chile		25%	11%	
	China		N/A	15%	17%
	Indonesia		40%	15%	

See footnotes at end of tables.

Table I-1

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Wood Products: Major products and markets<sup>3</sup>—Continued

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	Malaysia		N/A	25%-35%		
	Taiwan		N/A	20%		
	Korea		N/A	15% <sup>8</sup>		
	Japan		N/A	7%-7.8%		
	EU-15		N/A	6.8%		
	Mexico		35%	7.5%		
	Russia			N/A	20%	
4412.99 Other plywood	United States	(15)	0%-8% (3.4%)	0.8%-10.4% (3.8%)		
	Canada	4	5.3%-6.1%	Free		
	Mexico	2	35%	10%		
	<b>Other markets:</b>					
	Brazil		20%	13%		
	Chile		25%	11%		
	China		35%	15%	17%	
	Indonesia		40%	15%		
	Malaysia			N/A	25%-35%	
	Taiwan			N/A	5%-7.5%	
	Korea			N/A	15% <sup>8</sup>	
	Japan			6%	7%-7.8%	
	EU-15 <sup>9</sup>			6%	6.8%-10%	
	Russia			N/A	20%	
4418.10 Window frames	United States	(77)	3.2%	3.6%		
	Canada	18	6.1%-8.2%	Free		
	Japan	17	0%	Free		
	Mexico	3	35%	Free		

See footnotes at end of table.

Table I-1

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Wood Products: Major products and markets<sup>3</sup>—Continued

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Argentina	2	20%	20%	3%
	EU-15	2	3%	3.6%	
	China	1	40%	18%	17%
	Korea	1	13%	8%	
	<b>Other markets:</b>				
	Brazil		20%	17%	
	Chile		25%	11%	
	Indonesia		40%	15%	
	Malaysia		20%	20%	
	Taiwan		N/A	2.5%	
	Russia		N/A	20%	
4418.20 Door frames	United States	(257)	4.8%	5.3%	
	Canada	50	0%	Free	
	Japan	16	0%	Free	
	Mexico	3	35%	Free	
	EU-15	2	0%	1.2%-6% (1.2%)	
	Russia	1	N/A	20%	
	Taiwan	1	N/A	2.5%	
	<b>Other markets:</b>				
	Brazil		20%	17%	
	Chile		25%	11%	
	China		40%	18%	17%
	Indonesia		40%	15%	
	Malaysia		20%	20%	
	Korea		13%	8%	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

<b>HS item/product description</b>	<b>United States and major markets</b>	<b>1998 U.S. exports or (imports) (Million dollars)</b>	<b>Final bound WTO tariff</b>	<b>Applied MFN tariff (median tariff)</b>	<b>Other duties</b>
4418.40 Shuttering for concrete construction work	United States	(1)	3.2%	3.6%	
	Australia	3	5%	5%	
	Venezuela	1	35%	15%	
	<b>Other markets:</b>				
	Brazil		20%	17%	
	Chile		25%	11%	
	China		40%	18%	17%
	Indonesia		40%	15%	
	Malaysia		20%	20%	
	Taiwan		N/A	2.5%	
	Korea		13%	8%	
	Japan		2%	2.4%	
	EU-15		0%	0.8%	
	Mexico		35%	Free	
	Canada		6.1%	Free	
Russia			N/A	20%	
4418.50 Shingles & shakes	United States	(197)	0%	Free	
	Canada	9	0%	Free	
	<b>Other markets:</b>				
	Brazil		20%	17%	
	Chile		25%	11%	
	China		40%	18%	17%
	Indonesia		40%	15%	
	Malaysia		20%	20%	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**  
**Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Taiwan		N/A	2.5%	
	Korea		13%	8%	
	Japan		2.9%	3.5%	
	EU-15		0%	1%	
	Mexico		35%	Free	
	Russia			N/A	20%
4418.90 Other joinery/carpentry	United States	(593)	0%-3.2%	Free-3.6%	
	Canada	56	2.7%-6.1%	Free	
	Japan	49	0%-5% (3.9%)	Free-5.6%	
	EU-15	37	0%	1.2%	
	Russia	9	N/A	20%	
	Korea	4	13%	8%	
	Brazil	3	35%	17%	
	<b>Other markets:</b>				
	Chile		25%	11%	
	China		40%	18%	17%
	Indonesia		40%	15%	
	Malaysia		20%	20%	
	Taiwan		N/A	2.5%	
	Mexico		35%	Free-10%	
4421.10 Clothes hangers	United States	(20)	3.2%	3.6%	
	Canada	1	6.1%	Free	
	Mexico	1	35%	10%	
	Dominican Republic	1	40%	30%	

See footnotes at end of table.

Table I-1

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Wood Products: Major products and markets<sup>3</sup>—Continued

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Honduras	1	N/A	20%	10% surtax 5% customs admin fee
	<b>Other markets:</b>				
	Brazil		20%	17%	
	Chile		25%	11%	
	China		40%	21%	17%
	Indonesia		40%	15%	
	Malaysia		20%	20%	
	Taiwan		N/A	2.5%	
	Korea		13%	8%	
	Japan		3.9%	4%	
	EU-15		0%	1%	
	Russia		N/A	20%	
4421.90 Other articles of wood (e.g. spools, toothpicks, match splints)	United States	(684)	0%-10.7% plus 0¢/gross	Free-11.9% plus 0-7.2¢/gross	
	EU-15	50	0%-4%	0.5%-4.7% (0.9%)	
	Canada	47	0%-9.7% plus 0¢-C8¢/gross	Free	
	Mexico	31	35%	7.5%-10% (7.5%)	
	Japan	15	0%-10% (3.8%)	Free-10%	
	<b>Other markets:</b>				
	Brazil		20%	17%	
	Chile		25%	11%	
	China		35%-40%	10%-21%	17%
	Indonesia		40%	10%-15%	
	Malaysia		5%-30% (20%)	0%-20%	
	Taiwan		N/A	2.5%	

See footnotes at end of table.

**Table I-1**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Wood Products: Major products and markets<sup>3</sup>—Continued**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Korea		13%	8%	
	Russia		N/A	20%	

<sup>1</sup> Applied tariff rates for Canada and Mexico are those specified in the NAFTA for 1998.

<sup>2</sup> Sources for tariffs: All bound rates from WTO, *The Results of the Uruguay Round*, 1996 (CDROM). Applied tariff data for the United States are from *The Harmonized Tariff Schedule of the United States* (HTS), 1998; for the European Union, the *Official Journal of the European Communities*, No. L 312 (Nov. 14, 1997); for Japan, Chile, Korea, Taiwan, Canada, Hong Kong, New Zealand, and Singapore, the tariff schedules posted by the APEC Secretariat, found at Internet address: <http://www.apectariff.org>; tariff schedules for goods in Ch. 44 of the Harmonized System for Brazil, China, Indonesia, Mexico, and Malaysia are from FAS Attache Reports on Forest Products, all other tariffs are from UNCTAD, TRAINS, 1999 (CDROM). All tariffs are for 1998 except for the following: Dominican Republic (1997), Honduras (1995), Israel (1993), Jamaica (1996), and Russia (1997).

<sup>3</sup> There are discrepancies between the HS numbers used in the bound schedules and applied schedules that affect chapter 44 only. The following HS numbers used in the compilation of applied tariffs and trade partner data do not have a correspondence in the bound schedule; 4408.39, 4410.11, 4410.19, 4412.13, 4412.14, 4412.93.

<sup>4</sup> For HS 4407.10.01 (softwood planks) there is a TRQ of 9,500 tons. For HS 4407.10.02 (pine planks), there is a TRQ of 119,700 tons.

<sup>5</sup> For HS 4407.91.01 (oak planks), there is a TRQ of 3,325 tons.

<sup>6</sup> For HS 4407.99.99 (other planks), there is a TRQ 2,470 tons.

<sup>7</sup> For HS 4411.11 of Israel, the applied MFN rate for the U.S. and EU is set to zero.

<sup>8</sup> Tariff was raised from 8% to 15% in 1998.

<sup>9</sup> For HS 4412.19 and 4412.99 of EU, there is a TRQ of 650,000 m<sup>3</sup> which has an IQTR of 0% and an OQTR of 7.6%.

**Table I-2**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Paper and pulp: Major products and markets<sup>3</sup>**

<b>HS item/product description</b>	<b>United States and major markets</b>	<b>1998 U.S. exports or (imports) (Million dollars)</b>	<b>Final bound WTO tariff</b>	<b>Applied MFN tariff (median tariff)</b>	<b>Other duties</b>	
4703.11 Coniferous chemical wood pulp, soda or sulfate, unbleached	United States	(67)	0%	Free		
	Korea	6	0%	2%		
	Thailand	5	N/A	3%-7%	0.5% import surcharge	
	Japan	4	0%	Free		
	Taiwan	4	N/A	Free		
	China	3	20%	1%	17%	
	Mexico	2	35%	Free		
	Venezuela	1	35%	5%		
	<b>Other markets:</b>					
	Brazil			20%	7%	
	Chile			25%	11%	
	Indonesia			40%	Free	
	Malaysia			5%	Free	
	EU-15			0%	Free	
	Canada			0%	Free	
Russia			N/A	15%		
4703.21 Coniferous chemical wood pulp, soda or sulfate, semi-bleached or bleached	United States	(1,477)	0%	Free		
	EU-15	536	0%	Free		
	Japan	157	0%	Free		
	Mexico	143	35%	Free		
	Korea	79	0%	2%		
	China	71	1.3%	1%	17%	
	<b>Other markets:</b>					
	Brazil			20%	7%	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	Chile		25%	11%		
	Indonesia		40%	Free		
	Malaysia		5%	Free		
	Taiwan		N/A	Free		
	Canada		0%	Free		
	Russia			N/A	15%	
4703.29 Non-coniferous chemical wood pulp, soda or sulfate, semi-bleached or bleached	United States	(550)	0%	Free		
	EU-15	243	0%	Free		
	Japan	123	0%	Free		
	Korea	66	0%	2%		
	Mexico	73	35%	Free		
	Canada	34	0%	Free		
	Taiwan	31	N/A	1.25%		
	<b>Other markets:</b>					
	Brazil			20%	7%	
	Chile			25%	11%	
	China			2%	1%	17%
	Indonesia			40%	Free	
	Malaysia			5%	Free	
	Russia			N/A	15%	
4801.00 Newsprint	United States	(3,766)	Free	Free		
	Japan	108	0%	Free		
	Mexico	53	15%	Free-10.5% (10.5%)		
	Brazil	27	0%-35% (0%)	0%-15%		
	EU-15 <sup>4</sup>	22	3%	3.5%		
	Canada	18	0%	Free		

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	Taiwan	14	N/A	5%		
	Colombia	12	35%	Free		
	Venezuela	10	35%	Free		
	<b>Other markets:</b>					
	Malaysia	9	N/A	5%		
	Chile	5	25%	11%		
	China	4	20%	15%	17%	
	Korea			0%	8%	
	Indonesia			40%	5%	
	Russia			N/A	15%	
4802.20 Uncoated paper and paperboard, paper and paperboard of a kind used as a base for photo-sensitive, heat-sensitive, or electro-sensitive paper and paperboard	United States	(24)	0%	Free		
	Chile	5	25%	11%		
	Canada	3	0%	Free		
	EU-15	2	6%	6.6%		
	Singapore	1	0%	0%		
	Hong Kong	1	0%	0%		
	Japan	1	0%	3.1%		
	<b>Other markets:</b>					
	Brazil			35%	15%	
	China			35%	12%	17%
	Indonesia			40%	10%	
Korea			0%	8%		
4802.30 Uncoated paper and paperboard, carbonizing base paper	United States	(0)	0%	1.2%-1.6%		
	Mexico	7	35%	Free		
	EU-15	6	0%	1.8%		
	South Africa	2	N/A	0%		

See footnotes at end of table.

	Taiwan	2	N/A	3%	
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Table I-2–Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Thailand	1	30%	20%	
	Brazil	1	35%	5%-15%	
	<b>Other markets:</b>				
	Chile		25%	11%	
	China		35%	12%	17%
	Indonesia		40%	5%	
	Japan		0%	3.1%	
4802.51 Uncoated paper and paperboard, other not containing fibers obtained by mechanical process or which not more than 10 percent by weight of total fiber content consists of such fibers, weighing less than 40g/m <sup>2</sup>	United States	(3)	0%	Free-1.4% (1.1%)	
	China	7	35%	12%	17%
	Canada	6	0%	Free	
	Singapore	3	0%	0%	
	Guatemala	3	45%	0%	
	EU-15	2	0%-4%	0.8%-5%	
	Mexico	1	35%	Free-5% (Free)	
	<b>Other markets:</b>				
	Brazil		0%-35% (35%)	0%-15%	
	Chile		25%	11%	
	Japan		0%	4%	
4802.52 Uncoated paper and paperboard, other not containing fibers obtained by mechanical process or which not more than 10 percent by weight of total fiber content consists of such fibers, weighing between 40g/m <sup>2</sup> and 150g/m <sup>2</sup>	United States	(578)	0%	Free-1.4% (1.1%)	
	Canada	160	0%	Free	
	Mexico	45	35%	Free-7% (7%)	
	Hong Kong	11	0%	0%	
	EU-15	9	4%	5%	
	<b>Other markets:</b>				
	Brazil		0%-35% (10%)	0%-15% (10%)	

See footnotes at end of table.

	China		35%	12%	17%
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**Table I-2–Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Japan		0%	3.5%	
	Taiwan		N/A	Free-5%	
4802.53 Uncoated paper and paperboard, other not containing fibers obtained by mechanical process or which not more than 10 percent by weight of total fiber content consists of such fibers weighing more than 150g/m <sup>2</sup>	United States	(25)	0%	1%-1.4% (1.4%)	
	Canada	33	0%	Free	
	Mexico	13	35%	Free-5% (Free)	
	EU-15	8	4%	5%	
	<b>Other markets:</b>				
	Brazil		10%-35% (35%)	10%-15% (15%)	
	China		35%	12%	17%
	Japan		0%	3.5%	
	Taiwan		N/A	5%	
4802.60 Uncoated paper and paperboard, other, more than 10 percent by weight of total fiber content consists of fibers obtained by a mechanical process	United States	(1,690)	0%	Free-1.4% (1%)	
	Canada	26	0%	Free	
	EU-15	18	4%	3%-5% (5%)	
	Mexico	11	35%	Free	
	Dominican Republic	9	40%	3%-5%	
	Australia	8	0%-12%	Free-5%	
	Costa Rica	8	45%	15%	
	<b>Other markets:</b>				
	Brazil		0%-35% (35%)	0%-15% (15%)	
	China		35%	12%	17%
	Japan		0%	3.1%-3.5%	
4804.11 Unbleached kraftliner	United States	(49)	0%	Free	
	EU-15	352	3.5%	4%-4.6 (4%)	
	China	135	35%	15%	17%

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Hong Kong	104	0%	0%	
	Canada	102	0%	Free	
	Ecuador	90		15%	0.5% dev. fund children
	Mexico	84	35%	7%	
	<b>Other markets:</b>				
	Brazil		35%	15%	
	Chile		25%	11%	
	Indonesia		40%	15%	
	Malaysia		N/A	20%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
	Japan		0%	1.5%-2.1%	
	Russia			N/A	15%
4804.19 Other kraftliner	United States	(121)	0%	Free	
	EU-15	21	3.5%	4%-4.6% (4%)	
	Mexico	18	35%	Free-7% (Free)	
	Hong Kong	17	0%	0%	
	Indonesia	3	40%	10%	
	China	11	35%	15%	17%
	Ecuador	15		15%	0.5% dev. fund children
	Canada	7	0%	Free	
	<b>Other markets:</b>				
	Brazil		35%	15%	
	Chile		25%	11%	
	Malaysia		N/A	20%	

See footnotes at end of table.

**Table I-2—Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	Taiwan		N/A	5%		
	Korea		0%	8%		
	Japan		0%	1.5%-2.1%		
	Russia		N/A	15%		
4804.21 Sack kraft paper, unbleached	United States	(31)	0%	Free		
	China	18	35%	15%	17%	
	Canada	9	0%	Free		
	Taiwan	6	N/A	5%		
	Hong Kong	7	0%	0%		
	Malaysia	3	25%	0%		
	Indonesia	3	40%	10%-15%		
	Mexico	1	35%	5%		
	Japan	1	0%	2.1%		
	<b>Other markets:</b>					
	Brazil			35%	15%	
	Chile			25%	11%	
	Korea			0%	8%	
	EU-15			3.5%-4%	4.6%-4.8%	
	Russia			N/A	15%	
4804.29 Other sack kraft paper	United States	(7)	0%	Free		
	Mexico	4	35%	5%		
	Canada	3	0%	Free		
	EU-15	2	3.5%-4%	4.6%-4.8%		
	<b>Other markets:</b>					
	Brazil			35%	15%	
	Chile			25%	11%	
	China			35%	15%	17%

See footnotes at end of table.

**Table I-2–Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**  
**Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	Indonesia		40%	10%		
	Malaysia		25%	5%		
	Taiwan		N/A	5%		
	Korea		0%	8%		
	Japan		0%	2.1%		
	Russia		N/A	15%		
4804.31 Other unbleached kraft paper & paperboard, weighing less than 150g/m <sup>2</sup>	United States	(94)	0%	Free-2.6% (2.4%)		
	Canada	21	0%	Free		
	EU-15	16	0%-3.5% (3.5%)	0.5%-4.6% (4%)		
	Hong Kong	13	0%	0%		
	Brazil	12	25%-35%	5%-15%		
	Taiwan	12	N/A	5%		
	Japan	8	0%	2.1%		
	China	7	35%	15%	17%	
	<b>Other markets:</b>					
	Chile			25%	11%	
	Indonesia			40%	0%-10%	
	Malaysia			25%	20%	
	Korea			0%	8%	
	Mexico			35%	Free	
Russia			N/A	5%-15% (15%)		
4804.39 Other kraft paper & paperboard weighing less than 150g/m <sup>2</sup>	United States	(101)	0%	Free-2.6% (2.4%)		
	Canada	24	0%	Free		
	Mexico	8	35%	Free		
	China	4	35%	15%	17%	
	EU-15	3	0%-3.5% (3.5%)	0.5%-4-6% (4%)		

See footnotes at end of table.

**Table I-2–Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**  
**Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Hong Kong	2	0%	0%	
	Japan	1	0%	2.1%	
	<b>Other markets:</b>				
	Brazil		25%-35%	5%-15%	
	Chile		25%	11%	
	Indonesia		40%	0%-10%	
	Malaysia		25%	0%-20%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
4804.41 Unbleached other kraft paper & paperboard, weighing between 150-225g/m <sup>2</sup>	United States	(1)	0%	Free-2.4%	
	EU-15	34	3.5%	4%-4.6% (4.6%)	
	Taiwan	12	N/A	5%	
	Canada	11	0%	Free	
	Israel	5	N/A	0%	
	Japan	4	0%	2.1%	
	China	4	35%	15%	17%
	<b>Other markets:</b>				
	Brazil		35%	15%	
	Chile		25%	11%	
	Indonesia		40%	5%-10%	
	Malaysia		N/A	20%	
	Korea		0%	8%	
	Mexico		35%	7%	
	Russia		N/A	15%	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
4804.42 Bleached uniformly throughout mass & more than 95% of weight of fiber from chemical process; other kraft paper weighing between 150-225g/m <sup>2</sup>	United States	(2)	0%	Free		
	Japan	62	0%	2.1%		
	Australia	29	12%	5%		
	China	16	35%	15%	17%	
	Hong Kong	11	0%	0%		
	Canada	5	0%	Free		
	Mexico	3	35%	Free		
	Korea	1	0%	8%		
	<b>Other markets:</b>					
	Brazil			35%	15%	
	Chile			25%	11%	
	Indonesia			40%	5%-10%	
	Malaysia			25%	0%-20%	
	Taiwan			N/A	5%	
	EU-15			3.5%	4%-4.6%	
	Russia			N/A	15%	
4804.49 Other kraft paper, weighing between 150-225g/m <sup>2</sup>	United States	(5)	0%	2.4%		
	Canada	10	0%	Free		
	Mexico	2	35%	Free-7% (Free)		
	Peru	1	30%	12%		
	<b>Other markets:</b>					
	Brazil			35%	15%	
	Chile			25%	11%	
	China			35%	15%	17%
	Indonesia			40%	5%-10%	
	Malaysia			25%	0%-20%	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Taiwan		N/A	5%	
	Korea		0%	8%	
	Japan		0%	2.1%	
	EU-15		3.5%	4%-4.6%	
	Russia		N/A	15%	
4804.51 Unbleached, other kraft paper weighing more than 225g/m <sup>2</sup>	United States	(3)	0%	Free	
	EU-15	11	3.5%	4%-4.6%	
	Canada	7	0%	Free	
	Mexico	3	35%	Free	
	Saudi Arabia	2	N/A	12%	
	Taiwan	1	N/A	5%	
	<b>Other markets:</b>				
	Brazil		35%	15%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	5%-10%	
	Malaysia		25%	20%	
	Korea		0%	8%	
	Japan		0%	1.5%-2.1%	
	Russia		N/A	15%	
4804.52 Bleached other kraft paper weighing more than 225g/m <sup>2</sup>	United States	(6)	0%	Free	
	EU-15	30	3.5%	4%-4.6%	
	Mexico	11	35%	Free	
	Japan	4	0%	1.5%-2.1%	
	Australia	4	12%	5%	
	Chile	1	25%	11%	

See footnotes at end of table.

**Table I-2—Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**  
**Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Brazil	1	35%	15%	
	<b>Other markets:</b>				
	China		35%	15%	17%
	Indonesia		40%	5%-10%	
	Malaysia		25%	20%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
	Canada		0%	Free	
	Russia		N/A	15%	
4804.59 Other kraft paper, weighing more than 225g/m <sup>2</sup>	United States	(0.7)	0%	2.4%	
	Mexico	5	35%	Free	
	<b>Other markets:</b>				
	Canada		0%	Free	
	Brazil		35%	15%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	5%-10%	
	Malaysia		25%	0%-20%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
	Japan		0%	1.5%-2.1%	
	EU-15		3.5%	4%-4.6%	
	Russia		N/A	15%	

See footnotes at end of table.

Table I-2–Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
4810.11 Paper & paperboard for writing/printing, weighing less than 150g/m <sup>2</sup> & less than 10% fiber by weight from mechanical process	United States	(524)	0%	0.5%-1.5% (1%)		
	Canada	210	0%	Free		
	EU-15	45	4%-6%	5%-6.6% (5%)		
	Guatemala	12	45%	0%-10% (5%)		
	Mexico	12	35%	Free-7% (Free)		
	Honduras	7	35%	5%-10% (5%)	5% customs admin. fee	
	<b>Other markets:</b>					
	Brazil			35%	17%	
	Chile			25%	11%	
	China			35%	15%	17%
	Indonesia			40%	0%-15% (0%)	
	Malaysia			0%-5%	0%-15% (5%)	
	Taiwan			N/A	7%	
	Korea			0%	8%	
	Japan			0%	2.5%	
Russia			N/A	15%		
4810.12 Paper & paperboard for writing/printing, weighing more than 150g/m <sup>2</sup> & less than 10% fiber by weight from mechanical process	United States	(219)	0%	1.6%		
	Canada	57	0%	Free		
	Mexico	15	35%	Free-7% (Free)		
	Guatemala	7	45%	0%-10% (5%)		
	EU-15	5	6%	6.6%		
	Peru	3	30%	12%		
	Honduras	2	35%	5%-10% (5%)	5% customs admin. fee	
	Ecuador	2	N/A	10%	0.5% dev. fund children	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	<b>Other markets:</b>				
	Brazil		35%	5%-17% (17%)	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	0%	
	Malaysia		0%	0%-15% (5%)	
	Taiwan		N/A	7%	
	Korea		0%	8%	
	Japan		0%	Free	
	Russia		N/A	15%	
4810.21 Lightweight coated paper for writing/printing & greater than 10% fiber weight from mechanical process	United States	(898)	0%	1.5%	
	Canada	30	0%	Free	
	Australia	11	12%	5%	
	Mexico	8	35%	7%	
	China	4	35%	15%	17%
	EU-15	4	6%	6.6%	
	Hong Kong	3	0%	0%	
	Taiwan	2	N/A	7%	
	<b>Other markets:</b>				
	Brazil		35%	N/A	
	Chile		25%	11%	
	Indonesia		40%	0%	
	Malaysia		5%	0%-15% (5%)	
	Korea		0%	8%	
	Japan		0%	2.5%	
Russia		N/A	15%		

See footnotes at end of table.

**Table I-2—Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Paper and pulp: Major products and markets<sup>3</sup>**

<b>HS item/product description</b>	<b>United States and major markets</b>	<b>1998 U.S. exports or (imports) (Million dollars)</b>	<b>Final bound WTO tariff</b>	<b>Applied MFN tariff (median tariff)</b>	<b>Other duties</b>	
4810.29 Other paper & paperboard, more than 10% weight of total fiber from mechanical process	United States	(146)	0%	1.5%		
	Mexico	46	35%	Free-7% (Free)		
	Canada	43	0%	Free		
	Australia	11	12%	5%		
	New Zealand	10	0%	7.5%		
	Hong Kong	3	0%	0%		
	Japan	3	0%	2.5%		
	<b>Other markets:</b>					
	Brazil			35%	17%	
	Chile			25%	11%	
	China			35%	15%	17%
	Indonesia			40%	0%	
	Malaysia			5%	0%-15% (5%)	
	Taiwan			N/A	7%	
	Korea			0%	8%	
	EU-15			6%	6.6%	
Russia			N/A	15%		
4810.31 Bleached kraft paper, not for writing/printing, weighing less than 150g/m <sup>2</sup>	United States	(28)	0%	Free		
	Mexico	6	35%	Free		
	Dominican Republic	3	40%	15%		
	Canada	3	0%	Free		
	Hong Kong	2	0%	0%		
	India	2	40%	20%		
	South Africa	2	N/A	10%		
	Guatemala	2	45%	0%		

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	<b>Other markets:</b>				
	Brazil		35%	17%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	15%	
	Malaysia		N/A	0%	
	Taiwan		N/A	7%	
	Korea		0%	8%	
	Japan		0%	Free	
	EU-15		6%	6.6%	
	Russia		N/A	15%	
4810.32 Bleached kraft paper, not for writing/printing, weighing more than 150g/m <sup>2</sup>	United States	(5)	0%	Free	
	Canada	129	0%	Free	
	EU-15	88	5%-6%	5.6%-6.6%	
	Mexico	63	35%	Free	
	Japan	79	0%	Free	
	China	74	35%	15%	17%
	Australia	35	12%	5%	
	Brazil	30	35%	17%	
	<b>Other markets:</b>				
	Chile		25%	11%	
	Indonesia		40%	15%	
	Malaysia		N/A	0%	
	Taiwan		N/A	7%	
	Korea		0%	8%	
Russia		N/A	15%		

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>

Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
4810.39 Other kraft paper, not for writing/printing	United States	(55)	0%	Free-1.1%	
	EU-15	135	0%	1.8%	
	Canada	60	0%	Free	
	Japan	17	0%	Free	
	Israel	12	N/A	0%	
	<b>Other markets:</b>				
	Brazil		35%	17%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	15%	
	Malaysia		0%	0%	
	Korea		0%	8%	
	Mexico		35%	Free	
	Russia		N/A	15%	
Taiwan		N/A	7%		
4810.91 Multi-ply other paper & paperboard	United States	(173)	0%	Free-1.1%	
	Mexico	7	35%	Free	
	Canada	5	0%	Free	
	EU-15	2	6%	6.6%	
	<b>Other markets:</b>				
	Brazil		35%	17%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	15%	
	Malaysia		25%	5%	
	Taiwan		N/A	7%	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Korea		0%	8%	
	Japan		0%	Free	
	Russia		N/A	15%	
4810.99 Other paper & paperboard	United States	(17)	0%	1.1%	
	Mexico	16	35%	Free	
	EU-15	6	4%-6% (5.8%)	4.6%-6.6% (6.2%)	
	Canada	5	0%	Free	
	<b>Other markets:</b>				
	Brazil		35%	17%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	15%	
	Malaysia		0%	0%	
	Taiwan		N/A	7%	
	Korea		0%	8%	
	Japan		0%	Free	
	Russia		N/A	15%	
4811.10 Tarred, bituminized or asphalted paper or paperboard	United States	(69)	0%	Free	
	Mexico	4	35%	Free	
	Japan	3	0%	1.5%	
	Canada	2	0%	Free	
	EU-15	1	6%	6.6%	
	<b>Other markets:</b>				
	Brazil		35%	15%	
	Chile		25%	11%	
	China		35%	12%	17%

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Indonesia		40%	10%	
	Malaysia		25%	0%	
	Taiwan		N/A	7%	
	Korea		0%	8%	
	Russia		N/A	15%	
4811.21 Self adhesive gummed or adhesive paper & paperboard	United States	(64)	0%	3.5%	
	Canada	42	0%	Free	
	Mexico	14	35%	5%	
	EU-15	11	4%	5%	
	Japan	6	0%	2.3%	
	Singapore	2	0%	0%	
	China	2	35%	20%	17%
	<b>Other markets:</b>				
	Brazil		35%	15%	
	Chile		25%	11%	
	Indonesia		40%	10%	
	Malaysia		25%	25%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
	Russia		N/A	15%	
4811.29 Other gummed or adhesive paper & paperboard	United States	(8)	0%	Free	
	Canada	16	0%	Free	
	Mexico	8	35%	Free	
	EU-15	4	6%	6.6%	
	Brazil	2	35%	15%	
	Japan	1	0%	2.3%	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	<b>Other markets:</b>				
	Chile		25%	11%	
	China		35%	20%	17%
	Indonesia		40%	10%	
	Malaysia		25%-30%	25%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
	Russia		N/A	15%	
4811.31 Bleached paper & paperboard, coated, impregnated or covered with plastics	United States	(192)	0%	Free-1.6%	
	Japan	151	0%	Free	
	Korea	48	0%	5%-8%	
	Canada	46	0%	Free	
	Brazil	37	35%	5%-15% (15%)	
	EU-15	34	5.8%	6.2%	
	Taiwan	33	N/A	2.5%-7%	
	South Africa	24	N/A	10%	
	Mexico	23	35%	Free-7% (Free)	
	<b>Other markets:</b>				
	Chile		25%	11%	
	China		35%	20%	17%
	Indonesia		40%	10%	
	Malaysia		25%	0%	
Russia		N/A	5%		
4811.39 Other paper & paperboard, coated, impregnated or covered with plastics	United States	(206)	0%	Free-1.5%	
	Canada	62	0%	Free	
	Mexico	39	35%	Free-7% (Free)	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>

Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	EU-15	26	6%	6.6%	
	Japan	5	0%	Free	
	Taiwan	5	N/A	2.5%-7%	
	<b>Other markets:</b>				
	Brazil		30%-35%	15%	
	Chile		25%	11%	
	China		35%	12%-15% (12%)	17%
	Indonesia		40%	5%-15%	
	Malaysia		25%	0%	
	Korea		0%	8%	
	Russia		N/A	5%	
4811.40 Paper & paperboard coated with wax, paraffin wax, stearin oil, or glycerol	United States	(11)	0%	2%	
	Canada	15	0%	Free	
	Mexico	7	35%	5%	
	EU-15	2	6%	6.6%	
	Hong Kong	2	0%	0%	
	Taiwan	1	N/A	5.4%	
	<b>Other markets:</b>				
	Brazil		30%	15%	
	Chile		25%	11%	
	Hong Kong		0%	0%	
	China		35%	12%-15%	17%
	Indonesia		40%	5%	
	Malaysia		N/A	0%	
	Korea		0%	8%	

See footnotes at end of table.

Table I-2–Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	Japan		0%	Free-1.5%		
	Russia		N/A	15%		
4811.90 Other paper, paperboard, cellulose wadding, webs of cellulose fibers	United States	(157)	0%	Free-2.3% (1.7%)		
	Canada	97	0%	Free		
	EU-15	66	4%-6%	5%-6.6%		
	Mexico	20	35%	Free-5% (Free)		
	Hong Kong	15	0%	0%		
	Taiwan	7	N/A	Free-7% (5%)		
	Japan	5	0%	Free		
	<b>Other markets:</b>					
	Brazil			35%	15%	
	Chile			25%	11%	
	China			35%	15%	17%
	Indonesia			40%	5%-15% (5%)	
	Malaysia			N/A	5%	
	Korea			0%	8%	
	Russia			N/A	5%-15%	
4818.10 Toilet paper	United States	(62)	0%	3.2%		
	Canada	52	0%	Free		
	Mexico	7	35%	5%		
	Dominican Republic	3	40%	15%		
	Guatemala	2	45%	17%		
	El Salvador	2	40%	20%		
	<b>Other markets:</b>					
	Brazil			35%	19%	
	Chile			25%	11%	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	China		40%	25%	17%	
	Indonesia		40%	15%		
	Malaysia		25%	30%		
	Taiwan		N/A	9%		
	Korea		0%	8%		
	Japan		0%	2.4%		
	EU-15		4%	5%		
	Russia			N/A	20%	
4818.20 Handkerchiefs, facial tissues, towels	United States	(117)	0%	3.2%		
	Canada	72	0%	Free		
	Mexico	16	35%	5%		
	EU-15	8	6%	7%		
	Japan	5	0%	2.2%		
	Australia	3	12%	5%		
	Hong Kong	3	0%	0%		
	<b>Other markets:</b>					
	Brazil			35%	19%	
	Chile			25%	11%	
	China			40%	25%	17%
	Indonesia			40%	15%	
	Malaysia			25%	30%	
	Taiwan			N/A	9%	
	Korea			0%	8%	
Russia			N/A	15%		
4818.30 Tablecloths & serviettes	United States	(21)	0%	3.2%		
	Canada	21	0%	Free		
	Mexico	3	35%	5%		

See footnotes at end of table.

**Table I-2–Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**

**Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		40%	25%	17%
	Indonesia		40%	15%	
	Malaysia		25%	20%-30%	
	Taiwan		N/A	9%	
	Korea		0%	8%	
	Japan		0%	2.2%	
	EU-15		6%	7%	
	Russia		N/A	15%	
4818.40 Sanitary towels & tampons, napkins, & napkin liners for babies	United States	(289)	0%	Free-3.2%	
	Canada	247	0%	Free	
	EU-15	45	4%-6% (4%)	5.2%-6.8% (5.2%)	
	Dominican Republic	22	40%	15%	
	Mexico	16	35%	5%	
	Australia	10	0%-12%	Free-5%	
	Japan	10	0%	Free-2.2%	
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		40%	25%	17%
	Indonesia		40%	15%	
	Malaysia		10%-30% (25%)	0%-30% (20%)	
	Taiwan		N/A	7.5%-9%	
Korea		0%	8%		

See footnotes at end of table.

**Table I-2–Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	Russia		N/A	5%		
4818.50 Articles of apparel & clothing of paper pulp, paper, cellulose wadding, or webs of cellulose fibers	United States	(4)	0%	3.4%		
	Japan	13	0%	2.2%		
	EU-15	7	6%	7%		
	Venezuela	5	35%	20%		
	Mexico	4	35%	Free		
	Canada	2	0%	Free		
	Dominican Republic	1	40%	15%		
	<b>Other markets:</b>					
	Brazil			35%	19%	
	Chile			25%	11%	
	China			40%	25%	17%
	Indonesia			40%	15%	
	Malaysia			25%	20%	
	Taiwan			N/A	9%	
	Korea			0%	8%	
Russia			N/A	15%		
4818.90 Other articles of paper pulp, paper, cellulose wadding, or webs of cellulose fibers used for household/ sanitary purposes	United States	(17)	0%	1.8%		
	Mexico	29	35%	5%		
	Canada	27	0%	Free		
	EU-15	3	6%	6.8%-7%		
	<b>Other markets:</b>					
	Japan			0%	1.9%	
	Brazil			35%	19%	
	Chile			25%	11%	
	China			40%	25%	17%

See footnotes at end of table.

**Table I-2–Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	Indonesia		40%	15%		
	Malaysia		N/A	20%		
	Taiwan		N/A	5%-9%		
	Korea		0%	8%		
	Russia		N/A	5%		
4819.10 Cartons, boxes, & cases of corrugated paper or paperboard	United States	(120)	0%	1.7%		
	Mexico	517	35%	5%		
	Canada	146	0%	Free		
	Hong Kong	35	0%	0%		
	Taiwan	16	N/A	9%		
	Dominican Republic	16	40%	15%		
	Singapore	16	0%	0%		
	Indonesia	15	40%	15%		
	EU-15	14	6%	7.2%		
	<b>Other markets:</b>					
	Brazil			35%	19%	
	Chile			25%	11%	
	China			40%	25%	17%
	Malaysia			25%	25%	
	Korea			0%	8%	
	Japan			0%	3.2%	
Russia			N/A	10%		
4819.20 Folding cartons, boxes, & cases, of non-corrugated paper or paperboard	United States	(350)	0%	1.7%		
	Canada	112	0%	Free		
	Mexico	78	35%	5%		

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
	China	14	40%	25%	17%	
	Indonesia	7	40%	15%		
	Panama	6	N/A	15%		
	Taiwan	6	N/A	9%		
	Hong Kong	5	0%	0%		
	EU-15	5	4%-6%	5.6%-7.2%		
	<b>Other markets:</b>					
	Brazil			35%	19%	
	Chile			25%	11%	
	Malaysia			25%	25%	
	Korea			0%	8%	
	Japan			0%	3.2%	
	Russia			N/A	10%	
4819.30 Sacks & bags, with a width of less than 40cm	United States	(36)	0%	3.2%		
	Canada	15	0%	Free		
	Mexico	10	35%	5%		
	EU-15	8	6%	7.2%		
	<b>Other markets:</b>					
	Brazil			35%	19%	
	Chile			25%	11%	
	China			40%	25%	17%
	Indonesia			40%	5%-15%	
	Malaysia			25%	25%	
	Taiwan			N/A	9%	
	Korea			0%	8%	
	Japan			0%	3.4%	
Russia			N/A	20%		

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
4819.40 Other sacks & bags	United States	(193)	0%	3.2%	
	Canada	40	0%	Free	
	Mexico	11	35%	5%	
	EU-15	7	4%	5.6%	
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		40%	25%	17%
	Indonesia		40%	5%-15%	
	Malaysia		25%	25%	
	Taiwan		N/A	9%	
	Korea		0%	8%	
	Japan		0%	3.4%	
Russia		N/A	10%		
4819.50 Other packing containers, including record sleeves	United States	(35)	0%	0%-3.2% plus 0¢/kg-2.6¢/kg	
	Mexico	33	35%	5%	
	Canada	26	0%	Free	
	EU-15	8	6%	7.2%	
	Brazil	3	35%	19%	
	Korea	3	0%	8%	
	Chile	3	25%	11%	
	<b>Other markets:</b>				
	China		40%	25%	17%
	Indonesia		40%	15%	
	Malaysia		25%	25%	
	Taiwan		N/A	9%	

See footnotes at end of table.

Table I-2—Continued

Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
 Paper and pulp: Major products and markets<sup>3</sup>

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Japan		0%	3.2%	
	Russia		N/A	10%	
4819.60 Box files, letter trays, storage boxes, etc. used in offices, shops	United States	(11)	0%	3.2%	
	Mexico	6	35%	5%	
	Canada	5	0%	Free	
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		40%	25%	17%
	Indonesia		40%	15%	
	Malaysia		25%	25%	
	Taiwan		N/A	9%	
	Korea		0%	8%	
	Japan		0%	2.3%	
	EU-15		6%	7%	
	Russia		N/A	10%	
4823.11 Other self-adhesive gummed or adhesive paper in strips or rolls	United States	(54)	0%	3.5%	
	Canada	46	0%	Free	
	EU-15	23	0%-4%	0.9%-5% (0.9%)	
	Mexico	15	35%	Free	
	Japan	7	0%	1.6%	
	Hong Kong	7	0%	0%	
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		35%	25%	17%

See footnotes at end of table.

**Table I-2—Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Indonesia		40%	15%	
	Malaysia		25%	25%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
	Russia		N/A	15%	
4823.19 Other gummed or adhesive paper	United States	(8)	0%	1.8%	
	EU-15	6	0%	1.8%	
	Mexico	4	35%	Free	
	Canada	3	0%	Free	
	Japan	1	0%	1.6%	
	Hong Kong	1	0%	0%	
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		35%	25%	17%
	Indonesia		40%	15%	
	Malaysia		25%	25%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
Russia		N/A	15%		
4823.20 Filter paper & paperboard	United States	(17)	0%	2.2%-3.2%	
	Canada	11	0%	Free	
	EU-15	3	6%	6.6%	
	Mexico	3	35%	Free-5%	
	Japan	3	0%	1.9%	
	Hong Kong	1	0%	0%	

See footnotes at end of table.

**Table I-2—Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**

**Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	0%-15%	
	Malaysia		25%	10%-30%	
	Taiwan		N/A	5%	
	Korea		0%	8%	
	Russia		N/A	5%	
4823.40 Rolls, sheets, & dials printed for self-recording apparatus	United States	(3)	0%	3.2%	
	Canada	12	0%	Free	
	EU-15	3	4%	5.4%	
	Singapore	1	0%	0%	
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		35%	15%	17%
	Indonesia		40%	0%-15%	
	Malaysia		25%	25%	
	Taiwan		N/A	7%	
	Korea		0%	8%	
	Japan		0%	2.2%	
	Mexico		35%	Free	
Russia		N/A	5%		

See footnotes at end of table.

**Table I-2—Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>  
Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties	
4823.51 Printed, embossed or perforated other paper & paperboard used for writing etc.	United States	(52)	0%	1.8%		
	Canada	21	0%	Free		
	Brazil	10	35%	19%		
	Mexico	7	35%	5%		
	Taiwan	4	N/A	9%		
	China	4	40%	20%	17%	
	Hong Kong	3	0%	0%		
	<b>Other markets:</b>					
	Chile			25%	11%	
	Indonesia			40%	15%	
	Malaysia			0%-25%	5%-30%	
	Korea			0%	8%	
	Japan			0%	1.6%	
	EU-15			6%	6.6%	
	Russia			N/A	15%	
4823.59 Other paper & paperboard used for writing, etc.	United States	(303)	0%	0.5%-1.8%		
	Canada	141	0%	Free		
	Mexico	18	35%	7%		
	EU-15	16	0%	1.8%		
	Hong Kong	5	0%	0%		
	<b>Other markets:</b>					
	Brazil			35%	19%	
	Chile			25%	11%	
	China			40%	20%	17%
	Indonesia			40%	15%	
	Malaysia			0%-25%	5%-30%	

See footnotes at end of table.

	Taiwan		N/A	7.4%	
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**Table I-2–Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**

**Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Korea		0%	8%	
	Japan		0%	1.6%	
	Russia		N/A	15%	
4823.60 Trays, dishes, plates, cups made of paper & paperboard	United States	(15)	0%	2.6%	
	Canada	26	0%	Free	
	EU-15	18	6%	7%	
	Mexico	8	35%	5%	
	Hong Kong	3	0%	0%	
	Japan	2	0%	2.2%	
	Australia	2	12%	5%	
	Saudi Arabia	2	N/A	12%	
	<b>Other markets:</b>				
	Brazil		35%	19%	
	Chile		25%	11%	
	China		40%	25%	17%
	Indonesia		40%	15%	
	Malaysia		25%	25%	
	Taiwan		N/A	9%	
	Korea		0%	8%	
	Russia		N/A	15%	
4823.70 Molded/pressed articles of paper pulp	United States	(21)	0%	Free	
	Mexico	10	35%	Free-5% (5%)	
	Canada	10	0%	Free	
	EU-15	3	7.5%	8.2%	
	<b>Other markets:</b>				
	Brazil		35%	19%	

See footnotes at end of table.

**Table I-2—Continued**

**Forest products: Tariffs on major products by major markets<sup>1,2</sup>**

**Paper and pulp: Major products and markets<sup>3</sup>**

HS item/product description	United States and major markets	1998 U.S. exports or (imports) (Million dollars)	Final bound WTO tariff	Applied MFN tariff (median tariff)	Other duties
	Chile		25%	11%	
	China		40%	25%	17%
	Indonesia		40%	5%-15%	
	Malaysia		25%	25%	
	Korea		0%	8%	
	Japan		0%	2.2%	
	Russia		N/A	15%	
	Taiwan		N/A	9%	
4823.90 Other paper & paperboard, articles of paper pulp, paper, etc.	United States	(213)	0%	Free-10.2% (3.2%)	
	Mexico	100	35%	Free-5% (5%)	
	Canada	91	0%	Free	
	EU-15	13	0%-7.5% (4%)	Free-8.2% (5%)	
	<b>Other markets:</b>				
	Brazil		20%-35%	5%-19% (5%)	
	Chile		25%	11%	
	China		35%-40% (40%)	12%-25% (25%)	17%
	Indonesia		40%	0%-15% (10%)	
	Malaysia		10%-25% (25%)	0%-25% (20%)	
	Taiwan		N/A	2.5%-9% (4.5%)	
	Korea		0%	8%	
	Japan		0%	Free-1.9%	
Russia		N/A	5%-15%		

<sup>1</sup> Applied tariff rates for Canada and Mexico are those specified in the NAFTA for 1998.

<sup>2</sup> Sources for tariffs: All bound rates from WTO, *The Results of the Uruguay Round*, 1996 (CDROM). Applied tariff data for the United States are from *The Harmonized Tariff Schedule of the United States* (HTS), 1998; for the European Union, the *Official Journal of the European Communities*, No. L 312 (Nov. 14, 1997); for Japan, Indonesia, Chile, Korea, Taiwan, Hong Kong, New Zealand, and Singapore, the tariff schedules posted by the APEC Secretariat, found at Internet address: <http://www.apectariff.org>; tariff schedule for goods from Mexico are from *North American Free Trade Agreement, Annex 302.2, Schedule for Mexico*; all other tariffs are from UNCTAD, TRAINS, 1999 (CDROM). All tariffs are for 1998 except for the following: Costa Rica (1995), Dominican Republic (1997), El Salvador (1997), Honduras (1995), India (1997), Israel (1993), Jamaica (1996), Malaysia (1997), Russia (1997), South Africa (1997) and Thailand (1995).

<sup>3</sup> For the EU, note that for commodities in chapter 48, applied rates are scheduled to go to zero by 2005.

<sup>4</sup> For HS 4801.00 of the EU, there is a TRQ of 650,000 m<sup>3</sup> which an IQTR of 0% and an OQTR of 3.5%.

**APPENDIX J**  
**U.S. AND FOREIGN NON-TARIFF BARRIERS**

**Table J-1  
Non-tariff barriers in forest products**

<b>Non-tariff barriers in North America</b>	<b>USA</b>	<b>Canada</b>
<b>Wood Products:</b>		
Unscientific phytosanitary barriers . . . . .	None	None
Regulatory Barriers . . . . .	(B)	None
(A) = Inconsistent standards/tests		
(B) = Labeling or certification requirements		
Government Intervention . . . . .	None	(D)
(C) = Direct industry support		
(D) = Major government ownership of resources		
(E) = Government monopoly/cartel in marketing		
Export Restrictions . . . . .	(G) <sup>1</sup>	(G) <sup>2</sup>
(F) = Export taxes		
(G) = Export bans		
Other barriers . . . . .	None	None
<b>Pulp and Paper Products:</b>		
Regulatory Barriers . . . . .	None	None
(A) = Inconsistent standards/tests		
(B) = Labeling restrictions		
Government Intervention . . . . .	None	None
(C) = Direct industry support		
(D) = State-owned enterprises		
(E) = Government monopoly/cartel in marketing		
Other barriers . . . . .	None	None

<sup>1</sup> The United States prohibits the export of logs harvested from the National Forests west of the 100th meridian.

<sup>2</sup> Several important Canadian provinces prohibit log exports. Softwood lumber exports to the U.S. are subject to an export quota program.

Sources: General information on non-tariff barriers in the wood products sector comes from the American Forest & Paper Association, *Submission to the Office of the United States Trade Representative on Trade Barriers to Solid Wood Products for the National Trade Estimate Report on Foreign Trade Barriers.*, Dec. 4, 1998; Bourke, I. J. and Jeanette Leitch, *Trade Restrictions and Their Impact on International Trade in Forest Products*, FAO: Rome, 1998; and International Tropical Timber Organization, *Annual Review and Assessment of the World Tropical Timber Situation, 1997*. General information of non-tariff barriers in the pulp and paper industry comes from the American Forest & Paper Association, *1999 National Trade Estimate Report on Foreign Trade Barriers (NTE): Barriers to U.S. Paper Exports*, 1998.

**Table J-2  
Non-tariff barriers in forest products**

<b>Non-tariff barriers in Europe</b>	<b>EU-15</b>	<b>Russia</b>
<b>Wood Products:</b>		
Unscientific phytosanitary barriers . . . . .	Yes <sup>1</sup>	None
Regulatory Barriers . . . . . (A) = Inconsistent standards/tests (B) = Labeling or certification requirements	(B)	None
Government Intervention . . . . . (C) = Direct industry support (D) = Major government ownership of resources (E) = Government monopoly/cartel in marketing	None	(C) (D) (E)
Export Restrictions . . . . . (F) = Export taxes (G) = Export bans	None	None
Other barriers . . . . .	None	Inconsistent duty and tax administration
<b>Pulp and Paper Products:</b>		
Regulatory Barriers . . . . . (A) = Inconsistent standards/tests (B) = Labeling restrictions	None	None
Government Intervention . . . . . (C)= Direct industry support (D) = State-owned enterprises (E) = Government monopoly/cartel in marketing	None	(C) (D) (E)
Other barriers . . . . .	None	Inconsistent duty and tax administration

<sup>1</sup> Coniferous wood originating from North America, Japan, and China requires a phytosanitary certificate for entry into Finland and Sweden.

Sources: FAS attaché reports for Finland, Sweden, Germany, Italy, France, and Russia.

**Table J-3**  
**Non-tariff barriers in forest products**

Non-tariff barriers in Asia	Japan	Korea	China	Taiwan	Indonesia	Malaysia
<b>Wood Products:</b>						
Unscientific phytosanitary barriers . . .	None	None	None	None	None	None
Regulatory Barriers . . . . .	(A) <sup>1</sup> (B)	(A)	(A)	(A)	None	None
(A) = Inconsistent standards/tests						
(B) = Labeling or certification requirements						
Government Intervention . . . . .	(C)	None	(C) (D) (E)	None	(C) (D)	(C) (D)
(C) = Direct industry support						
(D) = Major government ownership of resources						
(E) = Government monopoly or cartel in marketing						
Export Restrictions . . . . .	None	None	None	None	(F) <sup>2</sup> (G) <sup>3</sup>	(F) (G) <sup>4</sup>
(F) = Export taxes						
(G) = Export bans						
Other barriers . . . . .	Numerous (see text)	None	Numerous (see text)	None	None	None
<b>Pulp and Paper Products:</b>						
Regulatory Barriers . . . . .	None	None	None	None	None	None
(A) = Inconsistent standards/tests						
(B) = Labeling restrictions						
Government Intervention . . . . .	None	None	(C) (D) (E)	None	None	None
(C) = Direct industry support						
(D) = State-owned enterprises						
(E) = Government monopoly/cartel in marketing						
Other barriers . . . . .	Numerous (see text)	Problems with customs procedure administration	Numerous (see text)	None	Restrictions on foreign ownership; problems with Customs administration	None

<sup>1</sup> Previous to 1998, standards for wood were generally based on aesthetic and prescriptive considerations rather than performance-based standards. These are currently being reformed in Japan to allow the use of wood products that have been proven to meet a set of detailed standards.

<sup>2</sup> Export taxes are on wood in rough, poles, rail sleepers, lumber, and plywood.

<sup>3</sup> While Indonesia no longer has an export ban on logs, it has initiated a system called Check Price, whereby export taxes are assessed against the Check Prices, rather than international prices. Given that the Check Prices are substantially greater than the international price, this has led to a *de facto* ban on log exports.

<sup>4</sup> A ban exists on log exports from Peninsular Malaysia, while Sabah imposes an export levy on logs.

Sources: U.S. Department of Commerce, International Trade Administration. *The Japanese Solid Wood Products Market: Profile and Outlook*, 1989; USDA-Foreign Agricultural Service. *Japan Forest Products Annual*, FAS Attache Report No. JA8064, Aug. 3, 1998; U.S. Department of Commerce, International Trade Administration, *Japan – Building Products/Single Family Homes*, Market Research Report, September 1997; USDA-Foreign Agricultural Service. *Japan, Forest Products, GOJ Lifts its Ban on Construction in QFP Districts*, FAS Attache Report No. JA7036, Sept. 9, 1997; U.S. Department of Commerce, International Trade Administration, *Japan -- Multi-Family Wooden Houses*, Market Research Report, September 1998; U.S. Department of Commerce, International Trade Administration. *Japan -- Paper*, Market Research Report, August 1996; Stafford, Brian, “Japanese paper industry in crisis”, *Papermaker*, Dec. 1998; *The South Korean Solid Wood Products Market: Profile and Outlook*, U.S. Department of Commerce, International Trade Administration, July 1993; USDA-Foreign Agricultural Service. *Korea Forest Products Annual*, FAS Attache Report No. KS8062, July 16, 1998; USDA-Foreign Agricultural Service. *Korea Forest Products Annual*, FAS Attache Report No. KS7043, July 15, 1997; U.S. Department of Commerce, International Trade Administration. *Korea – Wood Frame Housing*, Market Research Report, Oct. 1997; USDA-Foreign Agricultural Service. *China, People’s Republic of, Forest Products Annual*, FAS Attache Report No. CH8038, Aug. 28, 1998; U.S. Department of Commerce, International Trade Administration. *China -- Building Materials*, Market Research Report, Dec. 1997; McKellar, Keith. *Taiwan Market Study for Softwood Lumber*, Forest Industries & Building Products Branch, Industry Canada, Mar. 6, 1998; USDA-Foreign Agricultural Service. *Taiwan Forest Products Annual*, FAS Attache Report No. TW8314, July 30, 1998; USDA-Foreign Agricultural Service. *Taiwan Forest Products Annual*, FAS Attache Report No. TW7031, Aug. 15, 1997; USDA-Foreign Agricultural Service. *Indonesia Forest Products Annual*, FAS Attache Report No. ID8075, Nov. 27, 1998; U.S. Department of Commerce, International Trade Administration. *Indonesia -- Pulp and Paper*, Market Research Report, Nov. 1998; USDA-Foreign Agricultural Service. *Malaysia Forest Products Annual*, FAS Attache Report No. MY8040, July 14, 1998.

**Table J-4  
Non-tariff barriers in forest products**

Non-tariff barriers in Latin America	Mexico	Brazil	Chile
<b>Wood Products:</b>			
Unscientific phytosanitary barriers . . . . .	Numerous <sup>1</sup>	None	None
Regulatory Barriers . . . . .	None	None	None
(A) = Inconsistent standards/tests			
(B) = Labeling or certification requirements			
Government Intervention . . . . .	(C)	None	(C)
(C)= Direct industry support			
(D) = Major government ownership of resources			
(E) = Government monopoly/cartel in marketing			
Export Restrictions . . . . .	None	(G)	None
(F) = Export taxes			
(G) = Export bans			
Other barriers . . . . .	None	High import taxes	None
<b>Pulp and Paper Products:</b>			
Regulatory Barriers . . . . .	None	None	None
(A) = Inconsistent standards/tests			
(B) = Labeling restrictions			
Government Intervention . . . . .	None	None	None
(C)= Direct industry support			
(D) = State-owned enterprises			
(E) = Government monopoly/cartel in marketing			
Other barriers . . . . .	None	High import taxes	None

<sup>1</sup> Phytosanitary certificates are necessary for a number of items, including wooden pallets, Christmas trees, new sawn lumber, plywood, and veneer, and, in border areas only, used sawn lumber, plywood, and veneer. According to AF&PA, Mexican officials are not recognizing APHIS phytosanitary certificates and are requiring additional inspection and treatment in Mexico.

Sources: USDA-Foreign Agricultural Service. *Mexico Forest Products Annual Report 1998 (Part 1, Production and Trade Sections)*, FAS Attache Report No. MX8124, Oct. 16, 1998; USDA-Foreign Agricultural Service. *Mexico Forest Products, Translation of Mexican Draft Rule for Used Lumber*, FAS Attache Report No. MX8066, June 29, 1998; USDA-Foreign Agricultural Service. *Mexico Forest Products, Translation of Mexican Draft Rule for New Lumber*, FAS Attache Report No. MX8065, July 1, 1998; USDA-Foreign Agricultural Service. *Brazil: Forest Products Annual*, FAS Attache Report No. BR8620, Dec. 15, 1998; U.S. Department of Commerce, International Trade Administration, *Brazil – Building Products*, Market Research Report Dec. 1997; USDA-Foreign Agricultural Service. *Chile: Forest Products Annual*, FAS Attache Report No. CI8031, Oct. 28, 1998; U.S. Department of Commerce, International Trade Administration, *Chile – Building Products*, Market Research Report, Sept. 1997.

**APPENDIX K**  
**EXCHANGE RATE POLICY**

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A series of editorials and essays by Ernest Preeg suggest that nations such as Japan, China, and Korea (among others) have a “mercantilistic” policy of managing their currencies relative to the U.S. dollar (hereafter, mercantilistic exchange rate policy).<sup>1</sup> During (and since) 1990-96, Japan, Korea, and China<sup>2</sup> (among others) have allegedly purchased (and continue to purchase) U.S. dollars in order to weaken (or maintain the weakness of) their currencies relative to the dollar. By doing this, countries can increase or maintain desirable levels of their exchange rates relative to the U.S. dollar, which in turn can promote export sales through cheaper foreign export prices (when denominated in U.S. dollars, the currency of choice for significant portions of international trade).<sup>3</sup> The editorials and essays allege that such countries have been running increasing trade surpluses with the United States, which of themselves should appreciate the foreign currencies relative to the dollar, and then negating the currency-strengthening effects of such trade surpluses by having their central banks purchase U.S. dollars as foreign reserves.

## **Evidence of Mercantilistic Exchange Rate Policies**

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As evidence that these 3 countries (among others) are following a mercantilistic exchange rate policy, Preeg notes that during the 1990s: (1) the U.S. current account deficits have been increasing; (2) trade surpluses of such countries with the United States have been persistent and increasing; (3) foreign central bank holdings of U.S. dollar reserves have been rising substantially; and (4) the currencies of these nations have remained generally weak relative to the U.S. dollar.<sup>4</sup> Preeg focuses on higher central bank holdings of U.S. dollars and a weakening currency relative to the dollar (increasing or higher exchange rate) as evidence that a nation pursues a mercantilistic exchange rate policy.<sup>5</sup> There are three problems with using this evidence to support the idea that these countries pursue a mercantilistic exchange rate policy with the U.S. dollar.

First, some of the cited evidence is unavailable and was constructed by assumption. While a central bank’s foreign exchange reserves are available by country, dollar

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<sup>1</sup> E. Preeg, “The U.S. Trillion Dollar Debt to Foreign Central Banks,” unpublished essay draft, Sept. 1998; E. Preeg, “The Truly New Financial Architecture,” *Journal of Commerce*, Opinion section, Apr. 22, 1999; E. Preeg, “Call a Halt to Chinese Mercantilism,” *Journal of Commerce*, Opinion section, Apr. 1, 1999; E. Preeg, “The Dollar and the Trade Deficit,” *Journal of Commerce*, Opinion section, Feb. 22, 1999; and E. Preeg, “Japan’s Temptation to Buy Dollars,” *Journal of Commerce*, Opinion section, July 2, 1997.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

<sup>5</sup> See E. Preeg, “The U.S. Trillion Dollar Debt to Foreign Central Banks,” unpublished essay draft, Sept. 1998, pp. 2-3.

holdings of a particular nation's central bank are not.<sup>6</sup> Consequently, assumptions were made that U.S. dollars comprised constant proportions of total central bank currency reserves over time: 95 percent for the Bank of Japan and 75 percent for the Central Bank of China, as examples.<sup>7</sup> Such time-invariant assumptions are not valid. It is well known that central banks such as Japan's or China's have multi-currency and multi-asset reserve portfolios with managers who regularly juggle asset shares in and out of U.S. dollars, other hard currencies, and other reserve assets, depending on ever-changing levels of national indebtedness, currency requirements of foreign trade being implemented, and degrees of liquidity.<sup>8</sup> Consequently, assuming a nation's central bank holdings to be constant proportions of total reserves is excessively rigid.

Second, changes in the assumption-driven dollar holdings of central banks (such as Japan's or China's) are too narrow and inadequate a measure of changes in a nation's "demand for U.S. dollar and financial assets," which is the variable needed for any "correlation analysis" of a nation's demand for U.S. dollar assets and its exchange rate relative to the dollar. A broader, more complete, and more readily available measure of a nation's demand for dollar assets is the change in a nation's demand for U.S. dollars and dollar assets, by all individuals, not just the central bank. This recommended variable, hereafter called changes in a country's "total U.S. dollar and financial assets,"<sup>9</sup> includes:

- (1) changes in total short term U.S. liabilities payable in dollars and held by a country, and
- (2) net changes (purchases less sales) by the country of the following four U.S. long term financial assets: U.S. Treasury

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<sup>6</sup> See E. Preeg, "The U.S. Trillion Dollar Debt to Foreign Central Banks," unpublished essay draft, Sept. 1998, pp. 2-4 and table 3. Staff of the Federal Reserve Board of Governors confirmed that data on each nation's holdings specifically of U.S. dollar reserves are not published or otherwise available to the public, although data on a nation's total reserves (of all currencies and other reserves) are published and available. Such confirmation was obtained in telephone communications by USITC staff on June 22, July 9, and July 14, 1999.

<sup>7</sup> See E. Preeg, "The U.S. Trillion Dollar Debt to Foreign Central Banks," unpublished essay draft, Sept. 1998, pp. 2-4 and table 3.

<sup>8</sup> See E. Dal Bosco, "Central Banks' Management of Foreign Exchange Reserves," *Open Economies Review*, vol. 9, 1998, p. 665; and R. Babula, "Data Reject Notion of Mercantilistic Japan Rate Policy," *Journal of Commerce*, Aug. 17, 1999, p. 6.

<sup>9</sup> This variable for a country's holdings of U.S. dollar and financial assets was developed by USITC staff based on a series of recommendations obtained in telephone communications with the staff of the Federal Reserve Board of Governors on June 22, July 9, and July 14, 1999 and with the staff of the U.S. Treasury on June 22, 1999. Also, see R. Babula, "Data Reject Notion of Mercantilist Japan Rate Policy," *Journal of Commerce*, Aug. 17, 1999, p. 6.

bonds and notes, U.S. Government agency bonds, U.S. corporate bonds, and U.S. corporate stocks.<sup>10</sup>

The variable includes changes in the cited asset demands by all individuals and entities (private, corporate, and government) in a country, and not just demand from the central bank.

Finally, by using the more complete national demand for U.S. dollars and financial assets, there is no evidence to support the existence of a mercantilistic exchange rate policy with the dollar when Japan, Preeg's primary focus, is considered. Figure K-1 provides deflated changes in Japan's U.S. dollar and financial assets, the variable recommended by staff of the Federal Reserve and U.S. Treasury, and the real yen/dollar exchange rate.<sup>11</sup> Throughout most of the February 1994-December 1998 period,<sup>12</sup> there is no general or pervasive positive correlation between the Japanese purchases (sales) of dollars and financial assets, a rising (falling) Japanese real exchange rate, and hence a weakening (strengthening) real yen value relative to the dollar (figure K-1). Nor do Japan's purchases of U.S. dollars and financial assets follow a steady trend. In fact, Japan has sold assets as regularly as it has purchased them since 1994. That is, the yen seems to weaken against the dollar throughout most of the period regardless of whether Japan purchases or sells U.S. dollars and financial assets. The hypothesis that Japan has been buying U.S. dollar and financial assets to weaken the yen against the dollar is not supported by 1994-98 data.

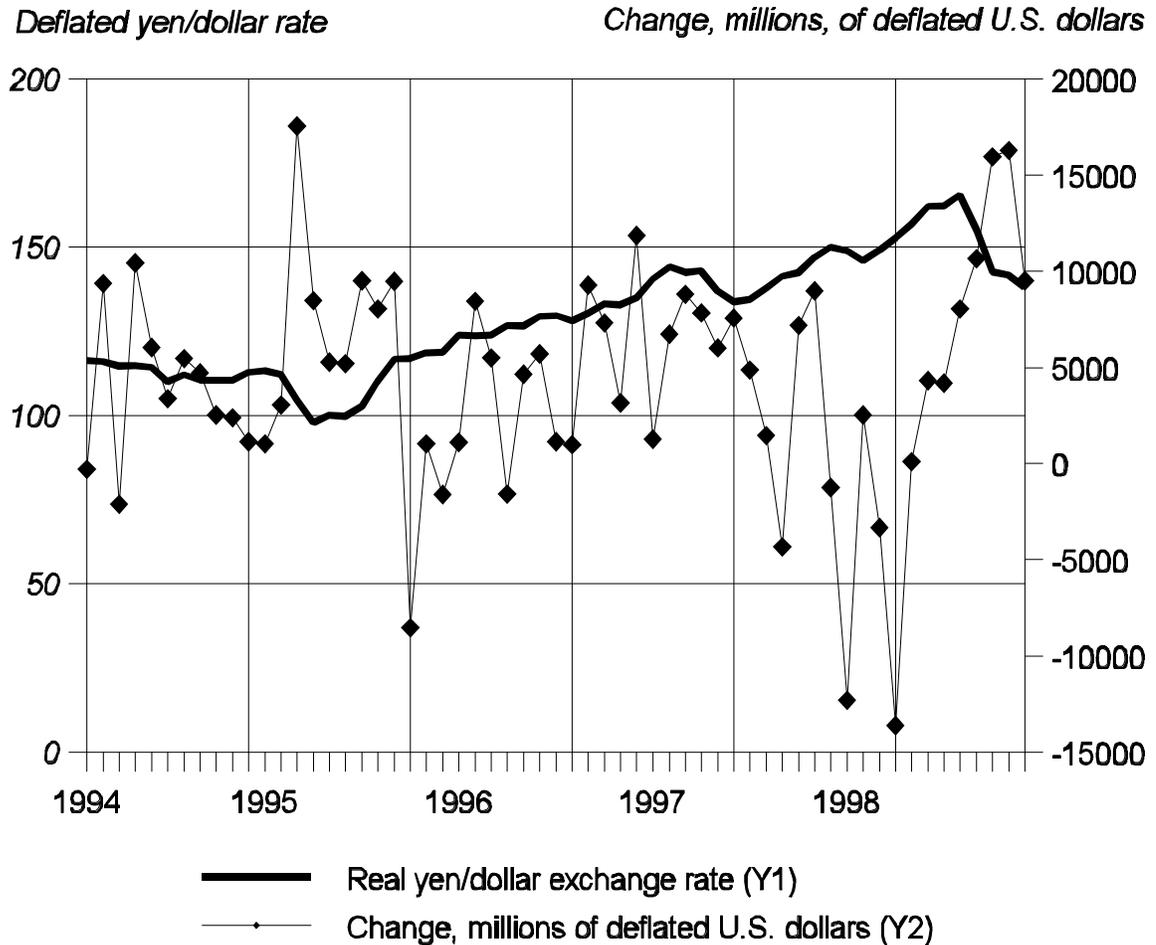
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<sup>10</sup> Such dollar holdings reflect only cross-border transactions between the United States and the relevant foreign country. They exclude sales/purchases of such U.S. assets between two foreign countries; such transactions involving U.S. assets by two foreign parties are not monitored and are not published or otherwise available. This information was obtained by USITC staff in a series of telephone communications with staff of the Federal Reserve Board of Governors on June 22, July 9, and July 19, 1999 and staff of the U.S. Treasury on June 22, 1999.

<sup>11</sup> USITC staff compiled the same figure for Japan in terms of nominal holdings of U.S. dollar and financial assets and nominal exchange rates. The nominal plots took on similar qualitative patterns and trends.

<sup>12</sup> In figure K-1, USITC staff considered data levels of deflated exchange rates and levels of Japan's U.S. dollar/financial holdings for the entire monthly analysis period of Jan. 1994-Dec. 1998. The Jan. 1994 observation was "lost" when the levels of Japan's holdings on total short term U.S. liabilities payable in dollars were first differenced into monthly changes in order to be added to the changes in holdings of the four long term U.S. financial assets. The U.S. Treasury publishes, in readily accessible form, the levels or "positions" of holdings of short term U.S. dollar-payable liabilities held by particular countries, but does not publish in readily available form information on the country's holdings or positions for the four long term U.S. financial assets, for which only a nation's changes (monthly purchases and sales) are published. Consequently, under recommendations from staff of the Federal Reserve Board of Governors and the U.S. Treasury, USITC staff first differenced (that is, calculated monthly changes for) the Japanese holdings of the short term U.S. liabilities and added these changes to net changes (purchases less sales) in each of the four U.S. long term financial assets in order to obtain monthly changes in their sum, "U.S. dollar and financial assets." USITC staff telephone communications with staff of the Federal Reserve Board of Governors on June 22, July 9, and July 14, 1999 and with staff of the U.S. Treasury on June 22, 1999.

**Figure K-1**  
**Japan: Monthly changes in U.S. dollar and financial asset holdings and the exchange rate in deflated terms**



Notes.—The real or deflated exchange rate of yen per U.S. dollar was calculated by USITC staff using the nominal exchange rate of yen per U.S. dollar; the U.S. producer price index; and the Japanese wholesale price index. The deflated changes in Japan's holdings of U.S. dollars and financial assets are the sum of monthly changes in (1) total short term U.S. liabilities payable in dollars and held by Japan, as well as (2) net changes (Japanese purchases less sales) of the following long term U.S. financial assets: U.S. Treasury bonds and notes; U.S. Government agency bonds; U.S. corporate bonds; and U.S. corporate stocks. Such dollar holdings reflect only U.S./Japan cross-border transactions included in the U.S. balance of payments and exclude sales/purchases of such U.S. assets between two foreign parties. Nominal dollar values were deflated by the U.S. producer price index.

Sources: The nominal exchange rate of yen per U.S. dollar, U.S. producer price index, and Japanese wholesale price index were obtained from the IMF, *International Financial Statistics*, monthly issues of Oct. 1994 through May, 1999, Japan and U.S. country pages. USITC staff calculated Japan's monthly changes in U.S. dollar and financial asset holdings from U.S. Treasury information sourced as follows: monthly levels of short term U.S. liabilities payable in dollars and held by Japan from Internet address [http://www.treas.gov/tic/bl\\_42609.txt](http://www.treas.gov/tic/bl_42609.txt); and monthly volumes of sales and purchases of long term financial assets from Internet address [http://www.treas.gov/tic/s1\\_42609.txt](http://www.treas.gov/tic/s1_42609.txt).

In fact, there are isolated subperiods where just the opposite seems to occur. During the first 9 months of 1995, Japan noticeably escalated its purchases of U.S. dollar and financial assets, which under a mercantilistic Japanese exchange rate policy would have weakened the yen relative to the dollar and increased the real exchange rate. Instead, the opposite occurred and the real exchange rate fell and remained low for much of this subperiod.<sup>13</sup> During the more recent subperiod of December 1997-May 1998, Japan sold significant dollar assets, which should have strengthened the yen relative to the dollar and decreased the real yen/dollar exchange rate. And again, just the opposite occurred, and the real exchange rate rose.

The implication is that there is more influencing the real yen/dollar exchange rate than Japanese purchases or sales of U.S. dollar and financial assets. Perhaps sales of such U.S. assets by other countries during Japan's 1995 subperiod of purchases, or other nations' purchases of U.S. assets during Japan's 1998 subperiod of sales, more than offset the effects of Japanese actions on overall U.S. dollar asset demand and supply, such that the real yen/dollar exchange rate did not move according to a mercantilistic exchange rate policy's implications. The yen/dollar exchange rate has been rising since 1995, regardless of whether Japan has purchased or sold U.S. dollars and financial assets. This could be due to more important factors such as Japan's expansionary monetary and fiscal policies to terminate a deep recession, and/or cautious U.S. monetary and fiscal policies aimed at avoiding inflation and balancing Federal budgets.

So contrary to some of Preeg's arguments, figure K-1 suggests that Japanese purchases of U.S. dollars and financial assets (1) have not been continuously rising with Japan's total foreign exchange reserves, and (2) have not themselves weakened the yen. More empirical and theoretical research should be conducted on the relationships between the demand for U.S. dollar and financial assets and on movements of the real exchange rate of such countries as Japan, Korea, and China before the mercantilistic theory of exchange rate management can be accepted or rejected as a mode of operation.

## **Mercantilistic Exchange Rate Policies and World Forest Product Markets**

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The U.S. forest and paper products industry has suggested that foreign countries that compete with the U.S. industry in world markets may be manipulating their exchange rates relative to the dollar.<sup>14</sup> The evidence for Sweden, a major world forest product producer/exporter and a rival with the United States in world markets, does not support the hypothesis that Sweden is manipulating its currency value relative to the dollar through buying and selling U.S. assets. Figure K-2 provides the real Swedish exchange rate (real krona/dollar rate) and Sweden's changes in deflated holdings of U.S. dollar

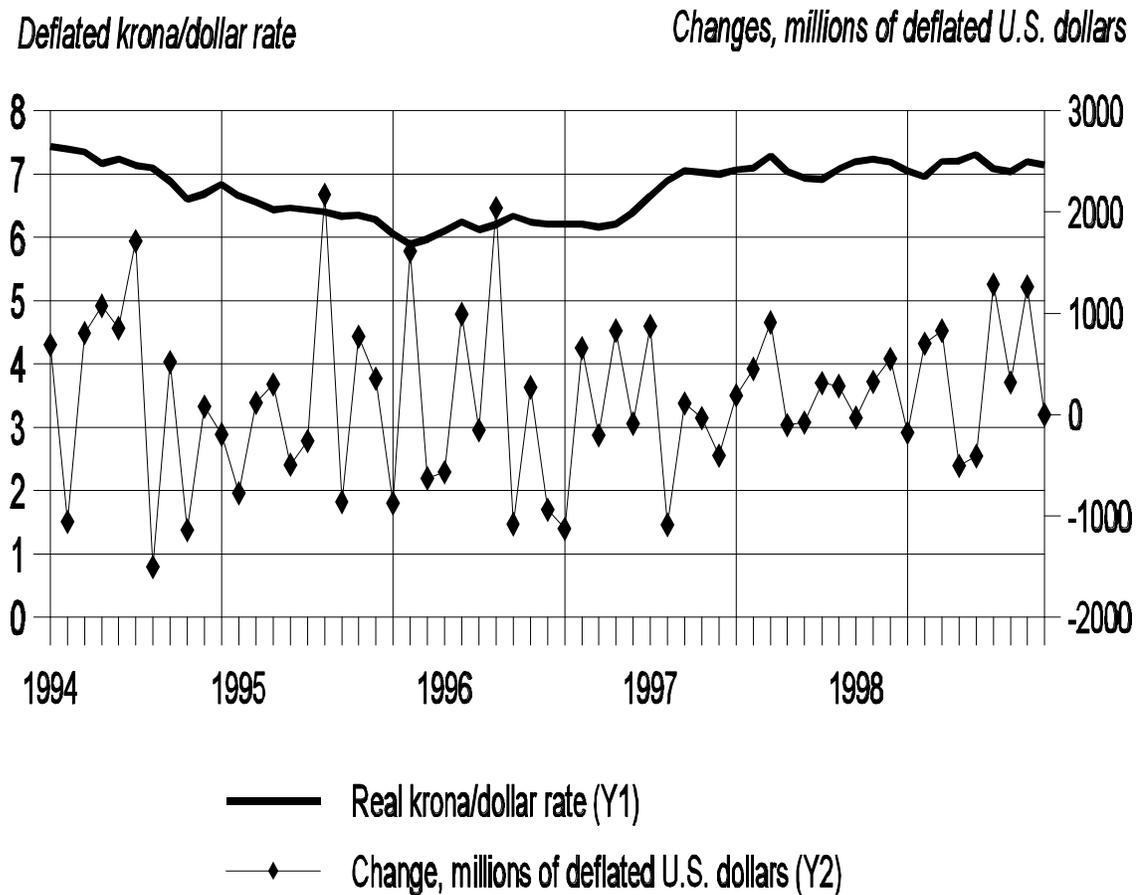
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<sup>13</sup> Note that McKinnon and Ohno report increasing levels of Japanese foreign exchange holdings during this time as well. See R. McKinnon and K. Ohno, *Dollar and Yen, Resolving Economic Conflict between the United States and Japan* (Cambridge, MA: MIT Press, 1997), p. 224 (figure 11-1).

<sup>14</sup> W. Henson Moore, president and chief executive officer, American Forest and Paper Association, transcript of the hearing, May 26, 1999, pp. 65-66.

**Figure K-2**

**Sweden: Monthly changes in U.S. dollar and financial asset holdings and the exchange rate in deflated terms**



Notes.—The real or deflated exchange rate of krona per dollar was calculated by USITC staff using the nominal exchange rate of krona per U.S. dollar; the U.S. producer price index, and the Swedish index of domestic supply prices. The deflated changes in Sweden's holdings of U.S. dollars and financial assets are the sum of monthly changes in (1) total short term U.S. liabilities payable in dollars and held by Sweden, as well as net changes (Swedish purchases less sales) of the following long term U.S. financial assets: U.S. Treasury bonds and notes; U.S. Government agency bonds; U.S. corporate bonds; and U.S. corporate stocks. Such dollar holdings reflect only U.S./Sweden cross-border transactions included in the U.S. balance of payments and exclude sales/purchases of such U.S. assets between two foreign parties. Nominal changes in holding values were deflated by the U.S. producer price index.

Sources: The nominal exchange rate of krona per U.S. dollar, U.S. producer price index, and Swedish index of domestic supply prices were obtained from the IMF, *International Financial Statistics*, monthly issues of Oct. 1994 through May 1999, Sweden and U.S. country pages. USITC staff calculated Sweden's monthly changes in U.S. dollar and financial asset holdings from information sourced as follows: monthly levels of short term U.S. liabilities payable in dollars and held by Sweden from Internet address [http://www.treas.gov/tic/bl\\_12602.txt](http://www.treas.gov/tic/bl_12602.txt), and monthly volumes of sales and purchases of the long term assets from Internet address [http://www.treas.gov/tic/s1\\_12602.txt](http://www.treas.gov/tic/s1_12602.txt).

and financial assets on a monthly basis for February 1994-December 1998.<sup>15</sup> Sweden does not appear to have purchased or sold U.S. dollar and financial assets with any pattern or trend, or with any systematic or persistent effect on its real exchange rate relative to the dollar. It does not appear that Sweden has conducted a mercantilistic policy of exchange rate management with the U.S. dollar. This is because the real krona/dollar exchange rate has fluctuated modestly and narrowly within approximately the range of 7 to 8 regardless of whether Sweden has purchased or sold U.S. dollar and financial assets.

The idea that Japan exercises a mercantilistic exchange rate policy against the dollar does not appear supported by the relevant data for Japan (figure K-1). Further, the theory that the U.S. forest products industry must contend with foreign mercantilistic exchange rate policies is not supported by the relevant data for Sweden, a primary world forest product exporter and U.S. competitor. Finally, the U.S. Treasury, which monitors foreign exchange rate manipulation in an annual report to Congress, did not report recent evidence of exchange rate manipulation by major U.S. trading partners, including Sweden, Japan, China, Korea, and Taiwan.<sup>16</sup>

## Published Literature on Mercantilistic Exchange Rate Policies

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Ernest Preeg noted that little empirical or theoretical research focusing on mercantilistic exchange rate policy exists.<sup>17</sup> Aside from the essays and editorials previously mentioned and occasional newspaper articles,<sup>18</sup> the USITC staff located only a modest volume of literature focusing on the theory of mercantilistic exchange rate policy.

McKinnon and Ohno address the idea of mercantilistic exchange rate policies, but suggest the opposite policies of those noted by Preeg. Without empirical testing, they assert that the United States has placed mercantilistic pressures on Japan in order to achieve certain financial and political goals.<sup>19</sup> Specifically, they note that the yen appreciated to

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<sup>15</sup> For the same reasons noted above with figure K-1's presentation of analogous Japanese data, the Jan. 1994 observation in figure K-2 was "lost" through differencing Sweden's holdings of short term U.S. dollar-payable liabilities into monthly changes. Also, USITC staff compiled the same figure in terms of Swedish holdings of nominal U.S. dollar and financial assets and nominal exchange rates. The nominal plots took on similar qualitative patterns and trends as the real ones depicted in figure K-2.

<sup>16</sup> U.S. Department of the Treasury, *Annual Report to Congress on International Economic and Exchange Rate Policy*, period covered from Nov. 1, 1996 to Oct. 31, 1999, found at Internet address <http://www.treas.gov/press/release/docs/fxrpt98.pdf>, retrieved on July 19, 1999.

<sup>17</sup> E. Preeg, "The U.S. Trillion Dollar Debt to Foreign Central Banks," unpublished essay draft, Sept. 1998, p. 4.

<sup>18</sup> P. Blustein, "U.S. Trade Deficit Hit Record High in May," *Washington Post*, July 21, 1999, pp. E1-E2.; P. Blustein, "Japan Contradicts Policy with Yen Moves," *Washington Post*, July 9, 1999, pp. E1 and E4.

<sup>19</sup> R. McKinnon and K. Ohno. *Dollar and Yen, Resolving Economic Conflict between the United States and Japan* (Cambridge, MA: MIT Press, 1997), pp. 223-228.

historically high levels against the dollar when the nominal yen/dollar exchange rate fell precipitously to 80 yen/dollar in early 1995.<sup>20</sup> They allege that the U.S. Government became concerned that such a strong yen (1) would imperil a sluggish Japanese economy that needed monetary expansion (and a weakening of the yen), and (2) would slacken Japanese investment into the United States needed to finance budget deficits and high levels of national debt.<sup>21</sup> McKinnon and Ohno posit that the United States, with 6 other leading industrial countries, subsequently intervened in the currency markets to purchase substantial blocks of dollars in order to weaken the then-appreciated yen.

Morici seems to agree with the hypothesis that certain governments (Japan and China among others) may be following mercantilistic exchange rate policies.<sup>22</sup> During the 1990s, there have been chronically high U.S. trade and current account deficits, and chronically strong dollar values relative to other major currencies.<sup>23</sup> This includes high levels of foreign investment in the United States from (1) a combination of high economic growth and a low domestic savings rate, (2) demands for foreign resources to finance recent Federal deficits and current high levels of national debt, and (3) “mercantilistic” purchases of U.S. government securities by foreign governments in the rest of the world (ROW) in order to prop the dollar’s value and weaken their own currencies.<sup>24</sup> Morici built a 1996 deterministic simulation model of domestic, foreign exchange, and capital markets for the United States and the aggregate ROW.<sup>25</sup> He simulated the model under a number of alternative scenarios where the aggregate ROW reduced its official purchases of U.S. government securities. Depending on the mix of U.S. monetary and fiscal policies, the reduction in ROW government or “official” purchases of U.S. securities may result in moderate to high real GDP growth, reductions in the real dollar value, reduced trade deficits, and improved current account balances.<sup>26</sup> The results imply that currently accumulating levels of U.S. Government securities by the aggregate ROW governments may be pushing up the dollar value relative to trading partners, and may be working against the improvement of the chronically high U.S. trade and current account deficits.

Yet, Morici’s model cannot be used to support or refute Preeg’s arguments that specific countries are following a mercantilistic exchange rate policy for a number of reasons. First, Morici’s model is one of the United States and the aggregate ROW, which implies that results may not be attributed to any one country’s actions, whether the nation is Japan or a principal forest products exporter such as Sweden. Second, because Morici’s model uses the Federal Reserve’s inflation-adjusted, trade weighted exchange rate index of the dollar’s value against a number of other currencies, model results cannot be traced or matched to any particular country’s reserves/exchange rate situation, and hence cannot be used to support or refute Preeg’s conclusions concerning the existence of Japanese, Chinese, or other national mercantilistic exchange rate policies against the dollar.<sup>27</sup> And

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<sup>20</sup> Ibid., pp. 223-225.

<sup>21</sup> Ibid.

<sup>22</sup> P. Morici, *The Trade Deficit: Where Does it Come from and What Does it Do?*, un-numbered report published by the Economics Strategy Institute, Washington DC, Oct. 1997.

<sup>23</sup> Ibid., pp. iii-v.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid., pp. 14-15, appendix 2.

<sup>26</sup> Ibid., pp. 15-16.

<sup>27</sup> P. Morici, *The Trade Deficit: Where Does it Come from and What Does it Do?*, un-numbered report published by the Economics Strategy Institute, Washington DC, Oct. 1997,

finally, the model accounts for changes in the ROW's "official" or government-implemented purchases of U.S. Government securities, and does not reflect the ROW's full demand for U.S. dollar and financial assets as defined above in accordance with Treasury and Federal Reserve staff recommendations.<sup>28</sup>

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p. v.  
<sup>28</sup> Ibid.

**APPENDIX L**  
**FOREST POLICY AND INTERNATIONAL**  
**ENVIRONMENTAL ISSUES**

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# Introduction

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Since the 1970s, there has been increasing concern about the relationship between the production and trade of forest products and environmental deterioration. This concern was initially caused by growing global deforestation during the 1970s and 1980s, particularly in the tropical rain forests of the world, which fundamentally changed the nature of the forest policy debate in the 1990s.

According to FAO, the production, consumption, and trade of forest products may have environmentally adverse effects.<sup>1</sup> Excessive harvesting or poor management of forest resources produces local effects such as increased erosion and water pollution as well as potentially global effects on biological diversity and climate change. Processing, transport, and consumption of forest products also produce additional negative effects related to waste disposal and the introduction of alien species.<sup>2</sup>

The objective of this section is to describe the international, national, and private efforts to address the linkages between these environmental concerns and international trade in wood and paper products. This section examines the changing public and private policies and practices of the major producing and consuming countries, particularly those that are the most important competitors and markets for the forest products industries of the United States.

## Current State of the Forest/Environment Debate

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A significant amount, perhaps half, of the original forested area in the world is gone, and deforestation is expanding and accelerating.<sup>3</sup> In the last 30-40 years, most deforestation has occurred in the tropics; between 1960 and 1990, one fifth of all tropical forest cover disappeared. Asia lost one-third, and Africa and Latin America lost about 18 percent each. These regions have continued to lose large portions of forest cover during the 1990s. In contrast, forest cover in Europe and the United States is gradually increasing, as secondary forests and tree plantations mature.<sup>4</sup> Some also note that many of the remaining forests that have been degraded are now vulnerable owing to health and quality problems. Finally, although deforestation was once viewed as a localized problem, more recently it is being viewed as a global problem.<sup>5</sup>

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<sup>1</sup> Bourke, I.J., "International trade in forest products and the environment," FAO, found at Internet address <http://www.fao.org/waicent/faoinfo/forestry/unasy1va>, retrieved on Jan. 11, 1999.

<sup>2</sup> Ibid.

<sup>3</sup> Victor Menotti, Director Environment Program International Forum on Globalization, San Francisco, CA, testimony at the Commission hearing, May 26, 1999, p. 220.

<sup>4</sup> Abramowitz, Janet, *Taking a Stand: Cultivating a New Relationship with the World's Forests*, Worldwatch Paper 140, (Washington, DC: Worldwatch Institute), p.17.

<sup>5</sup> Abramowitz, Janet, *Taking a Stand: Cultivating a New Relationship with the World's Forests*, Worldwatch Paper 140, (Washington, DC: Worldwatch Institute), p. 5.

The debate over deforestation has three dimensions: data quality, definition, and causes. The most widely used data are that of the FAO which relies on self-reporting by the countries, and the criticism is often made that some countries lack the capacity for the systematic inventories necessary to produce reliable statistics.<sup>6</sup> Although the FAO estimates of deforestation may be lower than other estimates, the global loss of forest and other wooded land area (100 million hectares in the 1980s) has been high enough to generate appropriate concerns.<sup>7</sup>

The FAO defines deforestation differently depending upon the country. In developed countries, deforestation occurs when tree cover has been reduced to less than 20 percent, while in developing countries deforestation occurs when the tree cover is reduced to less than 10 percent. Another complicating factor is that deforestation is defined by FAO as the conversion of forests to other uses such as cropland. Forests converted to tree plantations are not counted as deforested, nor are forests which have been intensively logged and left to regenerate.<sup>8</sup>

Between 1990 and 1995, there was a decrease of 65.1 million hectares of forests in developing countries and an increase of 8.8 million hectares in developed countries for a net loss of 56.3 million hectares.<sup>9</sup> The changes from 1990 to 1995 show a sharp contrast between consumer members and producer members of the International Tropical Timber Organization (ITTO). In several consumer countries (United States, Canada, France, and Germany), forest area grew by well over 100,000 hectares per year; U.S. forest area grew by nearly 600,000 hectares per year. Only five consumer countries experienced a decrease in forest area from 1990 to 1995. The growth in consumer countries was due primarily to the establishment of plantations. Producer member countries continue to lose forest area. Overall, ITTO producers lost over 4 million hectares of forest per year over the 5 years.<sup>10</sup>

The countries losing the largest areas of forest in absolute terms are those with the largest forest areas. The Philippines and Thailand had the greatest declines (-3.2 and -2.5 percent annually, respectively).<sup>11</sup> Plantation programs are offsetting deforestation, but are generally small in terms of relative area, as compared to areas cleared for agriculture or lost to fire.<sup>12</sup>

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<sup>6</sup> Ibid., p. 21.

<sup>7</sup> FAO, "State of the World's Forests," found at Internet address [http://www.wri.org/wri/wr\\_96-97/lc\\_txt2.html](http://www.wri.org/wri/wr_96-97/lc_txt2.html), retrieved on Feb. 23, 1999, p. 2.

<sup>8</sup> Abramowitz, Janet, *Taking a Stand: Cultivating a New Relationship with the World's Forests*, Worldwatch Paper 140, (Washington, DC: Worldwatch Institute), p. 23.

<sup>9</sup> FAO, *State of the World's Forests, 1999* (Rome, 1999), p. 1.

<sup>10</sup> ITTO, Annual Review and Assessment of the World Tropical Timber Situation 1997, Forest Resources International Tropical Timber Organization (Yokohama, Japan: 1997), found at Internet address [http://www.itto.or.jp/timber\\_situation/timber1997](http://www.itto.or.jp/timber_situation/timber1997), retrieved on Jan. 25, 1999, p. 1. (Data are from FAO's State of the World's Forests 1997 which updated FAO's 1990 Forest Resource Assessment to 1995.)

<sup>11</sup> Ibid., p. 2

<sup>12</sup> Ibid.

In 1997, fires in tropical forest areas drew international attention. The fires in Brazil were attributed to farmers clearing land on holdings up to 3 hectares. These farmers receive plots under a program which depends on land clearance. Brazil reportedly lost an average of 2.6 million hectares of forestland per year during 1990-95.<sup>13</sup>

Indonesia's fires were blamed mostly on plantation developments, particularly oil palm and pulp operations, although the fires were reportedly on forest areas that had already been logged. Some of the fires were on the lands of small land-holders being relocated under the transmigration program. About one-half of the estimated 100,000 to 700,000 hectares lost to the fires was in plantations, with the remainder consisting of brush/peat areas and productive forests.<sup>14</sup>

While fire often destroys large tracts of forest, other factors contribute to deforestation worldwide. According to the State Department, such factors include subsistence farming, unsustainable logging, unsound development of large-scale industrial projects, as well as national policies that distort markets and subsidize forest conversion to other uses.<sup>15</sup>

## **International Institutional Setting**

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### ***United Nations Conference on Environment and Development***

Sustainable forestry has received increasing attention, both internationally and domestically, since the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in June 1992. UNCED marked a watershed in the debates and discussions of how to address the world's environmental problems. Prior to UNCED, concerns focused on the tropical forests, and not on temperate forests which were generally not being converted to non-forest uses.

UNCED produced consensus on a broad agenda to address environmental and development issues, including a significant agreement that sustainable forestry should be practiced by all countries, both tropical and temperate. While concerns regarding tropical forests raised the issue, it is sustainable forestry in the temperate forests that are now drawing attention.<sup>16</sup> The Statement of Principles on Forests is a set of nonbinding principles of management, conservation, and sustainable development of all types of forests. UNCED also addressed specific management issues, such as certification and ecolabeling. Currently there is no clear definition of sustainable forestry that is accepted by all interests. The World Commission on Environment and Development (The Brundtland Commission) established the best known definition of sustainable development

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<sup>13</sup> Ibid.

<sup>14</sup> Ibid., p. 11.

<sup>15</sup> U.S. Department of State, "The Environment and U.S. Foreign Policy," (Washington, DC: U.S. Government Printing Office, 1998), p. 12.

<sup>16</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O. *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 11.

“. . . to meet the needs of the present without compromising the ability of future generations to meet their own needs.”<sup>17</sup> Basically, the push toward sustainable forestry is to develop forest management that balances the environmental, economic and social values of the world’s forests.<sup>18</sup>

### ***Intergovernmental Panel on Forests***

A number of international initiatives on forest issues have taken place since June 1992 which addressed forest management in the Statement of Forest Principles and Chapter 11 of Agenda 21, a comprehensive global plan of action adopted at UNCED. Many of these initiatives fed into the newly created UN Commission on Sustainable Development's (CSD) review of Agenda 21's Chapter 11 in 1995, where delegates established the Intergovernmental Panel on Forests (IPF). The IPF was established to pursue consensus and coordinated proposals for action to support the management, conservation, and sustainable development of all types of forests. The IPF met four times and presented its conclusions to the April 1997 meeting of the CSD.<sup>19</sup>

### ***Intergovernmental Forum on Forests***

The UN General Assembly continued the intergovernmental policy dialogue on forests by establishing, in 1997, the ad hoc open-ended Intergovernmental Forum on Forests (IFF) under the aegis of the CSD. In addition, the General Assembly decided that the IFF should work toward consensus on international arrangements and mechanisms for forest management.<sup>20</sup>

The IPF and IFF processes have examined a range of issues related to trade in forest products and have essentially affirmed the general points made at UNCED in 1992. These groups have studied the relationships among trade, environment and sustainable forest management. They also sought to clarify the concepts of certification and eco-labeling for forest products, and recognized the growing pressure for certification of sustainably managed forests for wood-based products in international trade.<sup>21</sup> The IPF had affirmed that any forest-related certification or other initiative should be

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<sup>17</sup> The World Commission on Environment and Development, “Our Common Future,” (Oxford: Oxford University Press, 1987), p. 43.

<sup>18</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 6.

<sup>19</sup> Earth Negotiations Bulletin, “Summary of the Fourth Session of the Intergovernmental Panel on Forests, 11-21 Feb. 1997,” found at Internet address <http://www.iisd.ca/linkages/vol13/1334001e.html>, retrieved on July 17, 1999.

<sup>20</sup> CTE, Background Paper on Trade and Environment in Relation to Forest Products and Services: an Overview of the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF) Deliberations, WT/CTE/W/84, July 1, 1998. p. 13.

<sup>21</sup> Ibid.

nondiscriminatory and transparent, and ensure open access by not imposing barriers to trade.<sup>22</sup>

They also sought to clarify the concept of “sustainable forest management (SFM)” through scientifically-based criteria and indicators (C&I) for sustainable management of boreal, temperate, Mediterranean, and tropical forests under a wide range of social, economic, cultural and political situations. They noted the need to address technology transfer and other assistance to developing countries. The role of governments, the private sector, and multilateral organizations, as well as the importance of traditional forest related knowledge in SFM and intellectual property rights, were acknowledged for addressing trade and environment issues.<sup>23</sup>

## ***Intergovernmental Working Group on Forests***

Malaysia and Canada initiated the Intergovernmental Working Group on Forests (IWGF) as a means of bridging the gap between temperate and tropical forest producers on forest issues. The IWGF included participants from about 15 countries, 3 intergovernmental organizations, and 4 NGOs. The group has identified categories for action and presented its work to the CSD.<sup>24</sup>

## ***Regional Institutions***

While these global processes noted above have been underway, several regional organizations were being developed to address similar sets of issues. Two of these processes, the Montreal Process and the Helsinki Process, deal with temperate forests and are thus directly of interest to the United States. The other regional processes are focused more on tropical forest management and utilization.

### **Montreal process**

Starting in 1993, the Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Boreal and Temperate Forests of 10 countries—Australia, Canada, Chile, China, Japan, South Korea, Mexico, New Zealand, Russia, and the United States—has established criteria and indicators for the conservation and management of temperate and boreal forests. The agreement does not include limits or performance

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<sup>22</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 17.

<sup>23</sup> CTE, Background Paper on Trade and Environment in Relation to Forest Products and Services: an Overview of the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF) Deliberations, WT/CTE/W/84, July 1, 1998. p. 13.

<sup>24</sup> WRI, “New International Policy Initiatives,” found at Internet address <http://www.wre.org/wri/biodiv/opp-bx2.html>, retrieved on Feb. 23, 1999.

targets for the criteria and indicators, such as species extinction, and is essentially aimed at providing the parameters for a national level information base. This agreement led to the Santiago Declaration in 1995 which formally released the seven criteria and 67 indicators.<sup>25</sup>

The first six criteria deal with forest conditions, attributes, and functions, as well as the values or benefits associated with the goods and services that forest products provide: (1) conservation of biological diversity, (2) maintenance of productive capacity, (3) maintenance of forest ecosystem health and vitality, (4) conservation and maintenance of soil and water resources, (5) maintenance of forest contribution to global carbon cycles, and (6) maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies. The seventh criterion-legal, institutional and economic framework for forest conservation and sustainable management-addresses the factors necessary for SFM.<sup>26</sup>

According to U.S. industry sources, the Montreal Process criteria differ from those developed by other processes in that they more clearly recognize, and reflect the connection between forests and people.<sup>27</sup> The first review of the forest inventory and monitoring system in the United States against the 67 indicators revealed a lack of coordination, accessibility and consistency necessary to portray the condition of the forests.<sup>28</sup>

## **Helsinki process**

The Helsinki Process, which includes the governments of the EU, is similar to the Montreal Process. The 1993 Ministerial Conference of the Protection of Forests in Europe endorsed the Helsinki Process. The criteria and indicators of SFM being developed for these primarily temperate forests are similar to those being developed under the Montreal Process. Similarly, the Helsinki Process does not identify performance targets for SFM.

In October 1998, a subset of the participants in the Helsinki Process reached an initial agreement on the basic elements of a framework for the establishment of national certification systems in Europe. The Pan-European Forest Certification framework (PEFC) is to provide a set of common principles for the voluntary certification of sustainable forest management and is to establish a mechanism for the mutual recognition

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<sup>25</sup> Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests, "Statement on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests," Santiago, Chile, Feb. 3, 1995, found at Internet address <http://sylva.for.ulaval.ca/DevDurable.html>, retrieved on May 10, 1999.

<sup>26</sup> Ibid.

<sup>27</sup> National Association of State Foresters, "Forests For a Sustainable Future: The Use of Criteria and Indicators in Sustainable Forest Management," White Paper, Sept. 1997, found at Internet address <http://www.nacdnet.org/forestrynotes/july98/forest-future.htm>, retrieved on Apr. 15, 1999.

<sup>28</sup> Ibid.

of national certification systems. Parties to this agreement come from the countries of Austria, Belgium, Denmark, Finland, France, Germany, Italy, Latvia, Luxembourg, Norway, Portugal, Spain, Sweden, and Switzerland.<sup>29</sup>

The six criteria for SFM used in the Helsinki process are: (1) maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles, (2) maintenance of forest ecosystem health and vitality, (3) maintenance and encouragement of productive functions of forests (wood and non-wood), (4) maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems, (5) maintenance and appropriate enhancement of protective functions in forest management (notably soil and water), and (6) maintenance of other socio-economic functions and conditions.<sup>30</sup>

## **Other regional processes**

Following the Helsinki and Montreal processes, there was a proliferation of regional initiatives. In 1995, countries in the Amazonian Cooperation Treaty began to develop the Tarapoto Proposal for the Amazon area, and similar proposals have been developed under Dry Zone Africa Initiative, the African Timber Organization, and the South Pacific Forum. These processes have all developed principles or criteria and indicators for SFM. As with the regional processes in the temperate areas, these processes have not included performance targets for SFM.<sup>31</sup>

## **International tropical timber agreement**

The International Tropical Timber Agreement (ITTA), adopted in 1983 and extended in 1994, was not originally negotiated as an environmental agreement but as a commodity agreement that recognized the importance of effective development and protection of tropical timber forests. The purpose of the agreement is, among other things, “to provide an effective framework for co-operation and consultation between producing and consuming members with regard to the tropical timber economy.” According to Article 1 of the ITTA, parties are to “promote the expansion and diversi-fication of international trade in tropical timber . . . improve market intelligence . . . to ensure greater market transparency, promote and support research and development” to improve forest management and wood utilization; to “encourage increased and further processing of tropical timber in producing member countries . . . encourage members to support and develop industrial tropical timber reforestation; improve marketing and distribution of tropical timber exports; . . . and encourage the develop-ment of national policies aimed

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<sup>29</sup> ITTO, Topical and Tropical, found at Internet address [http://www.itto.or.jp/forest\\_update/v8n4/28.html](http://www.itto.or.jp/forest_update/v8n4/28.html), retrieved on Apr. 6, 1999, p. 1.

<sup>30</sup> Taiga-News, “Criteria and Indicators for Sustainable Forest Management - What is going on?,” Taiga-News 20, Mar. 1997, found at Internet address <http://www.sll.fi/TRN/TaigaNews/News20/CriteriaUpdate.html>, retrieved on Apr. 15, 1999.

<sup>31</sup> Wijewardana, Don, “Criteria and Indicators for Sustainable Forest Management,” found at Internet address: [http://www.itto.or.jp/forest\\_update/v8n3/04.html](http://www.itto.or.jp/forest_update/v8n3/04.html), retrieved on Apr. 6, 1999, p. 3.

at sustainable utilization and conservation of tropical forests.”<sup>32</sup>

## **International tropical timber organization**

The ITTA established the International Tropical Timber Organization (ITTO) and its subsidiary body, the International Tropical Timber Council (ITTC), through which the organization functions. While the ITTO’s objective has been that total exports of tropical timber should come from “sustainably managed resources by the year 2000,” this effort reportedly suffered from a lack of rigorous standards during the organization’s early years.<sup>33</sup> The ITTO, with its issue of Criteria and Indicators for the Measurement of Sustainable Management of Tropical Forests in 1993, was the first organization to formally address certification of sustainably managed forests for wood-based products in international trade. A new ITTA, which entered into force on January 1997, calls for the consideration of criteria and indicators for all types of timber. Timber certification remains an issue for ITTO as forestry operations in many member countries are seeking some form of certification.

## ***Private Institutions and Processes***

### **World commission on forests and sustainable development**

One of the first groups to be formed following UNCED in 1992 was the World Commission on Forests and Sustainable Development (WCFSD). The WCFSD is essentially a private NGO paralleling the IPF.<sup>34</sup> The group has not received universal support in the traditional NGO community nor in all the major producing and consuming countries. In September, 1998, the WCFSD released a report entitled ‘Our Forests . . . Our Future’ which calls for, among other things, the creation of a 15-country member Forestry Security Council (F-15) to search for solutions to forest problems. The 15 countries (Australia, Brazil, Canada, China, Colombia, Ecuador, Ethiopia, Ghana, India, Indonesia, Japan, Russia, Sweden, the United States, and Venezuela) were named by the WCFSD for their relative importance in the amount and mix of forest resources, trade, and consumption of forest products.<sup>35</sup>

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<sup>32</sup> USITC, *International Agreements to Protect the Environment and Wildlife*, Investigation No. 332-287, Jan. 1991, publication 2351, p 5-44.

<sup>33</sup> *Ibid.*, p 5-45.

<sup>34</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 17.

<sup>35</sup> ITTO, Topical and Tropical, found at Internet address [http://www.itto.or.jp/forest\\_update/v8n4/28.html](http://www.itto.or.jp/forest_update/v8n4/28.html), retrieved on Apr. 6, 1999, p. 1.

## Global forest convention

As noted above, there is no consensus on a single set of criteria and indicators to be used for sustainable forest management. However, there is environmental NGO interest in having international regulations that seek to increase the security of global forest services through existing international agreements (notably CITES, the Climate Change, Desertification and Biodiversity Conventions, and the World Heritage Convention).<sup>36</sup> Some environmental organizations argue that the existing agreements are not being fully exercised and have gaps that need to be filled. These groups have concerns that a global agreement on forests may work at cross-purposes with multilateral environmental agreements (MEAs).<sup>37</sup> Some argue it is too early to negotiate a top-down international forest agreement owing to inequitable bargaining power among the interest groups, imperfect objectives, inadequate science, and cost of negotiation. They also argue that the effects of trade exacerbate the imbalances of the interest groups as loggers seek out forests subject to weak governmental/social control for harvesting.<sup>38</sup> According to the Foreign Agricultural Service, the United States continues to believe that an agreement on a new global treaty would likely result in standards that are lower than those that currently exist in many countries, including the United States.<sup>39</sup>

### *Related Multilateral Environmental Agreements*

A number of environmental NGOs have been advocating for a forestry protocol to be included within other existing MEAs, such as the Biodiversity Convention, but as yet no consensus has been reached.<sup>40</sup> Some have advocated to include more timber species under CITES, however it may be difficult to differentiate between listed and unlisted species as the wood and products enter international trade.<sup>41</sup>

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<sup>36</sup> Bass, Stephen, Global Forest Agreements, note prepared for the World Commission on Forests and Sustainable Development, (International Institute for Environment and Development, Apr. 1997), found at Internet address <http://www.iied.org/landuse/globalfo.html>, retrieved on Jan. 25, 1999, p. 1.

<sup>37</sup> WRI, Principles for a Global Agreement on Forests, found at Internet address <http://www.wri.org/wri/biodiv/b16-gbs.html>, retrieved on Feb. 23, 1999.

<sup>38</sup> Bass, Stephen, Global Forest Agreements, note prepared for the World Commission on Forests and Sustainable Development, (International Institute for Environment and Development, Apr. 1997), found at Internet address <http://www.iied.org/landuse/security.html>, retrieved on Jan. 25, 1999, p. 1.

<sup>39</sup> USDA, Foreign Agricultural Service, "Forest Products Trade Highlights," July 1999, found at Internet address <http://ffas.usda.gov/ffpd/wood-circulars/jul99/trdh.html>, retrieved on July 7, 1999, p. 2.

<sup>40</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 16.

<sup>41</sup> *Ibid.*, p. 17.

## **Convention on international trade in endangered species**

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), in force since 1975, is the primary agreement that monitors and controls international trade to prevent the extinction of fauna and flora. Over 20,000 species of plants and over 500 animal species are specifically protected by CITES, either by an outright ban on trade or through controlled trade. Currently, 138 countries, including the United States, are party to CITES, giving it the largest participation of all wildlife treaties.<sup>42</sup>

CITES regulates international trade in species that either are threatened with extinction or may become endangered if their trade is not regulated. Species to be regulated are divided into three categories and listed in appendices to the convention: (1) those threatened with extinction where trade in these species is authorized only under exceptional circumstances (Appendix I); (2) those that may become endangered unless trade is regulated (Appendix II); and (3) those that a party identifies as being subject to regulation within its own jurisdiction and as requiring international cooperation to control trade (Appendix III).<sup>43</sup>

For example, Brazil, Costa Rica, and Bolivia have requested their populations of bigleaf mahogany be listed in Appendix III. Listing in Appendix III means that exports of bigleaf mahogany logs, lumber, and veneer sheets from these countries must be accompanied by an export permit and importing countries must verify the country of origin of all shipments.<sup>44</sup> On June 15, 1999, the U.S. Fish and Wildlife Service announced an amendment to Appendix III to include Mexico as a listing country for bigleaf mahogany.<sup>45</sup>

Controversy has surrounded proposals to list big leaf mahogany in Appendix II, the first major commercial timber species to be so considered. Trade in Appendix II species requires an export permit (or re-export certificate) which requires a finding that the product has been legally acquired and that the export is not detrimental to the species.<sup>46</sup> Timber species already listed in Appendix II include Monkey-puzzle tree, ajo/garlic tree, commoner *lignum vitae*, holywood *lignum vitae*, gaviland, afrormosia, cristobal/granadillo, red sandalwood, Pacific Coast Mahogany, and Caribbean mahogany. Brazilian rosewood, a source of wood for musical instruments, is listed in Appendix I, and thus trade of that species is prohibited.<sup>47</sup>

## **Convention on biodiversity**

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<sup>42</sup> OECD, *Experience With The Use Of Trade Measures In The Convention of International Trade In Endangered Species Of Wild Fauna And Flora (CITES)*, Organisation for Economic Co-operation and Development, OCDE/GD(97)106, (Paris: 1997), p. 12.

<sup>43</sup> USITC, *International Agreements to Protect the Environment and Wildlife*, Investigation No. 332-287, Jan. 1991, Publication 2351, p 5-29.

<sup>44</sup> USDA, Foreign Agricultural Service, "Forest Products Trade Highlights," July 1998, found at Internet address <http://ffas.usda.gov/ffpd/wood-circulars/jul98/trdh.html>, retrieved on July 7, 1999, p. 2.

<sup>45</sup> U.S. Fish and Wildlife Service, AIA, CITES Update #70, June 1999, found at Internet address <http://www.fws.gov/r9dia/global/update70.html>, retrieved on July 22, 1999.

<sup>46</sup> OECD, 1997, p. 18.

<sup>47</sup> OECD, 1997, p. 18.

Biodiversity is related to many vital forest ecosystem functions, such as carbon exchange, flows of surface and groundwater, the protection and development of soils, and the regulation of surface temperature and climate. Biodiversity is the source of many of the world's products, including foods, fibers, pharmaceutical products and chemicals as well as a fundamental input to biotechnology. Finally, biodiversity is also associated with "intangible" values, whether aesthetic, cultural or scientific."<sup>48</sup>

The recognition of the global decline of biodiversity and the potential impacts of the decline led to the adoption of the United Nations Convention on Biological Diversity (CBD) in 1992. The three objectives of the CBD are the conservation of biodiversity, the sustainable use of biological resources, and the fair and equitable sharing of benefits resulting from the use of genetic resources.<sup>49</sup> Although the President has signed the convention, it has not been ratified by the U.S. Senate. In 1998, the conference of parties adopted a program which calls for countries to integrate biological diversity considerations into their forest management regimes.<sup>50</sup>

## Convention on global climate change

In May 1992, the United States and about 130 other countries signed the U.N. Framework Convention on Climate Change, the first binding agreement dealing directly with the issue. The Convention set a non-binding target of reducing greenhouse gas emissions to 1990 levels by the year 2000. At UNCED, more countries signed onto the agreement, bringing the total to 165.

Forest functions related to climate change include the generation of oxygen and the absorption and storage of carbon. According to the Intergovernmental Panel on Climate Change (IPCC), the world's forests could absorb 12-15 percent of the carbon emitted from fossil fuel burning over the next half century, if steps were taken to conserve and regenerate forests, particularly those in tropical areas.<sup>51, 52</sup> Other steps include establishing forest plantations, employing less disruptive harvest and land use practices,

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<sup>48</sup> OECD, *Experience With The Use Of Trade Measures In The Convention of International Trade In Endangered Species Of Wild Fauna And Flora (CITES)*, Organisation for Economic Co-operation and Development, OCDE/GD(97)106, (Paris: 1997), p. 11.

<sup>49</sup> Clearinghouse on Biodiversity, found at Internet address <http://www.biodiv.org>, retrieved on Apr.15, 1999.

<sup>50</sup> Environmental NGO official, telephone interview, Apr. 1999.

<sup>51</sup> Brown, Sandra et al., "Management of Forests for Mitigation of Greenhouse Gas Emissions," in Robert T. Watson et al., eds., *Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses: Contributions of Working Group II to the Second Assessment Report of the Intergovernmental panel on Climate Change* (New York: Cambridge University Press, 1996).

<sup>52</sup> Abramowitz, Janet, *Taking a Stand: Cultivating a New Relationship with the World's Forests*, Worldwatch Paper 140, (Washington, DC: Worldwatch Institute), p. 15.

and using the wood that is harvested to make longer-lasting products so the carbon storage is prolonged.<sup>53</sup>

## Discussion of Issues

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### *Approaches to Defining Sustainable Forestry*

As noted above in the discussions of the international efforts and activities, there is no consensus on a definition of sustainable forestry. However, sustainable forestry has become a de facto goal of most governments and international agencies involved.<sup>54</sup>

Owing to the increasing importance of environmental values in international policy, the values placed on forest resources, other than as a source for wood and paper products, are becoming more important. As noted above, forest habitats and ecosystems provide biodiversity and carbon sequestration, both with trade potential. However, the current trade in these services, and the relatively newly labeled service of eco-tourism, is relatively small.<sup>55</sup> For example, biodiversity increases the probability of new discoveries of new substances and genetic material that may have commercial value and thus yield revenues such as royalties to the forest owner. Also, nonwood forest products, such as rattan, fruits, medicines, and materials for crafts and native products, are a significant source of revenue and international trade.<sup>56</sup> FAO estimates annual trade in nonwood forest products to be \$11.1 billion, compared with \$160 billion in wood and wood products, and pulp, paper and paper products.<sup>57</sup>

In recent years, temperate forest area has been stable which suggests sustainability, at least in the classical sense of sustainable yield of fiber for wood and paper. Some do not view the changes in species mix of trees as necessarily damaging,<sup>58</sup> while others view current forestry approaches in the temperate areas as clearly unsustainable.<sup>59</sup> However, there is general agreement that net deforestation is still occurring in many tropical forests and thus current practices in many of those areas are not sustainable. This section briefly describes four types of approaches to SFM that are currently being developed.

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<sup>53</sup> Ibid.

<sup>54</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 7.

<sup>55</sup> CTE, Background Paper on Trade and Environment in Relation to Forest Products and Services: an Overview of the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF) Deliberations, WT/CTE/W/84, July 1, 1998. p. 5.

<sup>56</sup> Abramowitz, Janet, *Taking a Stand: Cultivating a New Relationship with the World's Forests*, Worldwatch Paper 140, (Washington, DC: Worldwatch Institute), p. 10.

<sup>57</sup> FAO, "Importance of NWFP," found at Internet address <http://www.fao.org/WAICENT/FAOINFO/FORESTRY/NWFP>, retrieved on Feb. 1, 1999.

<sup>58</sup> Grimes, 1997, p. 33.

<sup>59</sup> Mankin, 1998, p. 2.

## Criteria and indicators

As shown by the Montreal and Helsinki Processes, the components of SFM defined by the criteria include forest functions, such as biological diversity and forest health, economic benefits of forests, such as wood production, social and cultural values, and, in most cases, the legal and institutional framework needed to assist the implementation of SFM. The notion is that, measured over time, the indicators provide information about forest conditions and management that can chart progress towards or away from SFM.

Since UNCED, over 150 countries have committed to one of the 'processes' that have been developed in different regions of the world to develop criteria and indicators.<sup>60</sup> As noted previously, the processes have produced similar sets of criteria and indicators, suggesting a general agreement on the components of SFM. Each set attempts to define SFM on the basis of a range of benefits derived from forests and considers forests as complex ecosystems rather than simply as a source of timber. The differences are primarily in the indicators chosen, which is not surprising given the diversity of conditions around the globe. As yet, none of these sets of C&I is operational.

## Management systems approach

The International Organization for Standardization (ISO) has issued ISO 14000, an Environmental Management System (EMS) process that is designed to use a firm's management system to improve its environmental performance. The objective is to provide a standard that does not create technical barriers to trade. Such an approach is obviously attractive to multinationals, or other firms, engaged in the trade of wood and paper products.<sup>61</sup>

The components of an ISO 14000 system include environmental auditing, environmental labeling, environmental performance evaluation, life-cycle assessments, and terms and conditions. The ISO EMS approach is generic across industries, although Canada is extending the approach to specific standards for the forest products industry.<sup>62</sup>

The ISO 14001 EMS standard for forest management, which has been released in the form of a draft technical report, focuses on the development of management systems. However, forest products producers will have to define their own performance targets and methods. Under ISO requirements, a third party certification procedure evaluates only an organization's EMS, not its performance in the forest.<sup>63</sup>

Applying an ISO 14001 EMS in forest organizations would seem to complement

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<sup>60</sup> FAO, *State of the World's Forests 1999* (Rome: FAO, 1999), p. 15.

<sup>61</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 23.

<sup>62</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 24.

<sup>63</sup> International Organization for Standardization, "ISO Forestry Working Group Completes Technical Report," Nov. 1997, found at Internet address <http://www.sfms.com/rece71.htm>, retrieved on July 17, 1999.

approaches based on certification of performance standards. A single certification assessment could eventually reveal whether an organization meets ISO EMS requirements and whether the performance standards are achieved in the forest.

## **Industry-based standards**

### *United States*

The Sustainable Forestry Initiative (SFI) of the American Forest and Paper Association (AF&PA) initiated in 1994 is essentially a set of principles and guidelines that are a mixture of general concepts and performance measures.<sup>64</sup> It is similar to the ISO 14000 process in that the system is intended to be incorporated into the business practices of the forest products companies. The SFI does have a public review mechanism by requiring AF&PA members to publicly report on their progress, and the SFI does call for an annual progress report by an independent review panel. However, the SFI requires no external monitoring or auditing of company practices.<sup>65</sup>

AF&PA members adopted the principles of the SFI.<sup>66</sup> The first principle is “to practice sustainable forestry to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which integrates the growing, maturing, and harvesting of trees for useful products with the conservation of soil, air, and water quality, and wildlife and fish habitat, and aesthetics.” This definition is followed by four additional principles which cover economically and environmentally responsible practices, long-term forest health and productivity, the protection of sites of special significance, such as those with unique biological or historical qualities, and the concept of continuous improvement. The SFI guidelines are intended to provide measures for evaluating compliance with the SFI principles.

### *Canada*

The system proposed by the Canadian Standards Association and the Standards Commission of Canada is a management system approach.<sup>67</sup> Canada's National Sustainable Forest Management Standards, a voluntary system, have both a management systems framework, much like the ISO approach, and performance guidelines.

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<sup>64</sup> AF&PA, Sustainable Forestry for Tomorrow's World, 3rd Annual Progress Report, (Washington, DC: AF&PA, 1998).

<sup>65</sup> Sedjo, 1998, p. 24.

<sup>66</sup> AF&PA, Sustainable Forestry: Principles and Implementation Guidelines, May 1997, p. 3.

<sup>67</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 24.

The performance standards, approved in 1995 by the Canadian Council of Forest Ministers, are based on national criteria and indicators for sustainable forest management. The criteria were adapted from the criteria developed through the Montreal Process. The scope of the six criteria contain 21 supporting critical elements to assist in the adaptation of the national criteria into a performance plan with on-the-ground objectives for a local forest area.<sup>68</sup> The standards require an audit, by an independent third-party, of both the management system and on-the-ground performance. A certificate of registration issued after a successful audit can then be used to inform the market and the public that the products come from a sustainably managed forest.<sup>69</sup>

### *Malaysia*

A National Committee on Sustainable Forest Management in Malaysia was formed in 1994 to implement the ITTO's Criteria and Indicators.<sup>70</sup> Malaysia has now adapted the ITTO Criteria and Indicators into a set of Malaysian Criteria, Indicators, Activities and Management Specifications for Forest Management Certification. Demonstrating its position that certification should be vested in national authorities, Malaysia began operations of the National Timber Certification Council (NTCC) on January 1, 1999, to establish and administer an independent third party timber certification scheme. The intention is that the NTCC certificate will provide assurance to consumers that the forest products will have come from forests that have met the national criteria. The system calls for independent certifiers to assess Malaysian forests with regard to sustainable management practices.

In March 1999, representatives of the NTCC, and other industry related groups, met with representatives of the Forest Stewardship Council (FSC) to discuss the possible collaboration between NTCC and FSC to help produce Malaysian national standards that are compatible with the FSC Principles and Criteria. It appears that the objective of this collaboration is to have certificates that bear the logos of both the NTCC and the FSC.<sup>71</sup>

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<sup>68</sup> Canadian Sustainable Forestry Certification Coalition, Meet the Standards, found at Internet address [http://www.sfms.com/2s\\_1.htm](http://www.sfms.com/2s_1.htm), retrieved on Apr. 30, 1999.

<sup>69</sup> Canadian Standards Association, *A Sustainable Forest Management System: Guidance Document* (CAN/CSA-Z808-96), and *A Sustainable Forest Management System: Specifications Document* (CAN/CSA-Z809-96), found at Internet address [http://www.sfms.com/2s\\_1.htm](http://www.sfms.com/2s_1.htm), retrieved on Apr. 30, 1999.

<sup>70</sup> Malaysian Timber Council, Move Towards Sustainable Forestry, found at Internet address <http://www.mtc.com.my/forestry/reference/formal/2Cmtsf.htm>, retrieved on Dec. 10, 1998.

<sup>71</sup> NTCC, press release on Discussions between Malaysian Forestry and Timber Organizations and Forest Stewardship Council Regarding Timber Certification, found at Internet address [http://www.mtc.com.my/ntcc/ntcc\\_press.htm](http://www.mtc.com.my/ntcc/ntcc_press.htm), retrieved on Mar. 29, 1999.

## Third party certification and monitoring

The most well known third-party certification system, and the one operating in multiple countries, is that of the Forest Stewardship Council (FSC). This international non-profit organization was founded in 1993 to establish a set of common principles and criteria for judging whether the world's forests are being managed in an environmentally appropriate, socially beneficial, and economically viable manner. It reportedly consists of representatives from the timber industry, environmental groups, indigenous peoples, and forest product certification organizations from 25 countries. The FSC, based in Oaxaca, Mexico, is funded by foundations, government donors, membership subscriptions, and accreditation fees.<sup>72</sup> Other operational certification systems are the Forest Conservation Program of Scientific Certification Systems (SCS), the Smart Wood Certification Program of the Rainforest Alliance in the United States, and the Responsible Forestry Programme of the Soil Association and SGS Silviconsult Ltd. in the United Kingdom.

The FSC introduced a system of independent certification of forests that meets its practices and an international labeling scheme for forest products which are intended to provide a credible guarantee that products carrying its logo came from a well managed forest. The FSC's global forest practices and principles that apply to all tropical, temperate and boreal forests are implemented through national or regional standards developed by FSC-accredited certifiers.<sup>73</sup> Forest inspections are carried out by a number of FSC-accredited certification bodies; currently there are five accredited certification bodies, three of which operate in the United States. According to environmental organizations, most of which support the concept of a third-party, independent system of certifying products from well-managed forests, and the FSC in particular, a credible system is now in place, and consumers are starting to express their preference for these products.<sup>74</sup>

The FSC principles, like the criteria of the other approaches, address forest functions and values. However, the FSC appears to put more emphasis on land tenure and other rights of indigenous peoples and the long-term social and economic well-being of forest workers and local communities.<sup>75</sup> The FSC also places considerable emphasis on what they term high conservation value forests, generally termed old growth forests.<sup>76</sup> Earlier this year, at least partially in response to industry criticism regarding the focus on old growth, the FSC added a principle and some criteria related to plantations.<sup>77</sup>

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<sup>72</sup> FSC, About the Forest Stewardship Council, found at Internet address <http://www.fsc.org>, retrieved on Feb. 15, 1999.

<sup>73</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 25.

<sup>74</sup> Abramowitz, Janet, *Taking a Stand: Cultivating a New Relationship with the World's Forests*, Worldwatch Paper 140, (Washington, DC: Worldwatch Institute), p. 9.

<sup>75</sup> Environmental NGO official, interview, Mar. 25, 1999.

<sup>76</sup> Ibid.

<sup>77</sup> FSC, About the Forest Stewardship Council, found at Internet address <http://www.fsc.org>, retrieved on Feb. 15, 1999.

While the FSC's program and label are operational, it is not clear just how much forested area has been certified and remains certified. Much of this area, if not the vast majority, is reportedly in Sweden and Poland. One estimate places the area covered by FSC certification at less than 15 million hectares, or less than 0.5 percent of the world total.<sup>78</sup> The organization's reported goal is 200 million acres by 2000.<sup>79</sup>

Opponents of the current FSC system criticize it for being a single issue ecolabel that, while addressing the social, ecological, and economic aspects of forest management, does not address other factors such as transportation, manufacturing, or distribution.<sup>80</sup> Advocates of the FSC approach acknowledge a weakness of the certification approaches is that "scientific data do not yet support a single consensus on the definition of biological sustainability, especially given regional variations in ecology; the same is true for socioeconomic sustainability."<sup>81</sup>

## *Certification*

Regardless of the approach to SFM that is taken by the various producers around the world, it appears that some form of certification of on-the-ground performance is going to be at least a de facto market requirement for many forest products entering international trade. While there appears to be room for different, and even multiple, forms of certification, the current efforts to develop criteria and indicators attest both to the demand for a system and the desire to have compatible systems around the globe. According to a report for the United Nations Economic Commission for Europe (UN/ECE) and the FAO, the establishment of a global certification system is likely to depend upon mutual recognition of the various national systems.<sup>82</sup>

From the discussion above, it is apparent that the certification systems have some common features: similar criteria and indicators, or principles, that are relatively general in nature; broad applicability to all types of forest products; forest inspection or audits; chain-of-custody verification; standardized reporting; and some sort of label or logo. The distinctions between the certification systems are that some do not contain performance standards and some do not require that forest inspections and audits be conducted by independent third parties. These distinctions may prove crucial for

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<sup>78</sup> BNA, "UN/ECE Says Forestry Certification to Depend on Mutual Recognition of Audits, Eco-Label," *International Environment Reporter*, Vol 22., No. 9, Apr. 28, 1999, p. 353.

<sup>79</sup> Industry official, USITC telephone interview, Apr. 8, 1999.

<sup>80</sup> Berg, Scott, "Forest Stewardship Council Certification and Product Labeling in the U.S. Forestry Context," American Forest & Paper Association, Washington, DC, undated White Paper.

<sup>81</sup> Heaton, K. and R. Donovan, "Forest Assessment" in Viana, Virgilio, M. Jamison Ervin, Richard Z. Donovan, Chris Elliot and Henry Gholz (eds.) *Certification of Forest Products: Issues and Perspectives*, (Washington, DC: Island Press, 1996), p. 73.

<sup>82</sup> BNA, "UN/ECE Says Forestry Certification to Depend on Mutual Recognition of Audits, Eco-Label," *International Environment Reporter*, Vol 22., No. 9, Apr. 28, 1999, p. 353.

certification systems if the market perceives third-party certification as more credible in substantiating the environmental claims made by the producer.

All the certification systems seek to demonstrate to consumers that the forest products are made in an environmentally and socially responsible manner. The premises behind the certification approach are that consumer behavior can be influenced by these environmentally-differentiated products and that producer behavior can be influenced by price premiums generated by the differentiation. Given the low volume of certified wood on world markets, it is uncertain as to whether any price premiums are sufficient to induce additional producers to adopt certification.<sup>83</sup>

Studies in the United Kingdom and the United States have found a market share potential up to 19 percent with price premiums up to 13 percent.<sup>84</sup>

Certification of SFM involves certification of forest management practices at the forest level and certification of the products made from that timber at the various stages in the manufacturing and distribution process. Thus, while the forest certification obviously occurs in the country of the producer, the product certification must cover both the domestic and export markets.<sup>85</sup>

There are certainly costs associated with certification systems, in addition to any incremental costs of improved forest management practices and revenue reductions from reduced harvests. There are also the costs, such as record keeping, from the implementation of the certification system through the environmental audit, whether or not the audits are conducted by a third party. In addition, there are costs associated with maintaining the chain-of-custody of both the raw material and finished product through the various manufacturing and distribution stages. According to AF&PA, the initial costs of certification for small, private landholders are high, at about \$120 per hectare initially plus an annual retainer fee to monitor compliance with the management plan.<sup>86</sup> Another set of estimates puts the costs of certification assessments between \$.30 and \$1.00 per hectare per year in tropical countries, and the costs of tracking the chain of custody to be up to 1 percent of the border prices of the products.<sup>87</sup>

The chain-of-custody requirements could be a significant burden to pulp and paper industries, many of which obtain their raw material from a large number of forest owners, who are often small producers. Pulp and paper industries also use large amounts of

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<sup>83</sup> Bourke, I. J., Global Trends in Marketing Environmentally Certified Forest Products, Paper delivered to the Australian Outlook Conference, Canberra, Australia, Febr. 6-8, 1996, and Ozanne, L.K. and R.P. Vorsky, Willingness to pay for Environmentally Certified Wood Products: The Consumer Perspective. *Forest Products Journal*, 1998.

<sup>84</sup> Baharuddin, Hj. G., Timber certification: an overview, FAO, 1996, found at Internet address <http://www.fao.org/montes/unasylva/183/e/183-02e.htm>, retrieved on Jan. 11, 1999, p. 3.

<sup>85</sup> *Ibid.*, p. 2.

<sup>86</sup> Berg, Scott, Forest Stewardship Council Certification and Product Labeling in the U.S. Forestry Context, A White Paper (Washington, DC: AF&PA, undated).

<sup>87</sup> Baharuddin, Hj. G., Timber certification: an overview, FAO, 1996, found at Internet address <http://www.fao.org/montes/unasylva/183/e/183-03e.htm>, retrieved on Jan. 11, 1999, p. 2.

recycled and waste materials.<sup>88</sup> The additional record keeping, inventories, and possibility of separate production lines are often cited as examples of the impact of these requirements.

## **Consequences of forest sustainability issues**

If SFM is effectively practiced on a global scale, production shifts - intra-national and international - would be expected. For example, in the United States, the changes in forest practices in the Northwest to accommodate environmental concerns regarding the spotted owl reportedly induced a shift to Southern U.S. States and Canada. The policy changes reduced harvests on public lands leading to increased harvesting on industrial lands.<sup>89</sup>

Such production shifts would be expected to have implications for prices and competitiveness. Differences in systems or differences in implementation will affect domestic and international production and prices and may create short-run advantages for some firms or nations who are better positioned to adapt to any policy changes or who may currently be operating at or near the sustainable level as it is defined. A change in relative costs and prices between competitors certainly has international trade implications.

## **Trade**

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There are both direct and indirect linkages between trade in forest products and the environment. These linkages occur in both directions. That is, trade and changes in trade policy have environmental implications, and measures intended to protect the environment have intended, and unintended, effects on trade in wood and paper products.

### ***Effect of Trade on the Environment***

According to many environmental organizations, the effects of increased trade, particularly in response to trade liberalization, are increased production, consumption, and deforestation or degradation.<sup>90</sup> They cite the scale effects of liberalization on increasing logging and deforestation with examples noted of the Tiger Forest in Russia;

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<sup>88</sup> Berg, Scott, Forest Stewardship Council Certification and Product Labeling in the U.S. Forestry Context, A White Paper (Washington, DC: AF&PA, undated).

<sup>89</sup> Sedjo, Roger A., Goetzl, Alberto., and Moffat, Stevenson O., *Sustainability of Temperate Forests*, (Washington, DC: Resources for the Future, 1998), p. 36.

<sup>90</sup> USITC staff interviews with Environmental NGOs, Mar. 4, 11, 18, 25, and Apr. 8, 1999.

the temperate rainforests of British Columbia, Canada, and Chile; and the tropical forests of Indonesia and Malaysia.<sup>91</sup>

Transfer of alien species on raw wood, wood chips, dunnage, crates, pallets, and packing materials is a significant threat to forests. According to one source, imported pests could be the biggest single long-term threat to America's forests.<sup>92</sup> A leading tree pest expert estimates a 50-percent chance that unprocessed wood from Siberia will carry a pest that can destroy the Douglas fir of the Pacific Northwest.<sup>93</sup>

Recent outbreaks of the Asian Long-Horned Beetle, an extremely destructive pest, have been traced to solid wood packing material imported from China. Since late 1998, all such packing materials associated with cargo from China have had to be accompanied by official Chinese Government certification that the material was heat treated, fumigated, or treated with preservatives prior to its arrival in the United States.<sup>94</sup> USDA is reportedly considering extending this requirement to other countries.<sup>95</sup>

Environmental NGOs are concerned that increased trade, again especially trade liberalization, will raise pressure to remove certain so-called non-tariff barriers which in their view might be considered forest protections.<sup>96</sup> They fear that removal of such forest protections or harmonization of standards will cause a relaxation of pest control standards that will expose forests to increased risks of infestation from exotic pests, with a potential for substantial damage to U.S. forests and timber industry.<sup>97</sup>

In particular, the environmental community has raised concerns that the provisions of the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), and the WTO dispute resolution process, may be used by exporting nations to attack an importing nation's regulations as non-tariff barriers to trade.<sup>98</sup> Under the SPS Agreement, each member nation may establish its own level of protection and an exporter challenging a phytosanitary measure as trade restrictive must demonstrate that alternative measures, particularly those that are recognized by an international body, would provide the same level of protection. However, the burden is on the importing nation to prove that the pest species the measure is intended to keep out is in fact harmful.<sup>99</sup>

Two international organizations, the Commission on Phytosanitary Measures under the International Plant Protection Convention (IPPC) and the North American Plant Protection Organization (NAPPO), play important roles in setting international standards

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<sup>91</sup> Seligman, APEC hearing transcript, Apr. 21, 1998, p. 52.

<sup>92</sup> Ibid., p. 53.

<sup>93</sup> Ibid., p. 54.

<sup>94</sup> USDA/FAS, Forest Products Trade Highlights, found at Internet address <http://ffas.usda.gov/ffpd/wood-circulars/sep98/trdhi998.htm>, retrieved on June 7, 1999, p. 1.

<sup>95</sup> DOI, Press Release, found at Internet address <http://www.doi.gov/news/990203.html>, retrieved on July 7, 1999, p.2

<sup>96</sup> Seligman, APEC hearing transcript, Apr. 21, 1998, p. 52.

<sup>97</sup> Environmental NGO official, staff interview, Apr. 8, 1999.

<sup>98</sup> Campbell, USITC hearing transcript, May 26, 1999, p. 267.

<sup>99</sup> Campbell, Faith, "Fatal Flaws," *World Conservation*, (Gland Switzerland: The World Conservation Union (IUCN), 4/97-1/98, 1998), p. 6.

related to phytosanitary measures. The IPPC is a multilateral treaty intended to secure common and effective action to prevent and control the introduction and spread of pests. The IPPC, with over 100 contracting parties, is administered through a secretariat in FAO's Plant Protection Service. The IPPC provides a framework for harmonization and technical exchange between regional and national plant protection organizations and is recognized by the WTO in the SPS Agreement as a source of international standards for phytosanitary measures affecting trade.<sup>100</sup>

NAPPO, one of the regional plant protection organizations, performs a similar role for its member countries, which are the United States, Canada, and Mexico. For example, in late 1998, NAPPO approved a new standard covering dunnage and packing materials that member countries are intending to implement by October 1, 2000. These wood items, with some exceptions, must be kiln-dried or fumigated with methyl bromide when imported into member countries.<sup>101</sup>

On February 3, 1999, President Clinton issued an Executive Order which requires Federal agencies to take steps to prevent the introduction of invasive species and to restore native species. The Executive Order created a cabinet-level Invasive Species Council to implement the order and to come up with an invasive species management plan within 18 months.<sup>102</sup>

Environmental NGOs are also concerned about social/cultural effects of increased trade in forest products, particularly those that have been associated with unsustainable forest practices. For example, they often cite the loss of lands and way of life of indigenous peoples and the resettlement of large numbers of people as forest areas are converted to other uses.<sup>103</sup>

## *Effect of Environment on Trade*

Two types of effects of environmental related activities on trade are often cited. First, there are concerns that trade restrictions or inhibitions, some related to environmental protection, may be barriers to trade. Second, there are industry concerns that differences in environmental regulations and enforcement among the major competitors may affect the competitiveness of U.S. industry. Industry representatives have expressed the view that the costs of compliance with U.S. environmental laws and requirements, particularly for manufactured products, are high relative to their competitors.<sup>104</sup> One industry spokesman attributed the loss in U.S. competitiveness in

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<sup>100</sup> FAO, International Plant Protection Convention, found at Internet address <http://www.fao.org/ag/agp/agpp/pq/>, retrieved on June 30, 1999.

<sup>101</sup> USDA/FAS, Forest Products Trade Highlights, found at Internet address <http://ffas.usda.gov/ffpd/wood-circulars/dec98/trdhi298.htm>, retrieved on June 7, 1999.

<sup>102</sup> 64 FR 25, p. 6183.

<sup>103</sup> Seligman, APEC Hearing Transcript, Apr. 21, 1998, p. 52.

<sup>104</sup> Moore, W. Henson, Transcript of the Hearing, May 26, 1999, p. 10, and written statement, p. 2.

the early 1990s directly to U.S. environmental policy to conserve habitat for endangered species.<sup>105</sup>

There are generally three types of environmentally-related mechanisms that may affect trade patterns. First, there may be restrictions on production and exports in developed countries. Second, certain markets may adopt quantitative restrictions on imports of “unsustainably produced” timber products. Third, eco-labeling and “green” certification of wood and paper products may effectively act as import barriers.<sup>106</sup>

These industry concerns are related to the recent developments in forest management. First, some believe that certification systems for SFM will impose a non-tariff barrier to trade by using such a requirement to restrict trade.<sup>107</sup> Industry is concerned that markets may effectively require that products bear the logo of one or more of the third party certification processes. Noting that certification and eco-labeling are not consistently applied in Europe, where they are now the most common, industry is also concerned that different markets may require different certifications and that this may require multiple certifications and reporting systems for the same product.<sup>108</sup> Thus, mutual recognition of certification standards and processes may become an important industry objective. Second, while recognizing that science-based phytosanitary regulations are intended to protect the health of domestic forests, some in industry are concerned that some regulations of this type may be used as disguised trade barriers.

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<sup>105</sup> Lippke, Bruce, Transcript of the Hearing, May 26, 1999, p. 148, and written statement, p. 3.

<sup>106</sup> CTE, Background Paper on Trade and Environment in Relation to Forest Products and Services: an Overview of the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF) Deliberations, WT/CTE/W/84, July 1, 1998. p. 6.

<sup>107</sup> Bourke, I. J. “Global Trends in Marketing Environmentally Certified Forest Products,” Paper delivered to the Australian Outlook Conference, Canberra, Australia, Feb. 6-8, 1996.

<sup>108</sup> Industry official, USITC interview, Mar. 15, 1999.

**APPENDIX M**  
**HEARING TESTIMONY REGARDING TRADE**  
**AND THE ENVIRONMENT**

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At the Commission hearing, witnesses testified regarding the effects of trade and trade liberalization on the environment. Although the Senate Finance Committee did not request that the Commission study the effects of trade on the environment, the testimony of these witnesses touched on issues that were in the Committee request. These relate to forestry practices, environmental regulations and compliance, and institutional financial assistance. The testimony is summarized here by subject.

## **Trade Restrictions and Their Effects on the Environment and Forestry**

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Representatives of the forest products industry suggested that trade restrictions not only reduce the efficiency and profitability of the industry but adversely impact the environment. By curtailing activities in one area, the industry argued, the main effect is a shift of similar activities into another area. In the United States, for example, it was noted that “reducing timber harvests in the Pacific Northwest . . . has simply shifted logging pressure to the U.S. South and Canada.”<sup>1</sup> Furthermore, on a global scale “the issue is not solely whether to log or not to log, but rather where to log.”<sup>2</sup> Restricting trade or timber harvests would lead to increased use of substitute materials which may not be as ecologically beneficial as using wood, given that wood is “renewable, recyclable, and biodegradable.”<sup>3</sup> It was also argued that it is far better to harvest in regions with sound forest policies and practices than those regions without these practices.<sup>4</sup> Regarding forestry practices, it was stated that U.S. practices are among the best in the world and, since most of the remaining old growth in the U.S. is now protected, most exports come from managed second growth and plantation forests that impose minimal damage on the environment.<sup>5</sup> The move towards plantation forests was suggested as a way to develop a sustainable forest product sector that remains competitive and commercially viable. These plantations allow most of the world’s industrial wood to be produced on a small portion of the land base.<sup>6</sup> Trade restrictions compromise many of the advantages of plantation forest practices.<sup>7</sup>

It was further pointed out that “Restricting markets won’t save forests. It will in fact damage them because it puts them in an unmanageable condition.”<sup>8</sup> Expanded markets for forest products were proposed as a means to improve management of the forest by providing outlets for wood not currently marketable. This view suggested that the suppression of natural disasters such as fire leads to a buildup of biomass beyond what the forest can support, and for which the forest owner can find no market. The forest

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<sup>1</sup> Roger Sedjo, Senior Fellow, Resources for the Future, Washington, DC, testimony at the Commission hearing, May 26, 1999, transcript of the hearing, at p. 67 and p. 90. Mr. Sedjo noted that the views he expressed were his own and not to be attributed to RFF.

<sup>2</sup> Ibid. p. 60.

<sup>3</sup> Ibid. p. 68.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid. p. 69.

<sup>6</sup> Sedjo, p. 68.

<sup>7</sup> Sedjo, p. 70.

<sup>8</sup> Neil Sampson, Senior Fellow, American Forests, Alexandria VA, transcript, pp. 91-92.

practices of the United States where this is occurring were compared to those of Europe where intensive utilization of biomass is practiced.<sup>9</sup>

The environmental groups testified that lifting trade restrictions will lead to increased consumption, which in turn leads to increased production and thus to increased logging.<sup>10</sup> The main cause of forest degradation is trade, according to one environmental group.<sup>11</sup> They refuted the argument that “increased consumption will be met by more efficient production,” given that clear cutting is the most economically efficient way to log and, based on Commerce Department data, lower costs of production lead to increased logging.<sup>12</sup> Using the Softwood Lumber Agreement between the U.S. and Canada and the trade dispute over U.S. softwood lumber imports as an example, they asserted that the removal of certain trade barriers will lead to deforestation, while the removal or weakening of environmental protections is the same as lowering costs or removing tariff barriers.<sup>13</sup> They called for a closer look at subsidies, tax incentives, and tax burdens in the forest products industry.<sup>14</sup>

It was noted that tariffs are not a tool for forest protection in the long run. Without the appropriate environmental protections in place, such as production process requirements, elimination of existing tariffs will increase unsustainable forest practices.<sup>15</sup> However, these production process requirements are not sanctioned by the World Trade Organization (WTO).<sup>16</sup> Furthermore, they refuted the claim that free trade will improve environmental protection, noting that since the NAFTA and the creation of the WTO, there has been an expansion of industrial logging in the United States and worldwide. This expansion has led to a weakening of environmental protections in efforts aimed at “boosting competitiveness.”<sup>17</sup>

Reductions in non-tariff barriers to trade in the forest products sector could harm environmental-protection measures, since a number of existing U.S. laws could be threatened in global efforts to reduce non-tariff barriers to trade.<sup>18</sup> In addition, they argued that the concept of sustainable forestry goes against international trade law.<sup>19</sup> International trade laws do not allow discrimination between sustainably and unsustainably harvested wood.<sup>20</sup>

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<sup>9</sup> Sampson, p. 87 and pp. 91-92.

<sup>10</sup> Antonia Juhasz, Director, International Trade and Forests Program, American Lands Alliance, Washington, DC, transcript, p. 219.

<sup>11</sup> William Snape, Legal Director, Defenders of Wildlife, Washington, DC, transcript, p. 228.

<sup>12</sup> *Ibid.*, p. 220.

<sup>13</sup> Snape, pp. 222-224.

<sup>14</sup> *Ibid.*, p. 229.

<sup>15</sup> Juhasz, p. 220.

<sup>16</sup> *Ibid.*, p. 254.

<sup>17</sup> Victor Menotti, Director, Environment Program International Forum on Globalization, San Francisco, CA, transcript, p. 209.

<sup>18</sup> *Ibid.*, p. 221.

<sup>19</sup> Snape, p. 228.

<sup>20</sup> *Ibid.*, p. 253.

With respect to environmental standards, the environmental groups considered the question of how developing countries should be assisted in increasing their standards, rather than allowing U.S. industry to unilaterally alter those standards. Some solutions offered included debt relief, technical assistance, and technology sharing. The environmental groups felt that industry has failed to help with improving environmental standards outside the United States.<sup>21</sup>

Others argued that there is no country that operates its forestry sector on ecological principles; rather, it is based mainly on economic principles.<sup>22</sup> The expansion of trade from 1990 to 1996 and the financial crisis of 1997 have put pressure on forests in different ways. In the first period, there was a wide expansion of investment and trade, while in the second, forests were viewed as a source of foreign exchange necessary to prop up the economy. Both events have negatively impacted the environmental aspects of forest resources.<sup>23</sup>

## **Trade Restrictions and Their Effects on Trade**

In the testimony favoring the removal of trade restrictions, it was noted that restricting exports in one country does not reduce trade, but instead shifts trade to other countries. Using the example of the United States and Japan (which imports 80 percent of its wood requirements), it was noted that restrictions on exports of wood products from the United States to Japan would force Japan to source its forest products from countries other than the United States.<sup>24</sup>

Not all environmental testimony was opposed to the elimination of trade barriers. Yet there was concern that the lifting of trade barriers could result in a large increase in trade that would subsequently threaten the sustainability of the environment. A study from AF&PA was cited indicating that paper and paperboard production increased significantly in the European Union, the United States, and Canada after the elimination of tariffs and other trade agreements.<sup>25</sup> There was testimony questioning the USTR's assumption that the economic benefits from increased production and consumption will automatically improve the environment.<sup>26</sup> It was pointed out instead that tariff reduction has actually caused the opposite to occur. The elimination of tariff barriers resulted in increased economic activity in the Pacific Rim but without sound environmental policies.<sup>27</sup>

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<sup>21</sup> Ibid., p. 227.

<sup>22</sup> Menotti, p. 239.

<sup>23</sup> Ibid., pp. 239-240.

<sup>24</sup> Sedjo, p. 68.

<sup>25</sup> Doug Norlen, Policy Advisor, Pacific Environment and Resources Center, Washington, DC, transcript, p. 261.

<sup>26</sup> Norlen, p. 262.

<sup>27</sup> Ibid., p. 263.

## The Effect of Bank Loans and Guarantees

There were mixed views regarding the impact of multilateral lending from groups such as the World Bank on the environment. It was suggested that the World Bank was in the process of “reassessing their forest policy strategy” and that most of their loans have sided more towards environmental protection rather than harvesting.<sup>28</sup> A second industry source noted that the World Bank reissued their pollution prevention and control handbook in 1998. This provides new guidelines that need to be met by industries that wish to receive World Bank funding, though it is unclear to date what industries have utilized these funds and whether these industries are maintaining practices in line with the World Bank regulations.<sup>29</sup> Environmental groups contend that the forest products industry views the World Bank and other multilateral lenders as a real problem. It is their hope that lending policy reforms can be an area of collaboration where industry, government, and environmental groups can collaborate to ensure that trade liberalization delivers benefits to the environment.<sup>30</sup> In order to do this, it was recommended that the process be transparent and inclusive in order to “provide the best opportunity for positive ecological results.”<sup>31</sup>

With regards to finance policy, an environmental group decried the IMF’s insistence on open capital markets in countries that lack the proper regulatory environment. Opening up markets to short-term investment and financing has created instability in the wood products sector. To better stabilize the market, it was suggested that the United States take the lead in helping reduce “the financial system’s dependence on investment, on highly leveraged position taking, and on short term debt financing.”<sup>32</sup> It was hoped that investors bear the costs of risky investments. This stability is crucial for the forest products sector to operate in an ecologically sustainable manner.<sup>33</sup>

The same environmental group pointed out that, with respect to investment policy, the recent expansion of productive capacity overseas cited by the industry as a threat to U.S. competitiveness was often created by the domestic industry itself.<sup>34</sup> This group further suggested that the Commission “examine the numbers and the names attached to all of the new pulp and paper expansion around the world” to assess who really benefits from this new capacity.<sup>35</sup>

The same group feels that the U.S. can help to create a rules-based approach to investment decisions that “discourage companies from going abroad to seek out cost reductions for labor and environmental protection.”<sup>36</sup> The main hope would be to ensure

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<sup>28</sup> Sedjo, p. 85.

<sup>29</sup> Patricia Fleischauer, Vice President, ENSR Consulting, Acton, MA, transcript, pp. 85-86.

<sup>30</sup> Menotti, p. 215.

<sup>31</sup> Ibid., p. 216.

<sup>32</sup> Menotti, p. 211.

<sup>33</sup> Ibid.

<sup>34</sup> Menotti, p. 212.

<sup>35</sup> Ibid., p. 212.

<sup>36</sup> Ibid., pp. 212-213.

that foreign investment promotes development and transfers good forestry practices rather than simply exploiting cheaper labor costs and lax regulations.<sup>37</sup>

## **Environmental Regulatory Compliance**

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An industry representative testified that continued production of forest products in the United States helps the environment given the stringent environmental regulations of the United States.<sup>38</sup> Firms operating in the U.S. include the costs of compliance in their operating costs.<sup>39</sup> The industry acknowledged that developing countries often do not have the equivalent environmental regulations or enforcement of the United States.<sup>40</sup> When U.S. firms go abroad, they seek out the local environmental regulations and adhere to them, despite the cost to the company.<sup>41</sup> The industry representative was not aware of any cost data or studies that support the idea of the U.S. forest products industries being at a competitive disadvantage as a result of this type of policy.<sup>42</sup>

An environmental representative noted that U.S. companies have shaped the forest practices codes, enforcement capabilities, and national subsidy programs in other countries, often at the expense of the environment and competitiveness of the U.S. affiliates.<sup>43</sup>

## **Phytosanitary Regulations**

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One representative of an environmental panel testified before the Commission regarding non-tariff barriers to trade, specifically phytosanitary regulations. International trade, it was noted, is dangerous in the sense that it allows species and pests from one ecosystem to be transported to another, which can lead to severe ecological and economic consequences.<sup>44</sup> In particular, unprocessed wood can harbor unwanted pests. Further strengthening of phytosanitary measures, which are currently inadequate, is important in order “to protect the economic viability of agriculture, horticulture and numerous other activities.”<sup>45</sup> Unfortunately, as trade expands, there is more pressure to reduce these types

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<sup>37</sup> Ibid., p. 213.

<sup>38</sup> Fleischauer, p. 77.

<sup>39</sup> Ibid. p. 78.

<sup>40</sup> Fleischauer, p. 80.

<sup>41</sup> Ibid., p. 96.

<sup>42</sup> Ibid., pp. 93-94.

<sup>43</sup> Menotti, pp. 213-214.

<sup>44</sup> Faith Campbell, Director, Invasive Species Program, American Lands Alliance, Washington, DC, transcript, p. 265.

<sup>45</sup> Ibid., pp. 265-266. Ms. Campbell notes that pests introduced in the past cost the U.S. forest products industry approximately four billion dollars annually and cost the federal government \$12 million in efforts to deal with these pests. Ms. Campbell predicts that these costs will increase as alien pests are introduced (if trade in forest products increases). She further predicted that pests from East Asia, Siberia, and China alone will cost \$90 billion over a ten year period.

of non-tariff barriers.<sup>46</sup> WTO rules result in a weakening of phytosanitary regulations. This representative argued that the United States has an obligation to make sure that its own forest product exports do not carry pests.<sup>47</sup>

## Forestry Practices

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The industry also addressed criticism from the environmental community on current forest practices. The industry notes that the large forest resource available in the United States is a positive factor, but presents certain management problems. In the United States, two-thirds of forestry resources is owned by small, nonindustrial, private owners, which are becoming increasingly fragmented. For sustainable forest management to be a feasible alternative for a landowner, it must also be economically sustainable to that landowner. This proves to be a problem for the small nonindustrial and private owners. These owners also face a lack of markets for both low and high quality material.<sup>48</sup>

U.S. forestry practices were generally conceded to be as good or better than those of other countries.<sup>49</sup> Practices in other countries differ greatly. European practices in general can be viewed as sustainable even if they work in a different manner. Mr. Sedjo (Senior Fellow, Resources for the Future) noted that forestry practices in other parts of the world have opened up the forests to people wanting to use the land for agricultural purposes.<sup>50</sup> Mr. Sedjo also noted that plantation forestry requires substantial investment and generally occurs on land previously used for agriculture.<sup>51</sup>

The Commission asked the environmental groups about the role played by reforestation. One group indicated that reforestation does not necessarily equate to the creation of a new forest, though reforestation (specifically the planting of trees) does have to be part of the solution. The group further supported the industry view regarding the use of plantations, stating they could play a major role in the availability of wood and paper products.<sup>52</sup>

The environmental groups disputed the industry's claims about the environmental standards in Canada, which the industry considered similar to those of the United States.<sup>53</sup> In British Columbia, a major forest products producing province of Canada, many standards are far behind those in the United States, including clear-cut levels, clear-cut

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<sup>46</sup> Campbell, p. 266.

<sup>47</sup> Campbell, p. 267. Articles by Ms. Campbell which she refers to here include: an article from the last hearing that discusses the problems associated with the International Plan Protection Convention and the WTO's SPS agreement, an article from Business Week discussing invasive species and the role of trade, and a letter to the editor of the Washington Post that was published on May 26, 1999.

<sup>48</sup> Sampson, p. 73.

<sup>49</sup> Sedjo, p. 68, Snape, p. 226 and p. 234.

<sup>50</sup> Sedjo, p. 99.

<sup>51</sup> Ibid., p. 100.

<sup>52</sup> Snape, pp. 247-248.

<sup>53</sup> Snape, p. 225.

sizes, and buffer areas.<sup>54</sup> The United States has fairly stringent rules on these matters, while Canada and British Columbia have loose regulations. In addition, Canada lacks an endangered species act. The existence of an endangered species act in the United States negatively impacts forest harvest levels and puts producers at a competitive disadvantage. The solution to this situation is to bring other standards to U.S. levels, not to weaken existing U.S. regulations.<sup>55</sup>

## Forest Certification

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The Global Forest Policy Project has been involved with forest certification from its inception and has played an active role in the founding and development of the Forest Stewardship Council (FSC). Certification that forests are sustainably managed and labeling forest products to certify that they originated from sustainable forests have become part of the international forest policy debate around the world.<sup>56</sup> Certification gives consumers a greater degree of information and helps them to make more informed choices in the marketplace.<sup>57</sup> The Global Forest Policy Project does not believe the FSC to be a barrier to trade as it does not violate any WTO rules.<sup>58</sup>

Four elements constitute a credible certification program: (1) a strong set of forest management performance standards; (2) independent third party verification; (3) ability to associate a label with a specific forest on the ground; and (4) veracity of market claims.<sup>59</sup>

Free market principles should prevail in the certification of forest resources, with limited government interference.<sup>60</sup> The FSC has certified 40 million acres of forest resources in 30 countries. A number of other organizations have begun to certify forests, and the FSC is fully open to competing with these organizations in the marketplace and allowing consumers to choose the one they like best.<sup>61</sup>

It was noted that there are still many in the forest industry who oppose forest certification. Most of this opposition comes from a lack of agreement on the type of information that should be included as part of a certification program.<sup>62</sup> It was alleged that alternative programs, such as ones supported by the AF&PA or individual countries, such as Malaysia and Indonesia, do not have the strong standards of the FSC.<sup>63</sup> Industry representatives responded to Commission inquiries on third party sustainable forestry

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<sup>54</sup> Ibid., p. 234.

<sup>55</sup> Snape, pp. 233-235.

<sup>56</sup> Bill Mankin, Director, Global Forest Policy Project, Washington, DC, transcript, p. 268.

<sup>57</sup> Ibid., pp. 268-269.

<sup>58</sup> Ibid., p. 270.

<sup>59</sup> Ibid., p. 270.

<sup>60</sup> Ibid., p. 271.

<sup>61</sup> Ibid., p. 272.

<sup>62</sup> Ibid., p. 273.

<sup>63</sup> Ibid., pp. 287-288.

certification systems, such as the FSC. The industry noted that the sustainable forest initiative itself has created a voluntary third party verification option, which will become a common part of what is being called environmental auditing in the country.<sup>64</sup>

The industry noted that the sustainable forest initiative (SFI) is an important part of a movement that is changing the practice of forestry in the United States. However, the changes that are being made are not yet well documented by the data since these changes are recent and the necessary research to document them is still in the early stages. The industry contends that the forest management that is taking place in the United States is on the cutting edge in terms of sustainability and sophistication in its management.

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<sup>64</sup> Sampson, p. 83.