

---

---

# INTERNATIONAL ECONOMIC REVIEW

---

---

United States International Trade Commission  
Office of Economics

Washington DC  
20436

**March 1995**

*In This Issue:*

**International Economic Comparisons**

**U.S. Trade Developments**

**International Trade Developments:**

*Financial Crisis in Mexico*

*U.S. Firms May Help Rebuild in Aftermath of Japanese Quake*

*The Latin American Market: Investment, Trade Opportunities, and Finance*

**Special Focus**

*Trade Liberalization and Pollution in Manufacturing*

**Statistical Tables**



---

## OFFICE OF ECONOMICS

Peter G. Morici, *Director*

---

---

The *International Economic Review* is a monthly staff publication of the Office of Economics, U.S. International Trade Commission. The opinions and conclusions it contains are those of the authors and do not necessarily reflect the views of the Commission or of any individual Commissioner. The *IER* is produced as part of the Commission's international trade monitoring program. Its purpose is to keep the Commission informed about significant developments in international economics and trade and to maintain the Commission's readiness to carry out its responsibility to provide technical information and advice on international trade matters to policymakers in the Congress and the Executive branch. The *IER* is available to Government officials outside the Commission on a request basis. Inquiries or comment on items appearing in the *IER* may be made directly to the author, or to:

Editor, *International Economic Review*  
Trade Reports Division/OE, Room 602  
U.S. International Trade Commission  
500 E Street SW., Washington, DC 20436  
Telephone (202) 205-3255

---

# TABLE OF CONTENTS

	<i>Page</i>
<b>INTERNATIONAL ECONOMIC COMPARISONS</b>	
(Michael Youssef, 202-205-3269) .....	1
<b>U.S. TRADE DEVELOPMENTS</b>	
(Michael Youssef, 202-205-3269) .....	7
<b>INTERNATIONAL TRADE DEVELOPMENTS</b>	
<i>Financial crisis in Mexico</i>	
Mexico's first year under the North American Free Trade Agreement (NAFTA) ended with a financial crisis. The crisis was precipitated by sociopolitical tensions in Mexico that discouraged portfolio investors from continuing to finance the country's large current payments' account deficit.	
(Magda Kornis, 202-205-3261) .....	11
<i>U.S. Firms May Help Rebuild in Aftermath of Japanese Quake</i>	
U.S. glass manufacturers are likely to participate in the reconstruction of earthquake-ravaged Kobe, Japan, thanks to a recent market access agreement covering flat glass signed during the U.S.-Japan Framework for New Economic Relationships talks.	
(William Greene, 202-205-3240) .....	13
<i>The Latin American Market: Investment, Trade Opportunities and Finance</i>	
Participants in the 1995 Latin American Market Conference, held February 8-10, 1994, discussed the peso crisis and next steps toward hemispheric economic integration.	
(Sandra Rivera, 202-205-3007) .....	14
<b>SPECIAL FOCUS:</b>	
<i>Trade Liberalization and Pollution in Manufacturing</i>	
Increasingly, concerns are expressed that trade liberalization may increase air and water pollution or that the United States is at a competitive disadvantage because of its relatively strong environmental regulations relative to developing countries. A growing body of evidence shows that environmental regulation makes little difference to the trade performance of the industries it affects most. This article is adapted from a forthcoming USITC working paper.	
(Michael Ferrantino, 202-205-3241) .....	18
<b>STATISTICAL TABLES</b>	
(Dean Moore, 202-205-3259) .....	27



---

# INTERNATIONAL ECONOMIC COMPARISONS

## Summary of U.S. Economic Conditions

Interest rate hikes by the Federal Reserve are currently expected to cause a slowdown in economic activity in 1995. GDP growth is projected to grow by a 3.1-percent annual rate in the first quarter of 1995 and by an average rate of 2.5 percent during the remainder of the year. Inflation is expected to remain subdued because of rising labor productivity and lower unit labor costs. In 1994, the U.S. economy grew by 4.0 percent (\$207.8 billion), compared with a 3.1-percent increase in 1993, according to the U.S. Department of Commerce. The strong economic performance was propelled by consumers' and producers' spending that accounted for the bulk of the increase in GDP in 1994. Real consumption expenditures increased by 3.5 percent (\$119.8 billion). Nonresidential fixed investment increased by 13.7 percent (\$80.8 billion); residential fixed investment increased by 8.3 percent. In the foreign sector, exports reached a record high, increasing by 8.7 percent to a total of \$654.8 billion in 1994. Imports, however, increased by 13.7 percent to a total of \$769.0 billion. The merchandise trade deficit increased to \$104.2 billion from \$73.8 billion in 1993.

Several economic sectors slackened in January. Industrial output, housing, car sales and production and retail sales have slackened far below their growth rates during preceding months. The unemployment rate started climbing in January 1995, following a marked decline in December 1994. Retail sales rose by a modest 0.2 percent in January, an appreciable easing since April 1994. In addition, new construction contracts exhibited the largest plunge in 3 years.

The slowdown in economic activity is expected to be more pronounced in services than in manufactures for the following reasons. First, industrial capacity expanded in 1994. Second, a backlog of factory-unfilled orders—resulting in part from the strong rise in new orders for manufactures to \$298.6 billion in December 1994—will keep factories humming for a while in 1995. Third, unfilled orders increased in December by 2.9 percent to total \$431.2 billion. Finally, U.S. labor productivity has been

growing strongly, and unit labor costs remained subdued in manufacturing more than in other sectors.

## U.S. Labor Productivity and Costs

U.S. labor productivity grew and labor costs moderated in the fourth quarter of 1994 and for the year as a whole. Table 1 shows productivity, output, and cost changes in the fourth quarter of 1994 (seasonally adjusted annual rates), and table 2 shows annual changes in productivity and related measures, 1985-94. Productivity grew in the business sector by 1.7 percent in the fourth quarter and by 2.3 percent for the year 1994. In the nonfarm business sector, productivity grew by 1.8 percent in the fourth quarter and by 2.2 percent in 1994. Manufactures productivity set the pace of growth, rising by 2.8 percent in the fourth quarter and by 4.9 percent for the year. Productivity in durable goods manufacturing rose more rapidly, by 3.8 percent in the fourth quarter, than productivity in nondurable goods, which grew by 1.2 percent.

Long-term trends of productivity growth show a strong resurgence in U.S. labor productivity and output in recent years. Despite poor growth in the period 1987-90, since 1992, both productivity and output measures have continued to strengthen particularly in the manufacturing sector. Over most of the period 1985-94, manufacturing productivity and output showed remarkable growth. Also notable was the decline in manufacturing unit labor costs. After falling in 1985-87, these costs peaked in 1990 but then resumed decline, reaching their lowest levels in 1994.

Labor cost is one of several determinants of competitiveness in international markets. Comparison of hourly compensation costs in all manufactures between several major industrial countries and the United States shows large decreases in U.S. labor costs in more recent years than in the past, relative to those of other countries. Indexes of hourly compensation costs for workers in all manufacturing and for iron and steel workers, taking the United States as the benchmark country, are shown in table 3. From 1983 to 1986, U.S. compensation costs for production workers

**Table 1**  
**Productivity and costs change from preceding quarter, fourth quarter 1994, seasonally adjusted at annual rates**

(Percent)

	Productivity	Output	Hours	Hourly compensation	Real hourly compensation	Unit labor costs
Business .....	1.7	5.4	3.7	3.4	1.1	1.7
Nonfarm business .....	1.8	5.4	3.6	3.7	1.4	1.9
Manufacturing .....	2.8	7.7	4.8	3.7	1.4	0.8
Durable .....	3.8	10.4	6.3	4.4	2.1	0.5
Nondurable .....	1.2	3.9	2.7	2.3	0	1.0

Source: U.S. Bureau of Labor Statistics.

in manufacturing were higher than those of 14 of the 15 countries included in the comparison, with Germany the exception. Starting in 1987, U.S. compensation costs dropped below those of Austria, Belgium, Denmark, Germany, and Norway. Cost advantages in favor of the United States increased over the period 1987-93. In 1993, U.S. production costs were below those of the eight major industrial countries, including Japan and Germany.

Hourly compensation costs in iron and steel production exhibited a similar trend. From 1983 to 1989, U.S. compensation costs were higher than the costs of the seven countries included in the comparison. Since 1992, the United States gained labor-cost advantages against Japan and Germany, but U.S. compensation costs were higher than those of the five remaining countries. Despite the gains in compensation costs, the U.S. trade deficit in manufacturing reached \$115 billion in 1993 and increased to \$155.8 billion in 1994. The U.S. trade deficit in iron and steel manufacturing amounted to \$5.7 billion in 1993 and increased to \$9.3 billion in 1994.

## U.S. Economic Performance Relative to Other Group of Seven Members

### Economic Growth

Real GDP—the output of goods and services produced in the United States measured in 1987 prices—grew at a 4.5 percent rate in the fourth quarter, following a 4.0-percent seasonally adjusted annual rate in the third quarter of 1994. Real GDP increased by 4.0 percent in 1994 compared with an increase of 3.1 percent in 1993.

The annualized rate of real economic growth in the fourth quarter was 3.1 percent in the United Kingdom. In the third quarter of 1994, the annualized rate of real economic growth was 4.7 percent in Canada, 3.3 percent in France, 5.3 percent in Germany, 4.0 percent in Italy, and 3.7 percent in Japan.

### Industrial Production

Industrial production rose by 0.4 percent in January 1995, about one-half of the gain posted in the previous 2 months. The slowing was spread in manufacturing, with output of durable and nondurable goods production showing a noticeable slowdown. The production of durable consumer goods rose by 0.6 percent, compared with a 2.2-percent increase in December. Automotive production advanced a mere 0.7 percent, compared with a gain of more than 5 percent in the preceding 2 months. Output of consumer durables rose by 0.6 percent, one-half of the gain in December. Industrial production in January 1995 was 6.2 percent more than that of a year earlier. Industrial capacity utilization edged up 0.1 percent in January from December and increased by 2.8 percent over that of a year earlier.

Other Group of Seven (G-7) member countries reported the following annual growth rates of industrial production for the year ending December 1994: Germany reported an increase of 7.3 percent; Japan, 6.8 percent, France, 6.4 percent, Italy, 6.1 percent and the United Kingdom, 5.3 percent. For the year ending November 1994, Canada reported an increase of 8.0 percent.

### Prices

The seasonally adjusted Consumer Price Index (CPI) increased by 0.3 percent in January following a 0.1-percent increase in December 1994. The CPI advanced by 2.8 percent during the 12 months ending January 1995.

**Table 2**  
**Trends in annual productivity and output changes and related measures, 1985-94**  
*(Percent)*

Measure	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
<b>Business:</b>										
Productivity .....	1.4	2.1	1.0	1.0	-0.7	0.7	1.3	3.0	1.5	2.3
Output .....	3.6	2.8	4.1	4.3	1.7	0.7	-1.0	2.7	3.8	5.3
Hours .....	2.1	0.6	3.0	3.3	2.5	0.1	-2.3	-0.3	2.2	2.9
Hourly compensation .....	4.5	5.0	3.6	4.4	3.5	5.7	4.8	5.1	3.6	3.2
Real hourly compensation .....	0.9	3.1	-0.1	0.2	-1.3	0.3	0.6	2.0	0.6	0.6
Unit labor cost .....	3.0	2.8	2.5	3.4	4.3	5.0	3.5	2.1	2.0	0.9
<b>Nonfarm Business:</b>										
Productivity .....	0.8	2.0	0.8	1.0	-0.9	0.4	1.5	2.7	1.5	2.2
Output .....	3.4	2.8	4.1	4.4	1.7	0.6	-1.0	2.4	4.1	5.2
Hours .....	2.5	0.8	3.2	3.4	2.6	0.2	-2.4	-0.3	2.5	2.9
Hourly compensation .....	4.1	5.0	3.5	4.2	3.3	-5.5	5.0	5.1	3.3	3.1
Real hourly compensation .....	0.6	3.1	-0.2	0.1	-1.4	0.1	0.8	2.0	0.2	0.6
Unit labor cost .....	3.3	2.9	2.6	3.3	4.3	5.1	3.5	2.4	1.7	0.9
<b>Manufacturing:</b>										
Productivity .....	3.2	2.6	6.5	2.3	0.6	1.8	2.3	2.1	3.2	4.9
Output .....	2.4	1.1	7.2	5.2	0.9	-0.4	-1.9	1.5	4.1	6.2
Hours .....	-0.7	-1.5	0.7	2.9	0.4	-2.2	-4.1	-0.6	0.8	1.2
Hourly compensation .....	5.0	4.1	2.3	3.9	3.9	5.3	5.3	4.2	3.3	2.8
Real hourly compensation .....	1.4	2.2	-1.3	-0.2	-0.9	-0.1	1.1	1.2	0.3	0.3
Unit labor cost .....	1.8	1.5	-3.9	1.6	3.3	3.5	3.0	2.1	0.1	-1.9

Source: U.S. Bureau of Labor Statistics.

**Table 3**  
**International comparison of hourly compensation costs for production workers in manufacturing, 1983-93**  
*Index U.S.=100*

Country	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
<b>All manufactures</b>											
United States .....	100	100	100	100	100	100	100	100	100	100	100
Canada .....	92	89	84	84	89	97	103	106	110	105	98
Japan .....	50	50	49	70	80	91	88	86	94	101	114
Austria .....	64	59	58	81	101	104	99	119	116	126	121
Belgium .....	75	69	69	94	113	114	108	129	127	138	127
Denmark .....	72	64	62	83	108	109	101	120	117	124	114
France .....	64	58	58	78	91	93	88	102	98	105	97
Germany .....	85	75	74	101	126	131	124	147	146	157	154
Italy .....	63	59	59	79	96	101	101	119	119	121	96
Netherlands .....	78	69	67	92	112	114	105	123	117	126	119
Norway .....	85	80	80	100	124	133	128	144	139	143	121
Spain .....	38	36	36	47	56	61	62	76	78	83	69
Sweden .....	73	73	74	94	112	121	122	140	142	152	106
Switzerland .....	86	77	74	104	126	129	117	140	139	144	135
United Kingdom .....	53	48	48	58	67	76	74	85	88	89	76
<b>Iron and steel manufacturing (US SIC 331)</b>											
Canada .....	73	76	71	70	75	79	85	87	90	86	78
Japan .....	51	54	51	74	86	96	97	95	98	106	112
France .....	45	44	43	58	68	69	68	80	76	60	72
Germany .....	54	53	52	70	87	88	87	102	99	106	100
Italy .....	44	44	43	57	70	71	73	87	87	87	66
Netherlands .....	56	53	49	67	83	83	70	96	93	99	n/a
United Kingdom .....	35	34	33	41	49	54	54	61	61	62	51

Source: U.S. Bureau of Labor Statistics.

During the 1-year period ending January 1995, prices increased by 0.2 percent in Canada, 1.7 percent in France, 2.3 percent in Germany, 3.8 percent in Italy, 0.7 percent in Japan, and 3.3 percent in the United Kingdom.

## ***Employment***

The U.S. Bureau of Labor Statistics reported that unemployment rose to 5.7 percent in January 1995, after declining markedly during 1994. The unemployment rate fell by 1.3 percentage points, from 6.7 percent in January to 5.4 percent in December 1994. Job slowdown was spread across worker groups. The jobless rate for men was up by 0.3 percentage point to 5.0 percent; the jobless rate for women rose slightly to 4.9 percent; and the jobless rate for teenagers (16.7 percent) was little changed from that of the previous month. The rate for Hispanics rose to 10.2 percent in January, equaling that for blacks. The rate for whites, at 4.9 percent, changed little from December.

Manufacturing continued to add jobs, but job growth in services and retail trade was considerably slower than in recent months. Manufacturing employment increased by 39,000 jobs. Gains were concentrated in motor vehicles, fabricated metals, industrial machinery, and rubber and plastics. Employment in the construction industry increased by 27,000 in January, boosted by relatively mild temperatures across the nation. Services employment increased by 53,000 in January, the smallest monthly gain in nearly 2 years. Wholesale trade employment increased by 16,000, continuing its pace of job growth set over the past year. In contrast, government employment decreased by 32,000 over the month.

For comparison with other G-7 countries, the unemployment rate in January 1995 was 8.2 percent in Germany, 9.7 percent in Canada, 12.6 percent in France, 12.2 percent in Italy, 2.8 percent in Japan, and 8.5 percent in the United Kingdom.

## **Forecasts**

Forecasters expect real growth in the United States to slow to an average of 3.1 percent (annual rate) in the first quarter of 1995 and then to slow to 2.1 percent (annual rate) in the second half of the year. Factors that may restrain the recovery in 1995 include the impact of rising interest rates on new investment, of output, and of incomes, and the contractionary impact of the decline in government spending. Table 4 shows macroeconomic projections for the U.S. economy from January to December 1995, by six major forecasters, and the simple average of these forecasts. Forecasts of all the economic indicators except unemployment are presented as percentage changes over the preceding quarter, on an annualized basis. The forecasts of the unemployment rate are averages for the quarter.

The average of the forecasts points to an unemployment rate of 5.6 percent in the first quarter of 1995 and then to a rise to 5.9 percent in the third quarter. A mounting backlog of manufactures unfilled orders will induce factories to sustain their hiring in 1995. Inflation (as measured by the GDP deflator) is expected to remain subdued at an average rate of about 3.1 percent in the first three quarters of 1995 and then to decline in the last quarter to an average of 2.8 percent. Gains in labor productivity and a slow rise in labor costs, wages, and compensation are expected to hold down inflation rates.

**Table 4**  
**Projected changes of selected U.S. economic indicators, by quarters, Jan.-Dec. 95**  
*(Percent)*

Period	Confer- ence Board	E.I. Dupont	UCLA Business Forecasting Project	Merrill Lynch Capital Markets	Data Resources Inc. (D.R.I.)	Wharton WEFA Group	Mean of 6 fore- casts
<b>GDP current dollars</b>							
1995:							
Jan.-Mar. ....	7.5	6.2	7.4	6.4	5.8	5.0	6.4
Apr.-June. ....	7.3	6.4	5.3	5.5	4.5	5.1	5.7
July-Sep. ....	6.3	5.5	5.5	5.3	3.1	5.5	5.2
Oct.-Dec. ....	7.4	5.6	4.7	5.1	3.1	4.5	5.1
<b>GDP constant (1987) dollars</b>							
1995:							
Jan.-Mar. ....	3.9	3.1	3.9	2.9	3.0	2.0	3.1
April-June. ....	4.0	2.8	2.1	2.5	2.0	2.6	2.7
July-Sep. ....	3.2	2.0	2.0	2.3	0.5	2.4	2.1
Oct.-Dec. ....	4.1	2.0	1.9	2.0	1.0	1.9	2.1
<b>GDP deflator index</b>							
1995:							
Jan.-Mar. ....	3.4	2.9	3.4	3.4	2.7	2.9	3.1
April-June. ....	3.2	.5	3.1	3.0	2.6	2.4	3.0
July-Sep. ....	3.0	3.5	3.4	2.9	2.6	3.1	3.1
Oct.-Dec. ....	3.2	3.4	2.8	3.0	2.1	2.5	2.8
<b>Unemployment, average rate</b>							
1995:							
Jan.-Mar. ....	5.5	5.4	5.5	5.8	5.6	5.7	5.6
April-June. ....	5.5	5.3	5.4	5.8	5.3	5.7	5.5
July-Sep. ....	5.1	5.4	5.3	5.7	5.4	7.7	5.9
Oct.-Dec. ....	5.0	5.5	5.3	5.7	5.5	5.9	5.5

Note.—Except for the unemployment rate, percentage changes in the forecast represent compounded annual rates of change from preceding period. Quarterly data are seasonally adjusted. Date of forecasts: February 1995.

Source: Compiled from data provided by the Conference Board. Used with permission.

## U.S. TRADE DEVELOPMENTS

The U.S. Department of Commerce reported that seasonally adjusted exports of goods and services of \$63.6 billion and imports of \$70.9 billion in December 1994 resulted in a goods and services trade deficit of \$7.3 billion for the final month of the 1994, \$2.7 billion less than the November deficit of \$10.0 billion. The December 1994 deficit was \$2.8 billion more than the deficit registered in December 1993 (\$4.5 billion) and \$1.4 billion less than the average monthly deficit registered during the previous 12 months (\$8.7 billion).

The December trade deficit in goods was \$12.7 billion, approximately \$2.4 billion less than the November deficit of \$15.1 billion. The December

services surplus was \$5.3 billion, approximately \$0.2 billion more than the November surplus of \$5.1 billion.

The total deficit for 1994 was \$108.1 billion, \$32.4 billion more than the 1993 deficit (\$75.7 billion). Exports totaled \$696.4 billion and imports totaled \$804.5 billion. Table 5 shows seasonally adjusted U.S. trade in goods and services in billions of dollars, as reported by the U.S. Department of Commerce. Table 6 shows nominal export changes and trade balances for specific major commodity sectors. Table 7 shows U.S. exports and imports of goods with major trading partners on a monthly and year-to-date basis. Table 8 shows U.S. trade in services by major categories.

**Table 5**  
**U.S. trade in goods and services, seasonally adjusted, Nov.-Dec. 1994**  
*(Billion dollars)*

Item	Exports		Imports		Trade balance	
	Dec. 94	Nov. 94	Dec. 94	Nov. 94	Dec. 94	Nov. 94
Trade in goods (BOP basis):						
Current dollars—						
Including oil .....	46.7	44.9	59.4	60.0	-12.7	-15.1
Excluding oil .....	46.9	45.1	55.0	55.2	-8.1	-10.1
Trade in services:						
Current dollars .....	16.8	16.7	11.5	11.6	5.3	5.1
Trade in goods and services:						
Current dollars .....	63.6	61.6	70.9	71.6	-7.3	-10.0
Trade in goods (Census basis):						
1987 dollars .....	46.1	44.4	57.1	58.1	-11.0	-13.7
Advanced-technology products (current dollars, not seasonally adjusted) .....	11.5	10.5	9.3	9.3	2.2	1.2

Note.—Data on goods trade are presented on a Balance-of-Payments (BOP) basis that reflects adjustments for timing, coverage, and valuation of data compiled by the U.S. Census Bureau. The major adjustments on BOP basis exclude military trade but include nonmonetary gold transactions and estimates of inland freight in Canada and Mexico not included in the Census Bureau data.

Source: U.S. Department of Commerce News (FT 900), Feb. 17, 1995

**Table 6**  
**Nominal U.S. exports and trade balances of agriculture and specified manufacturing sectors,**  
**Jan. 1993-Dec. 1994**

Sector	1994 Exports		Change, Jan.-Dec. 1994 over Jan.-Dec. 1993		Share of total, Jan.-Dec. 1994	Trade balances, Jan.-Dec. 1994
	Jan.-Dec. 1994	Dec. 1994	Jan.-Dec. 1993	Dec. 1994 over Nov. 1994		
	Billion dollars		Percent		Billion dollars	
ADP equipment & office machinery .....	30.9	3.3	13.6	22.2	6.0	-21.2
Airplane .....	18.8	1.5	-11.7	7.1	3.7	15.0
Airplane parts .....	9.8	.9	3.2	0	1.9	7.1
Electrical machinery .....	44.3	3.9	20.4	0	8.6	-13.4
General industrial machinery .....	21.8	2.0	11.8	11.1	4.3	.5
Iron & steel mill products .....	3.6	.3	9.1	0	.7	-9.3
Inorganic chemicals .....	4.1	.4	7.9	0	.8	0
Organic chemicals .....	12.8	1.3	15.3	18.2	2.5	2.0
Power-generating machinery .....	20.3	1.8	5.7	0	4.0	0.7
Scientific instruments .....	16.5	1.5	8.6	7.1	3.2	6.5
Specialized industrial machinery .....	19.7	1.8	11.9	5.9	3.8	3.0
Telecommunications .....	15.8	1.6	20.6	6.7	3.1	-16.7
Textile yarns, fabrics and articles .....	6.4	.6	8.5	0	1.2	-2.8
Vehicle parts .....	21.2	1.8	9.8	-10.0	4.1	1.6
Other manufactured goods <sup>1</sup> .....	28.8	2.5	9.9	-7.4	5.6	-12.3
Manufactured exports not included above .....	127.3	10.9	9.9	0	24.8	-116.5
Total manufactures .....	402.1	36.1	10.2	2.8	78.4	-155.8
Agriculture .....	44.9	5.0	7.2	8.7	8.8	19.0
Other exports not incl. above .....	65.7	6.0	12.5	-3.2	12.8	-14.3
Total exports of goods .....	512.7	47.1	10.2	2.6	100.0	-151.1

<sup>1</sup> This is an official U.S. Department of Commerce commodity grouping.

Note.—Because of rounding, figures may not add to the totals shown. Data are presented on a Census basis.

Source: U.S. Department of Commerce News (FT 900), Feb. 1995.

**Table 7**  
**U.S. exports and imports of goods with major trading partners, Jan. 1993-Dec. 1994**  
*(Billion dollars)*

Country/area	Exports			Imports		
	Dec. 94	Jan.-Dec. 94	Jan.-Dec. 93	Dec. 94	Jan.-Dec. 94	Jan.-Dec. 93
North America .....	14.1	165.3	142.0	15.6	178.4	151.1
Canada .....	9.8	114.4	100.4	11.4	128.9	111.2
Mexico .....	4.3	50.8	41.6	4.2	49.5	39.9
Western Europe .....	11.6	118.1	113.7	11.8	130.7	15.6
European Union (EU) .....	10.2	102.8	97.0	10.0	110.9	97.9
Germany .....	1.9	19.2	18.9	3.1	31.8	28.6
European Free-Trade Association (EFTA) <sup>1</sup> .....	1.1	12.0	12.7	1.6	17.7	15.8
Former Soviet Union/ Eastern Europe .....	0.4	5.3	6.1	0.6	5.8	3.5
Former Soviet Union .....	0.2	3.6	4.0	0.5	3.8	2.1
Russia .....	0.2	2.6	3.0	0.4	3.2	1.7
Pacific Rim Countries .....	13.4	147.8	131.6	22.0	261.1	229.6
Australia .....	0.9	9.8	8.3	0.2	3.2	3.3
China .....	0.8	9.3	8.8	2.8	38.8	31.5
Japan .....	4.7	53.5	47.9	10.2	119.2	107.3
NICs <sup>2</sup> .....	5.7	59.6	52.5	6.2	71.4	64.6
South/Central America .....	4.4	41.7	36.8	3.3	38.5	34.5
Argentina .....	0.4	4.5	3.8	0.2	1.7	1.2
Brazil .....	1.1	8.1	6.1	0.7	8.7	7.5
OPEC .....	1.7	17.9	19.5	2.7	31.7	31.7
<b>Total .....</b>	<b>47.1</b>	<b>512.7</b>	<b>465.1</b>	<b>57.5</b>	<b>663.8</b>	<b>580.7</b>

<sup>1</sup> EFTA includes Austria, Finland, Iceland, Liechtenstein, Norway, Sweden, and Switzerland.

<sup>2</sup> The newly industrializing countries (NICs) include Hong Kong, the Republic of Korea, Singapore, and Taiwan.

Note.—Country/area figures may not add to the totals shown because of rounding. Exports of certain grains, oilseeds, and satellites are excluded from country/area exports but included in total export table. Also some countries are included in more than one area. Data are presented on a Census Bureau basis.

Source: U.S. Department of Commerce News (FT 900), Feb. 1995.

**Table 8**  
**Nominal U.S. exports and trade balances of services, by sectors, Jan. 1993-Dec. 1994 seasonally adjusted**

Service Sector	Exports		Change	Trade balances	
	Jan.- Dec. 1993	Jan.- Dec. 1994	Jan.- Dec. 1994 over Jan.- Dec. 1993	Jan.- Dec. 1993	Jan.- Dec. 1994
	Billion dollars		Percent	Billion dollars	
Travel .....	57.6	59.1	2.6	17.0	16.0
Passenger fares .....	16.5	17.1	3.3	5.2	4.5
Other transportation .....	23.1	24.5	5.8	-1.5	-1.2
Royalties and license fees .....	20.4	22.5	10.3	15.6	16.5
Other private services <sup>1</sup> .....	54.9	58.4	6.4	22.8	23.6
Transfers under U.S. military sales contracts .....	11.4	11.1	-2.7	-0.8	0.5
U.S. Govt. miscellaneous services .....	0.8	0.7	-13.6	-1.5	-1.9
<b>Total .....</b>	<b>184.8</b>	<b>193.6</b>	<b>4.6</b>	<b>56.9</b>	<b>58.0</b>

<sup>1</sup> "Other private services" consists of transactions with affiliated and unaffiliated foreigners. These transactions include educational, financial, insurance, telecommunications, and such technical services as business, advertising, computer and data processing, and such other information services as engineering, consulting, and so forth.

Note: Services trade data are on a Balance-of-Payments (BOP) basis. Numbers may not add to totals because of seasonal adjustment and rounding.

Source: U.S. Department of Commerce News (FT 900), Feb. 1995.

---

# INTERNATIONAL TRADE DEVELOPMENTS

## Financial Crisis in Mexico

Almost a year after the North American Free Trade Agreement (NAFTA) entered into force on January 1, 1994, Mexico, its expected major beneficiary, found itself in the middle of a financial crisis. The crisis erupted on December 20, when the new Administration of Ernesto Zedillo devalued the peso by widening the dollar/peso exchange rate band by 15.2 percent and, subsequently, letting the peso float freely against the dollar. For years, Mexico had maintained the peso within a specified trading range vis-a-vis the dollar, allowing it to float within that range only. Pegging the currency to the dollar assured cheap imports and control led inflation, but it led to a strong peso whose strength was justified neither by Mexico's domestic purchasing power nor by the balance of Mexico's current payments' account.

At the beginning of 1994, following the January uprising in Chiapas of the Zapatist National Liberation Army in protest against the country's social and political conditions, Mexico's economic prospects for the year were already clouded. The Chiapas conflict, which remains unresolved to date, was followed in March by a number of violent acts against prominent politicians. This pressure on the already overvalued Mexican currency, cast a shadow on expectations for the country's overall economic performance.

Sustaining the peso above its real value proved increasingly difficult. Investors in Mexican securities perceived a higher level of risk in 1994 than before, because of political uncertainties resulting from social tensions and of the upcoming change in administration. Additional factors luring away portfolio capital from Mexico included the smaller currency risk in advanced industrial countries and the rising interest rates in these countries, especially in the United States.

As investors became more cautious about purchasing peso-denominated Mexican securities, the Salinas Administration was prompted to issue in large volumes short-term Treasury Certificates (Tesebonos) indexed to the dollar to which investors could shift their foreign funds from the peso-denominated securities (Cetes). This policy shifted the burden of currency risk from private foreign investors to the

Mexican Government. However, it did succeed in helping Mexico to bridge its widening current account deficit for much of the year.

By mid-1994, some U.S. and Mexican experts began to publicly advocate the devaluation of the peso. Notable among the U.S. advocates was Dr. Rudiger Dornbusch, professor at the Massachusetts Institute of Technology, who argued for a 20-percent devaluation before a private business group in Guadalajara on June 17, 1994. A notable Mexican advocate of devaluation was Guillermo Ortiz, Mexico's current Secretary of Finance.

Despite these warning signals, the outgoing Salinas Administration continued to maintain the peso's value throughout its last months in power, that is, through November 30. In December, renewed political tension in Chiapas accelerated capital flight from Mexico and triggered a drop in security values. At that point, Mexico's foreign reserves had already been severely depleted. Efforts to sustain the peso's strength reduced reserves from \$28 billion at the end of 1993 to \$17.2 billion by November 1, 1994, and to less than \$7 billion by December 20. In response, the then 3-week old Zedillo Administration was forced to abandon official support of the currency, first, by widening the peso's trading range and, second, in the face of a strong speculative attack against the peso, by allowing it to float freely on December 22.

The manner in which the devaluation was handled was widely criticized. The new Administration's sudden move, immediately following its own promise to never take such an action, undermined the remaining confidence of foreign and domestic holders of Mexican Government securities, who rushed to unload their holdings. This took principally the form of investors refusing to renew their maturing short-term Tesebonos, which constituted a major portion of their holdings. This, and a precipitous fall of security values on the Mexican stock exchange, caused the peso to plummet still further, instead of adjusting in an orderly fashion as the Zedillo Government apparently intended.

The peso depreciated from 3.5 pesos to the dollar on December 20, 1994, to 6.3 pesos to the dollar on February 15, with grave consequences for Mexico's financial situation, at least in the short term. For

example, the depreciation makes repayment of Mexican foreign debt much more expensive. Mexico's foreign debt stood at some \$140 billion in the summer of 1994, when the Government turned to short-term Tesebonos that were indexed to the dollar to attract foreign capital. Because of the depreciation of the peso, all foreign debt increased significantly in dollars, threatening the country's banks with bankruptcy, as reflected by a precipitous fall of Mexican bank share values. In the second week of January 1995, concerned about Mexican banks' poor asset quality and the high level of nonperforming loans, Moody Investment Services and other credit-rating agencies downgraded the debt and deposits of several banks, including those of BANAMEX and BANCOMER, Mexico's two largest.

In hindsight, analysts generally agree about the principal causes of the peso's crash. Mexico's large merchandise trade deficits of recent years (especially in 1992 and 1994) have translated into large current account deficits, which amounted to \$28 billion, almost 8 percent of the GDP in 1994. In championing a liberal economic system and free trade for Mexico, the Salinas Government had been counting on a continued inflow of foreign capital to finance the deficit that was bound to be generated by opening the gates of a formerly protected economy. The Government apparently considered the inflow of foreign funds especially assured from the beginning of 1994, when NAFTA was to take effect.

Political tensions erupting in 1994 and the lure of safer investment opportunities at attractive interest rates elsewhere upset this scenario. NAFTA indeed had the effect of encouraging foreign investment in Mexico, but much of this was speculative, short-term portfolio investment, easily withdrawable. The earlier confidence NAFTA had inspired in investors was outweighed by factors that discouraged further investment during NAFTA's first year. Investor distrust, in turn, led to the crash of the peso and of Mexican security values.

This was the conclusion reached on the causes of the peso crisis that emerged at a January 30, 1995 conference of the American Enterprise Institute (AEI) in Washington DC, provocatively entitled "Did NAFTA kill the Peso?" Nonetheless, the argument of Professor Jagdish Bhagwati of Columbia University that NAFTA's effect on Mexico's plight, if any, had been mostly indirect went unchallenged by other participants. Professor Bhagwati argued that NAFTA may have aggravated the crisis by generating overconfidence. Others commented that NAFTA's impact was mostly "psychological."

It should also be noted that the United States, although Mexico's dominant trading partner, does not account for much of Mexico's large trade deficit, the root cause of Mexico's financial crisis. The U.S. trade surplus with Mexico peaked in 1992 (\$5.7 billion), and bilateral trade was almost balanced in 1994, with a U.S. surplus amounting to \$531 million. Although U.S. exports to Mexico rose to \$49.1 billion, or by 22.0 percent, in the first NAFTA year, U.S. imports from Mexico grew even faster, by 25.7 percent, totaling \$48.6 billion. Countries of the European Union and East Asia are principally responsible for the growth of Mexico's huge trade deficit in recent years. For more detail on Mexico's trade with these areas, see U.S. International Trade Commission (USITC), "NAFTA Update: Steady U.S. Bilateral Trade Growth With Mexico Faces Mixed Prospects in 1995," *Industry Trade and Technology Review*, USITC, Mar. 1995.

On January 31, 1995, President Clinton, in conjunction with the International Monetary Fund (IMF), the Bank of International Settlements (BIS), Canada, and some Latin American countries proposed a \$50 billion loan package to assist Mexico in its emergency. The U.S. portion, \$20 billion, comes out from the Exchange Stabilization Fund, which had been established in the 1930s to finance exchange market interventions. While the prospect of this rescue package temporarily calmed Mexico's financial markets, the peso and the Mexican stock market again began to lose value in the middle of February.

Many analysts believe that Mexico's long-term prospects are still good, and that its NAFTA partnership continues to be an asset for the future. The financial crisis and the measures Mexico is now committed to impose as a condition of U.S. and international assistance are likely to trigger some actions that will benefit the economy. For example, the Mexican market is likely to open up further to foreign financial institutions, and the privatization of key sectors will accelerate, as the Government struggles to supplement its resources and offset inflationary pressure.

Yet, the country's short-term outlook is bleak. Painful austerity measures required by Mexico's emergency program and the conditions of the rescue package will sharply raise the price of credit for Mexican business and farmers, cause a loss of jobs, weaken growth prospects, and fuel domestic discontent. It appears that a major shift in Mexico's trade policies toward non-FTA countries is being contemplated. And most of all, since a return of investor confidence—which is seen as the key to Mexico's recovery—is not yet in sight, the immediate outlook is shrouded in uncertainty.

## U.S Firms May Help Rebuild in Aftermath of Japanese Quake

On the morning of January 17, 1995, an earthquake measuring 7.2 on the Richter scale struck the Kobe-Osaka area and other cities in the Osaka, Hyogo, and Kyoto prefectures of Japan killing more than 5,000 people. Japan's worst quake in over 70 years also rendered 316,000 people homeless and seriously damaged or destroyed over 100,000 buildings. The Nomura Research Institute estimates that approximately 15 percent of Hyogo prefecture's infrastructure was destroyed by the quake. Notably, the quake also leveled large portions of the Hyogo prefecture port city of Kobe, the city hardest hit by the earthquake. In 1993, Kobe was Japan's sixth largest city and its third largest port in terms of foreign trade, accounting for 20 percent of Japan's trade surplus. Kobe's port also handled 30 percent of container traffic in and out of Japan and 12 percent of Japan's total exports.

Estimates of the costs for rebuilding Kobe and its surrounding areas have ranged as high as \$130 billion. The governments of Hyogo prefecture and the city of Kobe have appealed to Japan's large commercial banks to establish a \$10 billion, low-interest earthquake loan fund to cover reconstruction. The governments proposed that the banks lend money to individual homeowners on an interest-free basis and to businesses at a rate of 2 percent. The Mayor of Kobe also petitioned the central government for \$40 billion in aid for reconstruction and emergency housing.

At the urging of the Finance Minister and the Bank of Japan, many of Japan's major commercial banks have begun to establish special low-interest loan programs for quake victims. Sumitomo Bank, for instance, plans to offer 5- and 10-year, noncollateral loans at interest rates of between 3.3 to 0.9 percent, or 0.7 to 1.5 percentage points, below the prevailing market rate. Sanwa Bank will also extend a similar 20 year collateralized program at a rate of 3.5 percent.

Prime Minister Murayama vowed in late January to provide all necessary help for Kobe's reconstruction. The Japanese Government pledged \$1 billion to fund initial stages of reconstruction. The Government will probably use reconstruction bonds to finance the reconstruction of the quake affected area.

The reconstruction of Kobe will represent one of the largest construction projects Japan has experienced since the end of World War II. The large infusion of

building funds represent enormous business opportunities for Japanese construction, steel, glass, housing, and lumber producers. The reconstruction will create demand for materials and services worth over \$100 billion. Foreign companies are also likely to participate in the rebuilding. In particular, U.S. flat glass and safety glass manufacturers, such as PPG, Guardian Industries, and Monsanto, anticipate a surge in demand for replacement glass. U.S. glass manufacturers hope to gain greater access to Japan's flat glass market by taking advantage of a recent market access agreement signed last December during the U.S.-Japan Framework talks.

Before the agreement, Japan's flat glass market was, according to U.S. negotiators, highly concentrated with three firms controlling 95 to 97 percent of the market either through domestic production or through imports from offshore subsidiaries or affiliates. Each is either owned or affiliated with a keiretsu structure, which, in the view of U.S. industry, is a barrier both to competition and to free-market access. The majority of Japan's 400 flat glass wholesalers had exclusive sales contracts with the three manufacturers.

The Framework agreement aims to improve market access for competitive foreign products and will open Japan's flat glass distribution system to foreign glass suppliers. Specifically the agreement calls for Japan's flat glass distributors to issue an unprecedented public statement detailing their plans to diversify their sources of supply and state that they will no longer discriminate based on capital affiliation. Japan's three dominant glass manufacturers will also release statements affirming that their wholesalers are free to acquire flat glass from any source, even non-Japanese foreign producers. The agreement does not include specific import targets, but includes objective criteria that will measure the extent to which Japanese glass distributors deal in or use imported flat glass, the change in sales and market share of foreign flat glass in Japan, and the change in the volume and value of sales of insulating and safety glass in Japan.

The Japanese Government promised to also actively promote the use of safety and insulating glass windows, areas where U.S. firms have a clear competitive advantage, and end discrimination against foreign firms in public sector procurement of flat glass. U.S. government officials predicted that, during the first year of the agreement, three-quarters of the 100 largest Japanese wholesalers and glaziers would obtain 30 to 40 percent of their flat glass from nontraditional sources, both foreign and domestic.

## The Latin American Market: Investment, Trade Opportunities and Finance

With the passage of the North American Free Trade Agreement (NAFTA) and the completion of its first year, coupled with the recently approved peso rescue package, few topics seem more relevant for a conference than the tradeoffs associated with expanding trade and investment in Latin America. The Emerging Latin American Market Conference was held from February 7 to 10, 1995, in Miami Beach, Florida and was copresented by Forbes Magazine and the Council of the Americas in conjunction with several other sponsors.<sup>1</sup> The outcome of the Miami

Summit in December 1994 provided the backdrop for the forum to discuss the possibilities for trade in the region. Keynote speakers included Jose A. Estenssoro, CEO of YPF, Argentina; Enrique Iglecias, President of IDB; Thomas McLarty, Counselor to the U.S. President Bill Clinton; and Nicholas Brady, Former Secretary of the U.S. Treasury; all gave enlightening discussions on Latin American trade issues and concerns.

Discussions at the conference targeted three broad themes: (1) the criteria foreign companies consider when making direct investment, (2) the expanding NAFTA, and (3) the Mexican peso devaluation crisis. Summaries of the key points made at the conference in each of these areas follow.

**Criteria for direct investment**—A forum on foreign direct investment in Latin America considered what factors firms should consider when investing. Although the backgrounds and industries represented by panel members were quite diverse, there was a remarkable consistency in what criteria are considered important. Donald Pearson, International Venture Partners (Brazil), stated that macroeconomic conditions must be critically considered. Pearson also noted that, since Brazil has implemented the *Plano Real*, inflation and the budget deficit have decreased dramatically and tax revenues have increased. Moreover, opportunities for those interested in capital markets are significant since there is a shortage of capital in Brazil. J.P. Underranga, CEO of Chilgener (Chile) pointed out that, while his firm concentrated

primarily on “hands-on” or real investment rather than portfolio management, the kinds of criteria one needs to consider remain consistent with other types of financial investment. Chilgener’s investment strategies consist of (1) maintaining market share, (2) taking advantage of external marketing opportunities, and (3) integrating upstream or downstream proposed investment, all with a clear eye on risk assessment. Peter E. Weber, President of FMC Latin America (Chicago), highlighted his firm’s investment criteria: (1) does the opportunity fit strategically within the firm, (2) can the investment exceed a hurdle rate of 11.5 percent, and (3) is the payback period acceptable.<sup>2</sup>

The youthfulness of Argentina’s capital markets was underscored by Alejandro F. Reynal, Chairman of the Board of Merchant Bankers Asociados, S.A. (Argentina). He noted that no private equity investors or pension funds existed in Argentina until 1993. Opportunities for leverage, which sometimes encourage firms to take on additional risk, do not yet exist in Argentina since they can not borrow as much money as to make leverage possible. Reynal said that Merchant Bankers Asociados, S.A. was primarily interested in long-term real investments rather than in financial ones.

There was general consensus by the speakers on such other important considerations as (1) personal security of employees, (2) partnership considerations, (3) ability to manage risk, be it political, economic, exchange rate, or tax rate stability, and (4) local operating autonomy.

**NAFTA and Beyond**—One of the most lively discussions at the conference concerned the obstacles and opportunities regarding the expansion of NAFTA. Dr. Luis Rubio, President of Centro de Investigacion para el Desarrollo (Mexico), provided a perspective on what Mexicans generally thought of NAFTA before it was passed: sixty-five percent were concerned with how NAFTA would affect them, but seventy-five percent approved of it nevertheless. William Cavitt, former director of the Office of Canada, U.S. Department of Commerce, discussed Mexico’s peso devaluation, suggesting that it is “not another debt crisis revisited” because the structure of the Mexican economy and debt are substantially better today than in 1982. At the same time, Cavitt, who was highly involved in the implementation of NAFTA, underscored how difficult it will be to achieve a free-trade agreement of the Americas, as proposed by the Summit of the Americas, by the current goal of 2005, given Mexico’s peso devaluation and the recent eruption of a long-simmering border dispute between Ecuador and Peru.

<sup>1</sup> Sponsors include: The World Bank, Inter-American Development Bank, the Export-Import Bank, U.S. Trade and Development Agency, Overseas Private Investment Corp., U.S. Chamber of Commerce, Association of American Chambers of Commerce in Latin America, International Finance Corporation, FOMENTO, The Government Development Bank for Puerto Rico, and The Beacon Council.

<sup>2</sup> Length of acceptable payback period is a function of the investment type. For example, if the investment is more capital intensive, payback periods tend to be longer.

Jonathan Cahn, partner of Pepper, Hamilton & Scheetz, said that it is critical for any agreement to have clauses similar to those in chapter 19 of NAFTA, which sets up a multinational panel process for reviewing dumping and countervailing duty findings of domestic administering authorities. First a critical part of the U.S.-Canada Free Trade Agreement, chapter 19 is a response to a system of perceived bias. According to Mr. Cahn, chapter 19 was written so that foreign access to U.S. markets is not threatened by rulings by the U.S. Department of Commerce or by the USITC. Mr. Cahn explained that chapter 19, and especially article 19.04, insured foreigners a neutral forum to which they can appeal. The appellate procedure allows determinations by the Department of Commerce and by the USITC to be appealed to panels that include nationals from Canada, Mexico, and the United States.

The Hon. Bernard Landry, Vice Premier and Minister for International Affairs, Immigration and Cultural Communities (Canada), ignited a discussion on the political status of Quebec by asserting that the Province of Quebec will naturally be an equal, vibrant part of NAFTA when it secedes from Canada. Discussion among forum participants uncovered a wide range of attitudes regarding whether Quebec's best interest would be served by remaining part of Canada or by seceding and what the ramifications of either course were for international trade treaties.

*The Mexican Peso crisis*—Dr. Santiago Levy, Mexico's finance ministry under-secretary for budgetary affairs, offered an explanation of the causes of the Mexican peso crisis, the international support package, and other steps that are being taken to stabilize Mexico's economy to contain the crisis. Levy provided empirical data to illustrate how the composition of Mexico's foreign borrowing has changed over the past 5 years. More foreign debt was

in the form of tesebonos (dollar-denominated, short-term Mexican Government-issued securities) than in peso-denominated and longer-term types of borrowing instruments. As confidence in the peso decreased during 1994, many investors chose to cash in their tesebonos when they came due rather than rolling over the investment, as had typically been done. Mexico was not prepared to deal with such a large number of investors simultaneously cashing in, hence causing a problem of liquidity. Levy underscored that "there is not a debt problem in Mexico. There is a liquidity crisis." Levy pointed out that, since the devaluation of the peso, the tesebonos have become more expensive for Mexico to pay off. The under-secretary also pointed out that, with the aid package, the flow of tesebonos currently being called in should be finished by the end of March 1995.

The three-day conference afforded participants an opportunity to learn more about economic and marketing developments in Latin America. Most of the almost six hundred conference attendees represented private enterprises, some seeking to make contacts in Latin America and others promoting their particular enterprise as an excellent place to invest. A number of high-level government representatives from Latin America were also in attendance, including officials from Argentina, Brazil, Bermuda, Canada, Chile, Mexico, Peru, Spain, and Venezuela. In general, a sense of enthusiasm for Latin American market opportunities was obvious; participants went away with contacts and ideas to consider when developing marketing and investment strategies for the region. With the next negotiating session of the Free-Trade Area of the Americas set for June 1995, United States, Canadian, and Latin American private and public sectors already have their eyes set on the horizon beyond.



---

## **SPECIAL FOCUS**

# Trade Liberalization and Pollution in Manufacturing

## Summary

This article evaluates the evidence on the relationship between international trade and environmental regulation. First, evidence on the positive feedbacks among trade liberalization, economic growth, and environmental protection is examined at a global level. Focus then turns to certain U.S. industries that are associated with high levels of air and water pollution. While the cost of pollution control and abatement in U.S. manufacturing has risen steadily since the early 1970s, these costs have not been an important determinant of U.S. competitive advantage in such key industries as chemicals, leather, metals, paper and pulp, and petroleum refining. Patterns of foreign direct investment in these industries are relatively insensitive to changes in environmental regulation; indeed, such investment can support transfer of cleaner technologies to countries with weaker regulatory environments. The Uruguay Round tariff cuts should enhance global environmental quality by inducing the relocation of polluting industries to countries with stronger environmental controls.

This article is adapted from a forthcoming USITC working paper, entitled *International Trade, Environmental Quality and Public Policy*, which discusses this and other issues in further depth and contains detailed supporting statistical tables. A discussion of environmental issues pertaining to agricultural trade will appear in a forthcoming issue of the *International Economic Review (IER)*.

## Introduction

Over the last decade, twin concerns have emerged about the possibilities for conflict between the goals of trade policy and environmental policy. First, the expanding environmental regulations are often believed to exert adverse pressure on U.S. exports and competitiveness. Second, trade liberalization and the expansion of global commerce could potentially frustrate efforts to protect the environment. With the reduction of trade barriers, fears have emerged that manufacturing industries, having high costs of compliance with environmental regulations, will move plants to developing countries where standards are lower, creating unemployment for U.S. workers and causing environmental damage in developing nations.

The United States and other developed countries have over the past 25 years taken aggressive policy measures to protect air, water, and land quality that far

exceed comparable efforts in lower and middle-income developing countries. Although successful in improving environmental quality, concern is frequently expressed that the playing field is no longer level and that industries in the U.S. and other developed countries are unfairly compelled to export less and import more because of the costs of compliance with environmental regulations. At worst, some environmentalists and scholars<sup>3</sup> have argued that developing countries could deliberately choose to have weak environmental regulation in order to become "pollution havens" and to attract industrial activity.

Within the environmental movement, some go so far as to argue that any increase in economic activity increases pollution and environmental degradation. Thus, they warn that trade liberalization could stimulate the global economy beyond its ecological carrying capacity. While it is true that increased production of any good can lead to increased pollution, this circumstance is not peculiar to international trade.

In fact, trade liberalization appears to create new opportunities for developing countries to improve the environment. Past patterns of trade protection in developing countries have often created severe environmental damage because many Latin American, Asian, and Eastern European nations used tariffs, subsidies, and other tools of protectionism to bolster heavy industries. Although these strategies have been discredited on economic grounds, their legacy is much increased pollution in these countries. The Uruguay Round tariff cuts and liberalization of nontariff measures in such industries as chemicals, iron and steel, nonferrous metals, and pulp and paper should shift production back to the United States, the European Union and Japan, where cleaner technologies are applied.

In addition, substantial evidence indicates that environmental quality tends to increase markedly as incomes rise, particularly as countries begin to move from developing- to developed-country status. Since trade liberalization can be a powerful tool for promoting rising incomes, it can act as a catalyst to stimulate those technological, economic and political tendencies to generate increased environmental quality as part of the development process.

For manufacturing, which accounts for 73 percent of global merchandise trade,<sup>4</sup> the empirical evidence suggests that many concerns about pollution havens are ill founded. Although U.S. firms have indeed borne new costs with respect to pollution control and

<sup>3</sup> E.g., Duane Chapman, "Environmental Standards and International Trade in Automobiles and Copper: The Case for a Social Tariff," *Natural Resources Journal*, vol. 31 (winter 1991), pp. 449-461.

<sup>4</sup> General Agreement on Tariffs and Trade, *International Trade 1993: Statistics* (Geneva: General Agreement on Tariffs and Trade, 1993).

abatement, these costs are small, and statistical evidence indicates that U.S. export performance has been little affected in industries that have been bearing the highest regulatory costs. While the determinants of foreign investment are more complex, evidence does not support the fear of a massive relocation of U.S. production capacity and jobs overseas to escape environmental regulations.

While the particular focus of this article is on manufacturing, the interactions between trade and environment in agriculture are at least as important. The rate of deforestation is influenced by cropping patterns and incomes, and runoff from fertilizers and pesticides is an important source of water pollution. In order to construct a complete picture of the environmental impact of trade liberalization, it is important to understand both how trade liberalization affects the distribution of agricultural production across nations and how it affects the technological choices made by farmers. These topics will be discussed in a forthcoming issue of the *IER*.

Many of the interactions between trade policy and environmental policy are already well understood by analysts. In principle, it is possible to identify those countries and industries for which trade liberalization and environmental protection are likely to work hand in hand and those for which there are tradeoffs between trade-induced growth and environmental quality. In those cases in which trade liberalization leads to higher incomes and more pollution simultaneously, legitimate disagreements can arise about the appropriate course of action. Good analysis can provide the raw material for an informed public discussion and political resolution of the issues involved.

## *Trade Liberalization and Environmental Quality in the Growth Process*

Many of the optimistic arguments for complementarity between trade liberalization and environmental protection invoke dynamic effects associated with economic growth. First, the demand for environmental protection increases with income and may even be income-elastic; that is, as incomes rise, the desired share of that income to be spent on environmental quality may increase. Even if the share remained constant, there would be a link between growth and environmental protection. Many measures of environmental quality improve as *per capita* income rises. The demand for services is income-elastic, and services tend to be environmentally cleaner than mining, manufacturing, or agriculture. The tendency of the share of services in GDP to increase with per capita

income and with time also suggests that additional increments to material living standards are progressively "cleaner," particularly at the higher incomes.

Technological change can produce cleaner production methods. In addition, the general tendency of profit-driven technological change is to increase the value of output while reducing the quantity of inputs, thus generating a resource-conserving effect. Openness to trade and the rate of technological change exhibit positive feedbacks with respect to each other as well. Mounting empirical evidence establishes that economies with an outward-looking trade orientation tend to grow faster. Thus, the dynamic mechanisms in an open world economy in which resources are consciously directed toward technological progress are likely to have felicitous effects on environmental quality.

Recently, two teams of researchers<sup>5</sup> have marshalled substantial evidence on the relationship between various measures of environmental quality and per-capita GDP. Urban concentrations of sulfur dioxide (SO<sub>2</sub>) and airborne dark matter are higher for middle-income countries<sup>6</sup> than for low-income countries and taper off sharply for high-income countries. Sulfur dioxide and suspended particulate levels also show a general tendency to improve over time. Water quality, urban sanitation, and dissolved oxygen levels in rivers improve steadily with per capita income, whereas deforestation, particulates and sulfur dioxide peak at middle-income levels and improve markedly as one approaches developed-country levels of income. Drinking water and sanitation tend to improve over time regardless of income, as well as of SO<sub>2</sub> and particulates. Some environmental problems, such as municipal solid waste and carbon emissions, are more severe for the wealthy countries.

Nonetheless, the world's rich countries enjoy substantially better environmental quality than the poor countries on balance. The sanitation and water quality problems of the developing countries have a

<sup>5</sup> Gene Grossman and Alan Krueger, "Environmental Impacts of a North American Free Trade Agreement," *Woodrow Wilson School Discussion Papers in Economics* #158, Nov. 1991; and Nemat Shafik and Sushenjit Bandhyopadhyay, *Economic Growth and Environmental Quality: Time-Series and Cross-Country Evidence*, World Bank Policy Research Working Paper for World Development Report 1992, WPS 904 (Washington DC: World Bank, 1992).

<sup>6</sup> "Middle-income" as used here is approximately \$3000-\$5000 per capita on a purchasing-power-parity basis in 1988, measured in 1985 dollars. Examples of middle-income countries are Argentina, Brazil, Iran, Iraq, Turkey, and Yugoslavia. The results of the studies described in the text are statistical generalizations and may not reflect environmental quality in any of the above countries individually.

substantially higher impact on health and mortality, particularly for infants.

The explanation often given for these results is that, at higher levels of income, people can afford more environmental quality. At lower income levels, basic food and shelter needs take priority. The finding that some indicators of environmental quality have improved over time across countries is suggestive of technical progress in environmental control.<sup>7</sup> Since liberal trade and investment rules facilitate rapid dissemination of environmental technology, this, too, suggests that there are positive synergies between trade liberalization and environmental quality.

The connection between higher incomes and environmental quality should not be taken as a mechanistic argument that trade liberalization always and everywhere enhances the environment. In the first place, there is substantial evidence that many environmental problems get worse in the transition from low-to middle-income status. A country undergoing a sustained boom in industrialization experiences industrial pollution, though it can pay for some critical improvements in public health. Moreover, many forms of environmental improvements have a public-goods nature, requiring either infrastructure improvements or changes in regulation. This means that, even if the demand for environmental quality is income-elastic, households cannot simply purchase more of it; rather, those demands must be channeled through a political process.

The degree to which rising incomes translate to improved environmental quality in a given nation depends in part on the responsiveness of political institutions to rising public demands for environmental improvements. Furthermore, an acceleration in environmental regulation can induce technological advances in pollution control equipment.<sup>8</sup> Such advances have created new export products for the United States.

<sup>7</sup> Per capita income has increased over time in most countries as well. The environmental problems for which these studies find improvement over time estimate the time trend while controlling for per capita income, suggesting that improvement in environmental technology is a reasonable explanation of the results.

<sup>8</sup> Jean Lanjouw and Ashoka Mody, "Stimulating Innovation and the Internal Diffusion of Environmentally Responsive Technology: The Role of Expenditures and Institutions," photocopy. The authors are affiliated with Yale University and the National Bureau of Economic Research, and the World Bank, respectively. Lanjouw and Mody show that most patents related to pollution control arise in the machinery sector.

## *Industrial Location, Toxic Emissions and the "Pollution Havens" Hypothesis*

Recent decades have been marked by major trends in the organization of world production that have widely been characterized by the term "globalization." One of these trends is the increasing role of multinational corporations (MNCs), which operate production facilities in more than one country. The number of such firms headquartered in 14 major developed countries<sup>9</sup> more than tripled from 7,000 in 1969 to 24,000 in 1990. The overseas subsidiaries of MNCs had some \$5.5 trillion in worldwide sales in 1990, compared with \$4 trillion in worldwide exports from all other sources. Of all global trade, approximately one-third consists of intrafirm shipments of MNCs.<sup>10</sup>

Another trend is the increasing speed of technology transfer between developed and developing countries. More rapid technology transfer has shortened the length of the "product cycle" between invention of new products in developed countries and the manufacture of such products in developing countries.

Given these trends, concerns have emerged that environmental regulation in the United States has accelerated the relocation of production in polluting industries to countries with weaker environmental standards, with adverse consequences for U.S. competitiveness, growth, wages, and profits. Further, it is argued that countries will engage in an environmental "race to the bottom," deliberately setting environmental standards at low levels to attract international capital and transforming themselves into so-called "pollution havens" in the process. The formation of pollution havens would promote higher pollution worldwide than would otherwise be the case.

In general, there is no particular reason why all governments would systematically try to attract polluting industry. They may do so, if jobs or tax revenues from that industry are thought to be more important than the environmental damage it causes. Conversely, observers of state and local regulation in the United States note the opposite phenomenon, the NIMBY ("not-in-my-back-yard") policy, according to which governments go out of their way to avoid pollution even at the cost of jobs and tax revenues. The

<sup>9</sup> Austria, Belgium, Denmark, France, Federal Republic of Germany, Italy, Japan, Luxembourg, Norway, Portugal, Spain, Sweden, United Kingdom, United States.

<sup>10</sup> United Nations, *United Nations World Investment Report 1993* (New York: United Nations, 1993).

same diversity is true in the international setting. Whether governments seek to attract or repel pollution depends on a host of factors, including the incomes and preferences of citizens, the precise structure of taxation, and the nature of the political system.<sup>11</sup>

### Empirical Evidence on the "Pollution Haven" Effect

An established body of economic research has attempted to determine empirically whether the cost of environmental regulation determines the international location of polluting industries.<sup>12</sup> These studies vary according to statistical methods used, definition of polluting industries, countries covered, and methods for controlling other variables that explain patterns of trade. Generally, the level or intensity of national environmental regulations appears to be a weak or negligible determinant of the pattern of trade and the location of investment.

One study<sup>13</sup> examined the pattern of trade in iron and steel, nonferrous metals, refined petroleum, metal manufactures, and paper goods as being representative of "dirty" industries. They found that, overall, the share of exports of "dirty" products to total world exports has actually declined from 18.9 percent in 1965 to 15.7 percent in 1988. Seventeen of the top 25 exporters of "dirty" products are OECD nations, and the share of exports accounted for by such products is generally higher for developed than developing countries. However, during much of the postwar period, state-directed economies in Eastern Europe and highly regulated economies in Latin America placed strong emphasis on development of heavy industries, and, for these two regions, the share of "dirty" exports in world exports rose in the period in question.

During the NAFTA debate, attempts were made to analyze the role of environmental regulation in U.S.-Mexico trade. The most noteworthy of these<sup>14</sup> sought to analyze the determinants of the ratio of U.S. imports from Mexico to total U.S. shipments in a multivariate framework. Low levels of skilled labor and physical capital (that is, high levels of unskilled

labor) turned out to be the primary determinants of those commodities which Mexico ships to the United States. Whereas, high pollution abatement costs in the United States are associated with more shipments from Mexico, the effect is nowhere near statistically significant.

A study by Jeffrey Leonard, perhaps the most thorough examination of the relationship between pollution control and patterns of trade and investment currently available,<sup>15</sup> shows that relatively little systematic relationship was found between pollution (or countries' policies toward pollution) and international trade and investment patterns. For certain narrowly defined industries (asbestos, arsenic trioxide, benzidine based dyes, some pesticides, nonferrous metal processing, some organic chemicals), U.S. environmental regulation may have induced some overseas investment. In examining the policies of several countries, only Ireland was found to have a deliberate policy of attracting polluting industries. It also appears that Ireland's windy, rainy, oceanic location gives it a relatively self-cleansing ecosystem, so that any Irish public policy seeking to create a competitive advantage in polluting industry may be exploiting a natural attribute — higher absorptive capacity or, possibly, the ability to export offending substances downwind.

### Analysis of Revealed Competitive Advantage

The modern period of environmental regulation in the United States is marked by the National Environmental Policy Act of 1969, the Clean Water Act of 1970, and the 1972 Federal Water Pollution Control Act. The Environmental Protection Agency was established during this period. Subsequently, U.S. pollution abatement operating costs in manufacturing, including fines, rose from less than 0.3 percent of the value of shipment in the early 1970s to nearly 0.8 percent in 1992. Certain industries exceed this average. In 1992, pollution abatement operating costs alone amounted to between 1.5 and 2 percent of total sales for paper and allied products, chemical and allied products, petroleum and coal products, and primary metal industries. For U.S. manufacturing as a whole, total abatement costs amount to slightly over 1 percent of sales revenues when capital costs are included. This relatively small percentage indicates that environmental regulation has a limited impact on product prices.

<sup>11</sup> See John D. Wilson, "Capital Mobility and Environmental Standards: Is There a Theoretical Basis for a Race to the Bottom?," paper for Ford Foundation conference on Fairness Claims and Gains From Trade, Washington, DC, 1994.

<sup>12</sup> For a more detailed review, see Arik Levinson, "Environmental Regulations and Industry Location: International and Domestic Evidence," paper for Ford Foundation conference on Fairness Claims and the Gains From Trade, Washington, DC, 1994.

<sup>13</sup> Patrick Low and Alexander Yeats, "Do 'Dirty' Industries Migrate?" in Patrick Low, ed., *International Trade and the Environment* (Washington, DC: World Bank, 1992).

<sup>14</sup> Grossman and Krueger.

<sup>15</sup> Jeffrey Leonard, *Pollution and the Struggle for the World Product* (Cambridge: Cambridge University Press, 1988).

Environmental capital expenditures are particularly important, as these expenditures are large relative to total capital expenditures in manufacturing. For manufacturing overall, capital expenditures for abatement fell from around 9 or 10 percent of total capital outlays in the early 1970s to 2.9 percent in 1984 and rose again to 10.7 percent in 1992. For the most heavily affected industries, which are the same four industries named above, pollution abatement capital expenditures now represent from 15 to 30 percent of total capital expenditures, with leather goods following at 10 percent. This is much larger than the ratio of total expenditures to total costs, and suggests that the main effects of U.S. environmental regulation on competitive advantage operate through the diversion of capital from production activities rather than through higher product prices. Since environmental equipment investments are primarily purchased by the industrial machinery sector,<sup>16</sup> this in turn suggests that some of the capacity of that sector is being diverted from production (both domestically and for export) to domestic pollution control activities. A study by the U.S. Bureau of the Census reveals that high pollution control spending has a negative impact on industrial productivity,<sup>17</sup> which in turn may lead to lower wages in the affected industries. It can also be demonstrated that the level of toxic emissions of a particular industry is closely correlated with its level of pollution abatement and control costs, so that the variation in such costs across industries is a reasonable proxy for public health impacts across industries. Based on this correlation and on the observed pattern of regulatory costs, an assessment of the trade and production shifts in the five industry names above should, at first approximation, capture a substantive share of the trade-pollution interactions in manufacturing as a whole. The subsequent analysis is conducted on this basis, with petroleum and coal products treated in a less detailed fashion because of data limitations.

If regulatory costs have an impact on trade patterns, it would presumably show up in differences between the trade of the highly regulated United States and that of the less regulated developing countries. On examination of the data, however, the most striking pattern is that trade performance in "dirty" industries

<sup>16</sup> Lanjouw and Mody.

<sup>17</sup> U.S. Department of Commerce Economics and Statistics Administration Bureau of the Census, *Statistical Brief: Measuring the Productivity Impact of Pollution Abatement*, SB/93-13 (Washington DC: U.S. Dept. of Commerce). During the study period, pollution abatement costs as a percentage of operating costs were 1.0 percent in oil, 2.3 percent in paper, and 2.2 percent in steel. These led to reductions in total factor productivity of 3.20 percent, 5.32 percent, and 7.62 percent, respectively.

appears to closely track U.S. trade performance as a whole. The aggregate U.S. trade deficit increased during 1973-86 and decreased during 1986-91. Trade performance in chemicals, paper and paperboard, iron and steel, and nonferrous metals weakened during the former period and recovered during the latter period; this pattern prevailed in each industry.

Such a coincidence indicates that the competitive performance of these industries has been determined to a far greater extent by macroeconomic conditions, such as exchange rates and the relative timing of U.S. and foreign business cycles, than by environmental policy. If environmental policy were the primary driving factor, it would have induced steady deterioration in these industries' trade performance. In order to observe the relatively small effects of environmental costs on trade, such macro effects must be purged from the data. It is possible to achieve this by creating an index of revealed competitive advantage (RCA). This index shows whether trade in a given industry and year would most likely have been in surplus or deficit under "neutral" macroeconomic conditions, for instance, those that in that year would have sufficed to generate a balance of merchandise trade.<sup>18</sup> The RCA yields a value greater than 1 if the industry would have been in trade surplus under the hypothetical neutral conditions, and less than 1 if the industry would have been in trade deficit.

During the episode of rising environmental costs, the RCA of the most sensitive U.S. industries has evolved as follows:

Year	Chemicals	Paper and paper board	Iron and steel	Non-ferrous metals
1973	1.39	.70	.59	.61
1991	1.41	.84	.70	.87

The calculation ends in 1991 in order to facilitate comparison with developing countries, whose data are recorded with some lag. Note that, for each of the main polluting industries, U.S. trade performance has improved. Since the index effectively holds overall U.S. trade balanced, this shows that each of these industries has improved its trade performance relative to other U.S. industries, even in the face of rising environmental costs.

<sup>18</sup> This index is calculated as follows: For a given year—

$$RCA = \frac{\text{(exports in industry)}}{\text{((exports + imports in industry)/2)}} \text{ divided by } \frac{\text{(all U.S. merchandise exports)}}{\text{((all U.S. merchandise exports + imports)/2)}}$$

A similar calculation for developing countries as a whole yields the following:

Year	Chemicals	Paper and paper board	Iron and steel	Non-ferrous metals
1973	.33	.17	.26	1.53
1991	.65	.48	.72	.93

This indicates that developing countries have also made steady competitive gains in the environmentally sensitive industries. Clearly, these were not primarily at the expense of U.S. trade. As a group, the developing countries remain net importers in each of the four categories. In recent years, the United States and the developing countries have gained simultaneously in competitiveness. This seems to indicate that it is the competitive position of the United States *vis-à-vis* other developed and transitional economies, particularly the resource-intensive North (that is, Canada, the Scandinavian countries, Russia) that may raise the most interesting issues with respect to environmental policy. Also noteworthy, the developing countries have lost RCA in nonferrous metal industries (such as, copper, tin, zinc) where environmental concern has been particularly intense. This may be due to the fact that consumption has risen faster than output in the developing world as a whole.

### Effects on U.S. Foreign Direct Investment<sup>19</sup>

Given that the pattern of environmental costs in the United States emphasizes capital expenditures over unit costs of production, one might expect that the effects of such regulation on the international pattern of capital investment would be more significant than the effects on merchandise trade. In general, other determinants of direct investment swamp those arising from environmental regulation. These include natural resources, labor markets, consumer demand, tax and regulatory policies, and intellectual property protection.

On examination, one finds that direct investment follows macroeconomic trends, which are a mirror image of those affecting merchandise trade. Direct investment is a component of the capital account, which moves approximately in the opposite direction of the current account. That is, countries that import more than they export must attract funds through the

<sup>19</sup> Because of limitations in the Department of Commerce data on direct investment, the discussion in this section focuses on the two broad industry groups, chemicals and primary and fabricated metals, rather than on the four groups used in the preceding analysis of merchandise trade.

sale of capital in the form of new investments in plant and equipment, the sale of existing assets, and through borrowing to make up the difference. The reverse is also true: countries that export more than import are more readily able to finance investments overseas.

In aggregate, overseas capital expenditures of U.S. manufacturers fall when the current account deficit rises, as it did through the mid-1980s. U.S. new plant and equipment investments abroad amounted to 33 percent of the value of investments made in the United States in 1973, when trade was balanced. This statistic falls to a minimum of 18 percent in 1985 and is 21 percent in 1987, the year of the record current account deficits. As the current account deficit shrank, the ratio of U.S. foreign direct investment (FDI) to domestic investment in manufacturing rose, reaching 28 percent by 1992.

A close examination of the pattern of new U.S. FDI in chemicals and primary and fabricated metals provides indirect evidence that overseas investment by U.S. multinationals in polluting industries seems to have been little influenced by the trend of rising environmental costs. Overseas investment in chemicals follows a pattern similar to that for all foreign direct investment in manufacturing, falling from 40 through 42 percent of the investment level in the United States during 1973-75 to 30 through 34 percent during 1982-85 and rising to 38 percent in 1992. For primary and fabricated metals, the time path of FDI shows little similarity to the overall path of FDI, fluctuating between 8 and 17 percent of the investment level in the U.S. during 1973-92. Nonetheless, this is a substantially lower ratio than for other manufacturing industries, indicating that foreign direct investment is relatively less important for the U.S. metals industries in any event.

If developing-country pollution havens were the principal motivating factor behind the recent rise in chemical investment abroad, such investment should account for a rising share of U.S. capital expenditures abroad since Western Europe, Japan, and other developed countries have had environmental regulations that are much more comparable to the United States. Yet the ratio of developing-country capital expenditures by U.S. affiliates in chemicals to chemical equipment expenditures in the United States remained remarkably constant from 1982 through 1992, varying only from between 5.4 and 6.4 percent during those years. For both chemicals and metals, the largest part of the historical swings in capital investment by U.S. firms overseas has been induced by U.S. firms' increasing and decreasing their investments in Western Europe, Japan, and in other developed countries. Whatever the determinants of such business decisions may be, fluctuations in environmental

protection relative to the United States are unlikely to be important.

Statistics such as those presented above paint a fairly broad picture. In general, such data lend support to the case that U.S. regulatory costs are generally not so high as to drive investment out of the country. Consequently, the idea that environmental regulation leads to any sizeable loss of U.S. jobs through either trade or direct investment is difficult to support. As noted above, there may be such effects for certainly narrowly defined, highly polluting industries. For such industries, any loss in output or employment through international channels would be accompanied by substantial improvements in U.S. environmental quality. Further research in this area would be useful.

### ***Environmental Benefits of Foreign Direct Investment***

Direct investment in polluting industries may on balance have a positive environmental effect. Much research indicates that multinational firms tend to replicate the technologies employed in their home markets when operating in developing countries.<sup>20</sup> Indeed, the ability to duplicate technology in a number of countries is deemed central to the competitive strategies of most multinationals. This tendency has been criticized on the grounds that firms may transfer to the developing countries technologies that are too capital-intensive and provide insufficient employment. In the environmental context, though, duplicative technology transfer implies that firms which have already researched and invested in relatively clean technologies in order to comply with developed-country market expectations or regulations will find it convenient to routinely transfer such technologies to developing countries. This would make their production cleaner than the average for indigenous firms in the same industries. Further, developed-country MNCs would have a strategic incentive to lobby for more stringent environmental regulation in developing countries in order to raise their rivals' costs.

The leading role of MNCs in the pattern of U.S. technology transfer is apparent. In 1994, the United States received \$22.502 billion from abroad in royalties and license fees while paying only \$6.002 billion in royalties and license fees to foreigners, for a surplus of better than 3:1. Surpluses of this size or larger have characterized U.S. technology trade over the years. (For comparison, the surplus of Japanese exports over imports in commodity trade is typically only around 4:3.) Furthermore, around 75 percent of

U.S. receipts for technology represent payments by affiliates of U.S. multinationals overseas to their parents, demonstrating that technology exports by U.S. MNCs are the central feature of the world technology trade.

In the environmental area, intrafirm exports of technology can be tracked by looking at registration of U.S. patents overseas. Multinationals typically invent new technologies in their home countries and register the patents abroad in part to facilitate intrafirm technology payments.<sup>21</sup> Lanjouw and Mody report that, of 2,180 patents for environmental control technologies registered in Brazil between 1971-88, 67 percent represented technologies originating in the OECD countries, with the largest share (484, or 22 percent) originating in the United States. U.S. firms registered 101 environmental control patents in India during 1974-88, 63 patents in South Korea during 1976-88, 55 in Mexico during 1979-88, and 31 in China during 1984-88 alone. Most of this patenting activity is associated with specific technology transfers from U.S. parent firms to overseas affiliates. Japanese and European firms engage in similar technology transfer on a smaller scale, while direct shipments of pollution control equipment for use in direct investment represent an additional source of technology transfer.

If multinational firms are an important source of environmentally friendly technologies in developing countries, then developing-country pollution may be affected by a wide variety of policy instruments. Developing-country policies that facilitate direct investment in manufacturing may raise the level of environmental protection embodied in the capital stock, relative to that which would appear in comparable investments by indigenous firms in the same industries. Since many heavy industries have traditionally been reserved either for government investment or for domestic private investment, liberalization and privatization in such industries may have measurable environmental impact.

### ***Impact of Uruguay Round Trade Liberalization***

The Uruguay Round lowers tariffs and trade barriers in a number of the industries discussed in this section. Traditionally, such "heavy" industries were seen by developing countries as critical to the success of the schemes of inward-looking industrialization so

<sup>20</sup> Richard Caves, *Multinational Enterprise and Economic Analysis* (Cambridge: Cambridge University Press, 1982), particularly chs. 7 and 9.

<sup>21</sup> It can be shown that countries whose willingness to enforce U.S. patents is expressed by their adherence to the Paris Convention enjoy more technology transfer from U.S. parents to subsidiaries, as measured by royalties and license fees. See Michael Ferrantino, "The Effect of Intellectual Property Rights on International Trade and Investment," *Weltwirtschaftliches Archiv*, 129:2 (1993), 300-331.

popular in the 1950s, 1960s, and 1970s. Consequently, import barriers in these industries have been much higher in the developing than in the developed countries, and Uruguay Round tariff reductions in the developing countries have been much larger than in previous negotiating rounds.

As a result, most studies of the Uruguay Round have projected an increasing share of polluting-industries production and trade in the developed countries, while developing countries will increasingly be satisfying their demands for chemicals, metals, and so forth through imports. If it is true that production processes are cleaner in the developed countries, this means an overall reduction in toxic emissions because of trade liberalization. One simulation of this effect emerged in a simulation conducted at the USITC, making use of the computable-general equilibrium (CGE) model of the Global Trade Analysis Project, or GTAP.<sup>22</sup> In this Uruguay Round-type experiment, global tariffs were lowered by one-third; agricultural policies in support of producers were lowered by 30 percent; and the textile quotas in the Multifiber Arrangement were eliminated. This analysis is preliminary and is meant to be suggestive of the types of trade-induced production shifts of environmental interest. While useful, such shifts do not of themselves permit direct inferences regarding human, animal, or plant health.

These estimates show that, for five manufacturing sectors associated with toxic emissions (chemicals, iron and steel, nonferrous metals, petroleum and coal, and pulp and paper), the share of global output going to developed countries is expected to increase, whereas, the share going to developing countries is expected to decrease as a result of trade liberalization.<sup>23</sup> For a sixth, smaller polluting industry (leather and leather goods), production moves from developed to developing countries as a result of trade liberalization.

The United States experiences relatively large gains in chemicals and petroleum and coal, while Europe gains in nonferrous metals, pulp and paper, iron and steel, and leather goods, and Japan does relatively well in chemicals and iron and steel. These results, broadly consistent with the partial-equilibrium results in the principal USITC investigation of the impact of

<sup>22</sup> This model is documented in Thomas Hertel and Marinos Tsigas, "Structure of the Standard GTAP Model," ch. 2 in *Notebook for Short Course in Global Trade Analysis*, July 30-Aug. 5, 1994, Purdue University, West Lafayette, Indiana.

<sup>23</sup> For the purposes of this simulation, the "developed" countries are the United States, Japan, Western Europe (i.e. those countries which were non-communist before 1989), Canada, Australia and New Zealand. The developing countries consist of Latin America, Africa, Asia other than Japan, and the "economies in transition" (i.e. the former Soviet Union and Eastern Europe).

the Uruguay Round,<sup>24</sup> indicate that U.S. production and exports are increasing for most of the industries with high levels of toxic emissions as a result of Uruguay Round liberalization.<sup>25</sup>

While global aggregate pollution levels from manufacturing are expected to decrease as a result of the Uruguay Round, it is important to recognize structural differences among the developing countries. In particular, such countries as Hong Kong, South Korea, Singapore, and Taiwan have already efficient production facilities in many of the "dirty" industries that would be expected to expand under trade liberalization. Other researchers,<sup>26</sup> using a CGE model to identify these four countries as a separate region, find that "basic intermediate industries" (including primary metals, chemicals, wood products, textile fibers, fabricated goods and electrical energy) would expand as a result of an Uruguay Round-type liberalization while contracting in other developing countries. The USITC "Uruguay Round" experiment described above finds that, in addition to leather goods, output of pulp and paper increases in Pacific Asia; output of nonferrous metals, petroleum and coal, and iron and steel increases in the economies in transition;<sup>27</sup> and petroleum and coal output increases in the regions of South Asia, Africa and the Middle East. This implies that, in certain regions and industries, the developing countries face trade-environment conflicts.

Within manufacturing, poorer countries enjoy opportunities to expand exports in relatively cleaner industries, including textiles, clothing and food processing. As broad categories, these industries have smaller volumes of pollutants per value of output than the ones this analysis has focused on, although some subcategories may be relatively pollution intensive. Developing countries also are likely to gain in agricultural production. As mentioned above, this raises a different set of environmental issues that, though important, are not directly comparable with those discussed by this article.

<sup>24</sup> USITC, *Potential Impact on the U.S. Economy and Industries of the GATT Uruguay Round Agreements*, (investigation No. 332-353), USITC publication 2790, June 1994.

<sup>25</sup> It bears emphasizing that the projected effects on output in polluting industries are based on the tariff cuts in the Uruguay Round, which are relatively easy for CGE models to handle. As noted, the actual pollution associated with output may depend importantly on patterns of direct investment and on what happens to the vintage of capital, issues for which traditional CGE models are relatively ill-equipped. More econometric work in this area is needed.

<sup>26</sup> Trien Nguyen, Carlo Perroni, and Randall Wigle, "An Evaluation of the Draft Final Act of the Uruguay Round," *The Economic Journal* 103 (Nov. 1993), pp. 1540-9.

<sup>27</sup> I.e., Eastern Europe and the countries composing the former Soviet Union.



---

# STATISTICAL TABLES

**Industrial production, by selected countries and by specified periods, Jan. 1991-December 1994.**  
(Total industrial production, 1985=100)

Country	1991	1992	1993	1993				1994				Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
				IV	I	II	III	IV	I	II	III						
United States <sup>1</sup>	104.2	104.3	109.2	112.9	115.7	117.4	118.8	120.4	118.2	119.1	119.0	119.4	120.3	121.4			
Japan	127.7	120.4	115.3	114.7	90.3	90.6	(2)	(2)	97.0	88.9	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Canada <sup>3</sup>	113.8	114.9	118.0	119.6	100.1	105.5	(2)	(2)	101.5	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Germany <sup>4</sup>	100.0	98.1	91.5	95.1	92.6	94.6	(2)	(2)	91.6	86.8	(2)	(2)	(2)	(2)	(2)	(2)	(2)
United Kingdom	109.0	108.6	111.1	116.7	104.9	101.4	(2)	(2)	95.9	93.3	(2)	(2)	(2)	(2)	(2)	(2)	(2)
France	114.2	112.9	108.6	111.5	100.2	(2)	(2)	(2)	97.4	75.4	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Italy	116.8	115.3	112.8	116.3	101.1	107.1	(2)	(2)	108.4	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)

<sup>1</sup> 1987=100

<sup>2</sup> Not available.

<sup>3</sup> Real domestic product.

<sup>4</sup> 1991=100

Source: *Main Economic Indicators*; Organization for Economic Cooperation and Development, November 1994, *Federal Reserve Statistical Release*; January 17, 1995.

**Consumer prices, by selected countries and by specified periods, Jan. 1992-December 1994**  
(Percentage change from same period of previous year)

Country	1992	1993	1994	1993				1994				Oct.	Nov.	Dec.	
				Dec.	I	II	III	IV	Jun.	Jul.	Aug.				Sept.
United States	3.0	3.0	2.6	2.7	2.5	2.4	2.9	2.7	2.5	2.8	2.9	3.0	2.6	2.7	2.7
Japan	1.6	1.3	(1)	1.0	1.2	0.7	0.0	(1)	0.6	-0.2	0.0	0.2	0.7	1.0	(1)
Canada	1.5	1.8	0.2	1.7	0.6	0.0	0.2	0.0	0.0	0.2	0.2	0.2	-0.2	-0.1	0.2
Germany	4.0	4.2	3.0	3.7	3.3	3.0	3.0	2.8	3.0	2.9	3.0	3.0	2.8	2.7	2.7
United Kingdom	3.7	1.6	2.5	1.9	2.4	2.6	2.3	2.6	2.6	2.3	2.4	2.2	2.4	2.6	2.9
France	2.4	2.0	1.7	2.1	1.7	1.7	3.8	1.6	1.8	1.7	1.7	1.6	1.6	1.6	1.6
Italy	5.1	4.4	1.0	4.3	4.3	3.9	3.8	4.0	3.7	3.8	3.8	3.8	3.8	4.0	4.1

<sup>1</sup> Not available.

Source: *Consumer Price Indexes, Nine Countries*, U.S. Department of Labor, February 1995.

**Unemployment rates, (civilian labor force basis)<sup>1</sup> by selected countries and by specified periods, Jan. 1992-December 1994**

Country	1992	1993	1994	1993				1994				Oct.	Nov.	Dec.
				Dec.	I	II	III	IV	Jul.	Aug.	Sept.			
United States	7.4	6.8	6.1	6.4	6.6	6.2	6.0	5.6	6.1	6.1	5.9	5.8	5.6	5.4
Japan	2.2	2.5	(2)	2.9	2.8	2.8	3.0	(2)	3.0	3.1	3.0	3.0	2.9	(2)
Canada	11.3	11.2	10.3	11.2	11.0	10.7	10.2	9.7	10.2	10.3	10.1	10.0	9.6	9.6
Germany <sup>3</sup>	4.7	5.9	(2)	6.5	6.4	6.5	6.5	(2)	6.5	6.5	6.5	6.5	6.4	(2)
United Kingdom	10.0	10.4	9.5	10.0	9.9	9.7	9.6	9.0	9.5	9.4	9.4	9.1	9.0	8.8
France	10.2	11.3	(2)	11.7	12.3	12.4	12.4	(2)	12.3	12.4	12.4	12.4	12.4	(2)
Italy	7.3	9.4	11.6	(4)	11.2	11.9	11.4	12.0	(4)	(4)	(4)	12.0	(4)	(4)

<sup>1</sup> Seasonally adjusted; rates of foreign countries adjusted to be comparable with the U.S. rate.

<sup>2</sup> Not available.

<sup>3</sup> Formerly West Germany.

<sup>4</sup> Italian unemployment surveys are conducted only once a quarter, in the first month of the quarter.

Source: *Unemployment Rates in Nine Countries*, U.S. Department of Labor, January 1995.

**Money-market interest rates,<sup>1</sup> by selected countries and by specified periods, Jan. 1992-January 1995**  
(Percentage, annual rates)

Country	1992	1993	1994	1994								1995		
				I	II	III	IV	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
United States .....	3.7	3.2	4.6	3.4	4.3	4.8	5.8	4.7	4.8	5.0	5.5	5.7	6.2	6.2
Japan .....	4.4	2.9	2.2	2.2	2.1	2.2	2.3	2.1	2.2	2.3	2.3	2.3	2.3	(2)
Canada .....	6.7	5.1	5.5	4.0	5.7	5.8	5.9	6.2	5.7	5.6	5.6	5.7	6.7	(2)
Germany .....	9.4	7.1	4.0	5.7	5.1	4.8	5.1	4.8	4.8	4.9	5.1	5.1	5.2	(2)
United Kingdom .....	9.5	5.8	5.4	5.2	5.1	5.3	6.0	5.1	5.4	5.6	5.8	5.9	6.3	(2)
France .....	10.1	8.3	5.7	6.1	5.5	5.5	5.5	5.5	5.4	5.5	5.5	5.4	5.8	(2)
Italy .....	13.9	10.0	8.4	8.3	7.9	8.5	8.8	8.3	8.8	8.6	8.8	8.7	8.9	(2)

<sup>1</sup> 90-day certificate of deposit.

<sup>2</sup> Not available.

Source: *Federal Reserve Statistical Release*, February 15, 1995 *Federal Reserve Bulletin*, February 1995.

**Effective exchange rates of the U.S. dollar, by specified periods, Jan. 1992-January 1995**  
(Percentage change from previous period)

Item	1992	1993	1994	1994								1995	
				I	II	III	IV	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Unadjusted: Index <sup>1</sup> .....	97.0	100.1	98.5	101.6	100.0	96.5	95.9	97.1	95.7	94.8	95.5	97.4	97.0
Percentage change .....	-1.5	3.1	-1.6	.4	-1.6	-3.5	-.6	.4	-1.4	-.9	.7	1.9	-.4
Adjusted: Index <sup>1</sup> ..	100.9	104.2	101.5	104.7	103.5	99.9	98.0	100.7	99.1	98.2	97.8	99.3	98.4
Percentage change .....	-.1	3.3	-2.7	.6	-1.2	-3.6	-1.9	.7	-1.6	-.9	-.4	1.5	-.9

<sup>1</sup> 1990 average=100.

Note.—The foreign-currency value of the U.S. dollar is a trade-weighted average in terms of the currencies of 18 other major nations. The inflation-adjusted measure shows the change in the dollar's value after adjusting for the inflation rates in the United States and in other nations; thus, a decline in this measure suggests an increase in U.S. price competitiveness.

Source: Morgan Guaranty Trust Co. of New York, February 1995.

**Trade balances, by selected countries and by specified periods, Jan. 1992- December 1994**
*(In billions of U.S. dollars, Exports less Imports (f.o.b - c.i.f), at an annual rate)*

Country	1992	1993	1994	1994				Sept.	Oct.	Nov.	Dec.
				I	II	III	IV				
United States <sup>1</sup>	-84.5	-115.7	-151.1	-129.1	-152.4	-164.5	-157.1	-160.6	-165.7	-168.7	-136.9
Japan	106.4	120.3	(2)	127.0	121.9	113.5	(2)	108.8	108.2	(2)	(2)
Canada <sup>3</sup>	12.1	-13.3	(2)	13.4	14.7	19.3	(2)	14.0	21.2	(2)	(2)
Germany	21.0	35.8	(2)	34.4	51.7	40.2	(2)	30.1	52.0	(2)	(2)
United Kingdom	-30.8	-25.5	(2)	-25.5	-21.4	-15.3	(2)	-15.7	(2)	(2)	(2)
France <sup>3</sup>	5.8	15.8	(2)	10.6	14.8	15.6	(2)	20.5	26.0	(2)	(2)
Italy	-6.6	20.6	(2)	25.9	21.6	27.6	(2)	35.0	(2)	(2)	(2)

<sup>1</sup> Figures are adjusted to reflect change in U.S. Department of Commerce reporting of imports at customs value, seasonally adjusted, rather than c.i.f. value.

<sup>2</sup> Not available.

<sup>3</sup> Imports are f.o.b.

Source: *Advance Report on U.S. Merchandise Trade*, U.S. Department of Commerce, February 17, 1995; *Main Economic Indicators*; Organization for Economic Cooperation and Development, January 1995.

**U.S. trade balance,<sup>1</sup> by major commodity categories and by specified periods, Jan. 1992-December 1994**
*(In billions of dollars)*

Country	1992	1993	1994	1994				Sept.	Oct.	Nov.	Dec.
				I	II	III	IV				
Commodity categories:											
Agriculture	18.6	17.8	19.0	4.4	3.6	3.8	6.9	1.3	2.0	2.6	2.3
Petroleum and selected product— (unadjusted)	-43.9	-45.7	-47.5	-9.6	-11.9	-14.0	-11.5	-4.4	-3.8	-4.1	-3.6
Manufactured goods	-86.7	-115.3	-155.7	-29.1	-33.8	-44.3	-47.5	-15.0	-18.1	-17.0	-12.4
Selected countries:											
Western Europe	6.2	-1.4	-12.5	-1	-2.3	-5.4	-3.6	-1.5	-1.5	-1.9	-.2
Canada <sup>2</sup>	-7.9	-10.2	-14.5	-2.7	-3.0	-3.7	-4.8	-1.3	-1.6	-1.7	-1.5
Japan	-49.4	-59.9	-65.6	-15.0	-15.4	-16.8	-18.2	-5.3	-6.6	-5.5	-6.1
OPEC (unadjusted)	-11.2	-11.6	-13.8	-1.6	-3.7	-4.8	-3.2	-1.3	-1.2	-1.1	-.9
Unit value of U.S. imports of petroleum and selected products (unadjusted)	\$16.80	\$15.13	\$14.22	\$11.80	\$13.98	\$15.70	\$14.95	\$15.03	\$14.83	\$15.31	\$14.71

<sup>1</sup> Exports, f.a.s. value, unadjusted. Imports, customs value, unadjusted.

<sup>2</sup> Beginning with 1989, figures include previously undocumented exports to Canada.

Source: *Advance Report on U.S. Merchandise Trade*, U.S. Department of Commerce, February 17, 1995.

UNITED STATES  
INTERNATIONAL  
TRADE COMMISSION,  
WASHINGTON, DC  
20436

---

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE, \$300





