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PREFACE

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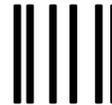
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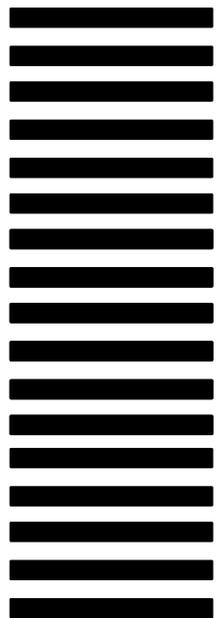
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Global Copyright Protection and the Challenge of Digital Piracy

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Overseas infringement of intellectual property rights (IPR) has become a significant problem for the international trade and investment of U.S. industries that depend on recognition of copyrights, such as the publishing, software, and entertainment industries. The growing use of digital technology by copyright industries has increased the ease and speed with which infringers of IPR can illegally duplicate and transmit copyrighted products, thereby accelerating digital copyright piracy. This article discusses (1) the importance of copyright industries to the U.S. economy, (2) the costs incurred by these industries due to overseas copyright infringement, (3) efforts to address copyright protections in international agreements, and (4) the challenges of digital piracy. Although other means to address international copyright infringement exist, such as technical measures by industry and trade policy actions by government, this article is focused primarily on copyright protections in international agreements.

Importance of Copyright Industries to the U.S. Economy

Copyright industries are among the fastest growing in the world and are particularly important to the U.S. economy because the performance of these industries is characterized by above-average growth in output and employment and higher-than-average wages and salaries. According to a study completed in 2002, the value of output accounted for by U.S. copyright-based industries, including those producing computer software, printed materials, movies, home videos, compact discs (CDs), audiocassettes, and other media products, rose during 1977-2001, at an average annual growth rate of 7 percent, compared with 3 percent for the remainder of the U.S. economy.² In 2002, those industries accounted for \$535.1 billion in value added, or more than 5 percent of GDP. Meanwhile, domestic employment in copyright-based industries more than doubled between 1977 and 2001, to 4.7 million workers, representing an average annual growth rate of 5 percent, or almost 3 times the rate of growth of the U.S. economy as a whole.

U.S. exports and other overseas sales by U.S. copyright businesses amounted to almost \$89 billion in 2001, an increase of more than 9 percent from the prior year.³ In 2000, the seven members of the U.S. motion picture industry alone earned over \$12.5 billion in film, television, and home video revenues in over 154 foreign countries around the world.⁴

¹ The views expressed in this article are the author's. They are not the views of the U.S. International Trade Commission (USITC) as a whole or of any individual Commissioner.

² Stephen Siwek, *Copyright Industries in the U.S. Economy: The 2002 Report* (Washington, DC: Economists Inc., 2002), p. 1.

³ Ibid.

⁴ Motion Picture Association of America (MPAA), *Trade Barriers to Exports of U.S. Filmed Entertainment*, 2002 Report to the United States Trade Representative, Dec. 2001, p. iv.

Magnitude and Effect of Copyright Piracy

Because of the importance of copyright industries to the strength of the U.S. economy, mounting revenue losses due to IPR infringement are of concern to U.S. industry and government officials.⁵ In its recent report to the United States Trade Representative (USTR), the International Intellectual Property Alliance (IIPA) estimated U.S. losses in 2002, due to copyright piracy in 56 selected foreign countries for 5 copyright-based industries, to be \$9.2 billion (table 1).⁶ Although U.S. copyright holders continue to be subjected to IPR piracy⁷ carried out in the United States, the enactment of more stringent U.S. copyright legislation⁸ and stiffer enforcement in recent years have reduced the rate of such piracy significantly vis-à-vis the infringement of U.S. copyright industries in many overseas markets.⁹

Table 1
Estimated 2002 U.S. sales losses due to copyright piracy in 56 selected countries

<i>(Million dollars)</i>	
U.S. Industry	Estimated losses
Motion pictures	1,322.3
Sound recordings	2,142.3
Business software applications	3,539.0
Entertainment software	1,690.1
Books	514.5
Total	9,208.2

Source: IIPA, *2003 Special 301 Report on Global Copyright Protection and Enforcement*, Feb. 14, 2003.

⁵ U.S. industry representatives, in-person and telephone interviews by USITC staff, June 2002-Apr. 2003.

⁶ Cumulative losses in numerous other countries considered less problematic than the 56 selected countries, including the United States and European Union countries, are not included in table 1. The IIPA, an alliance representing the major U.S. copyright industries, estimates that total U.S. industry losses due to global copyright piracy could amount to up to \$20 billion annually. For further information on how these estimates were made, see IIPA, *2003 Special 301 Report on Global Copyright Protection and Enforcement*, Feb. 14, 2003, pp. 1-6 and appendix A, located at <http://www.iipa.com>.

⁷ Copyright piracy traditionally has covered a range of unauthorized uses that resulted in commercial advantage to the infringer. This has included unauthorized reproduction of copyrighted published material, broadcasts, public performances, motion pictures, and computer software. Such piracy was facilitated by the development of tape recorders, audiocassettes, videocassettes, and other analog means that further enabled the illicit replication and distribution of copyrighted products and services. More recently, digital technology has resulted in new products and services, such as CDs, digital video discs (DVDs), and the Internet, that have not only made unauthorized copying and distribution much easier and inexpensive, but anonymous as well.

⁸ For further information on the protection of computer software under U.S. copyright law, see Christopher Johnson and Daniel J. Walworth, *Protecting U.S. Intellectual Property Rights and the Challenges of Digital Piracy*, Office of Industries Working Paper, USITC publication No. ID-05, Mar. 2003, pp. 10-12, located at <http://www.usitc.gov>.

⁹ The Business Software Alliance (BSA), which represents the commercial computer software industry, states that the U.S. piracy rate declined to 23 percent in 2002, representing the lowest rate of any country. Similar statements were made to USITC staff by representatives of other copyright industries, including IIPA, MPAA, and the Recording Industry Association of America (RIAA), in interviews during 2002 and 2003. BSA, *Eighth Annual BSA Global Software Piracy Study*, June 2003 (Wash. D.C.: International Planning and Research Corp.), June 2003, p. 4; and U.S. copyright industry representatives, in-person and telephone interviews by USITC staff, May-Sept. 2002 and Apr.-June 2003.

Copyright piracy particularly affects business and entertainment software. The Business Software Alliance (BSA) reports that losses due to Internet and other digital piracy (including the unauthorized replication of optical discs such as CDs and digital video discs (DVDs))¹⁰ have been rising rapidly in recent years and are believed to contribute to an increasing percentage of overall foreign piracy losses.¹¹ BSA has pointed out that more than one-third of the shipment value of all personal computer software (representing about \$35 billion) was pirated in 1999, and it estimates that by 2008, foreign software piracy will cost the U.S. economy 175,000 jobs, \$4.5 billion in wages, and nearly \$1 billion in tax revenues annually.¹²

Meanwhile, according to U.S. music industry representatives and analysts, unauthorized downloading and file-sharing on the Internet were responsible for a significant portion of the more than \$2 billion in global music revenue losses incurred by the industry in 2002.¹³ Further, although the major portion of the motion picture industry losses in that year were due to illegal copying of CDs, DVDs, and other digital forms, in a process known as “ripping and burning,” the industry is concerned that as online broadband services rapidly increase, as expected over the next several years, there could be a sharp increase in lost movie revenues due to Internet piracy.¹⁴

International IPR Agreements

In recognition of the importance of copyright industries to the U.S. economy and concerns regarding both domestic and overseas piracy, the United States has signed a number of international agreements related to copyright protection (table 2), including international conventions and treaties that are now administered under the auspices of the World Intellectual Property Organization (WIPO).¹⁵ In addition, in 1995 the United States became a party to the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs),¹⁶ the first multilateral intellectual property agreement with a strong dispute-resolution mechanism enforceable between governments. These agreements have enabled the United States to make significant progress in addressing overseas copyright piracy, and have led to higher minimum standards of protection in the United States and other nations. However, none of these agreements specifically addressed digital piracy. As a result, the United States and a number of other countries signed two newly created international agreements in 1996 (which entered into force in 2002), popularly known as the WIPO Internet Treaties,¹⁷ which clarified that copyright is applicable in the digital environment.

¹⁰ Also known as digital versatile discs.

¹¹ BSA, “Enhancing Trade Opportunities,” *Trade Policy News*, 2000-2002, p. 1, found at <http://www.bsa.org>, retrieved June 19, 2003.

¹² BSA, “Software Theft--Stopping the Piracy of Intellectual Property,” *Copyright Policy News*, 2000-2002, p. 1, found at <http://www.bsa.org>, retrieved June 19, 2003; and BSA, *Piracy Study*, June 2003, pp. 8 and 10, found at <http://www.bsa.org>, retrieved Aug. 22, 2003.

¹³ Ronald Grover and Heather Green, “Hollywood Heist,” *Business Week*, July 14, 2003, pp. 74-82; and U.S. industry representatives, in-person and telephone interviews by USITC staff, May 2002-Apr. 2003.

¹⁴ One business journal estimates that within several years, 50 percent of Internet users will have broadband, “making it easier to pass programs captured in digital form around on the Net.” Grover and Green, “Hollywood Heist,” pp. 74-82.

¹⁵ See more detailed discussions of WIPO in following sections.

¹⁶ See discussion of agreement later in this section.

¹⁷ For further details on the WIPO Internet Treaties, see the box that follows a more detailed discussion of the treaties later in this article. Additional information on the treaties may be found on WIPO’s Internet site located at <http://www.wipo.org>.

Table 2
Major international copyright conventions

Agreement (Year)	Number of signatories	Goals	Administrator
Berne Convention (1886, revised in 1971)	111	Basic copyright treaty based on principles of non-discrimination and national treatment.	World Intellectual Property Organization
Universal Copyright Convention (1952)	57	Copyright treaty accommodating U.S. statutory requirements and based on principles of non-discrimination and national treatment.	United Nations Educational, Scientific, and Cultural Organization
Rome Convention (1961)	47	Protection of neighboring rights (performers, producers of phonograms, broadcasting organizations).	World Intellectual Property Organization
Geneva Convention (1971)	52	Protection of producers of phonograms against the making of duplicates in another country.	World Intellectual Property Organization

Source: Bernard Hoekman and Michel Kosteci, *The Political Economy of the World Trading System* (Oxford: Oxford University Press, 1997); and other sources.

Early International IPR Efforts

The increase in the flow of creative ideas among more advanced countries at the end of the late 19th century spurred international cooperation with respect to copyright protection.¹⁸ Several European countries established the first major agreement, the Berne Convention, to address intellectual property protection internationally (see table 2). Other international copyright-related conventions that followed in the mid-20th century included the Universal Copyright Convention, the Rome Convention, and the Geneva Convention. The United States and most of its major trading partners are now signatories to each of the above conventions.

In 1967, WIPO was created to administer most of the international IPR-related treaties.¹⁹ The major accomplishment of the WIPO-administered copyright conventions was the requirement that signatory countries provide both national treatment and most-favored-nation status for foreign countries, enabling creators an opportunity to apply for copyright and related protection in other member countries on the same terms as other domestic and foreign creators.

Some believe that WIPO and the international copyright regimes it oversees, although valuable in establishing international cooperation in the protection of copyrighted products, were developed with “loose rules, weak dispute settlement mechanisms, and [little] ability to enforce the provisions of international treaties.”²⁰ For instance, despite the obligations placed on member countries by the Berne Convention and

¹⁸ Keith E. Maskus, *Intellectual Property Rights in the Global Economy* (Washington, DC: Institute for International Economics, Aug. 2000), p. 2.

¹⁹ In 1967, a diplomatic conference among 51 mostly industrialized countries established WIPO to administer the Berne and Rome Conventions, as well as a number of other international treaties related to areas of IPR such as patents, trademarks, appellations of origin, etc. Some of these other treaties administered by WIPO include the Paris Agreement on Industrial Property (1883), the Madrid Agreement (1890), the Lisbon Agreement (1958), and the Treaty on Intellectual Property in Respect of Integrated Circuits (1989). WIPO joined the United Nations System in 1974. For further information on WIPO, see WIPO’s Internet site located at <http://www.wipo.int/about-wipo/en>.

²⁰ Michael P. Ryan, *Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property* (Washington, DC: Brookings Institution, 1998), p. 131.

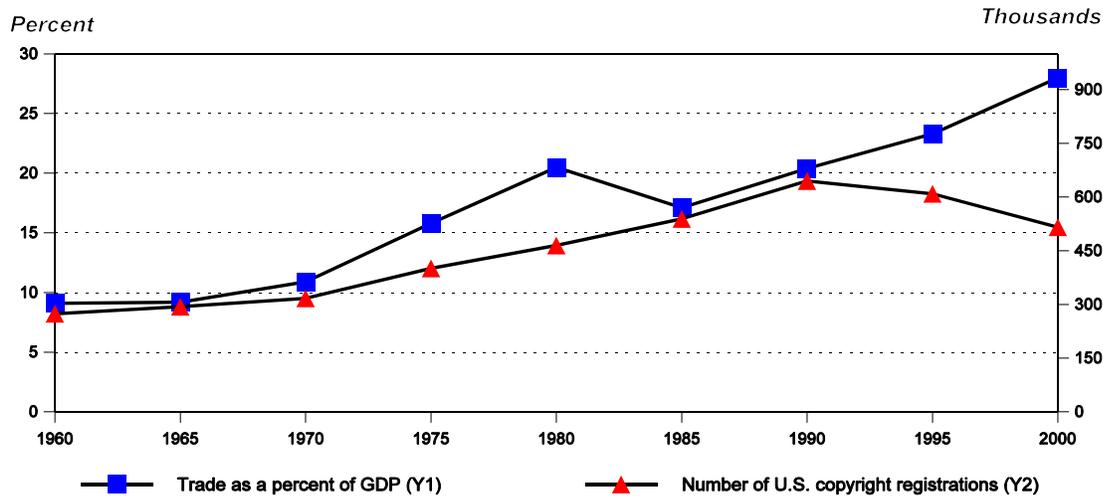
the other international copyright treaties, the lack of provisions requiring minimum standards of protection hindered the ability of the WIPO system to enforce strong copyright protection.²¹

Another reported weakness of the WIPO system was that not all countries were members of WIPO or signatories to each of the individual agreements it oversees, particularly the rapidly emerging markets in Asia that were increasingly being targeted for exports and investments by U.S. firms.²² More importantly, it could not guarantee protection to copyrighted products or services at or near the same level as they received in the United States.

TRIPs

Intellectual property protection became an increasingly important international trade policy issue for the United States in the 1970s and 1980s as copyright (and other IPR-dependent) industries and foreign trade became more important components of the U.S. economy (figure 1). At the time, the most authoritative international trade forum for the industrialized countries, the General Agreement on Tariffs and Trade (GATT), had not yet adequately addressed protection of IPR in general, let alone copyright protection. Thus, WIPO and the conventions it oversees were the primary international agreements available to the United States to deal with inadequate copyright protection overseas.

Figure 1
U.S. trade as a percentage of gross domestic product (GDP), and number of U.S. copyright registrations, 1960-2000



Source: Compiled from official statistics of the U.S. Department of Commerce; and U.S. Copyright Office, *105th Annual Report of the Register of Copyrights*, 2003, p. 52.

²¹ Ibid., pp. 94-104.

²² Ibid.

The United States and other large trading partners, including the European Union and Japan, sought to have copyright and other IPR issues addressed during the GATT Uruguay Round of trade negotiations. An agreement was negotiated, to be administered by the newly established WTO,²³ namely the TRIPs agreement. TRIPs covers copyrights (and related rights of performers; broadcasters; and producers of records, compact discs, and videos), as well as trademarks, patents, layout-designs of integrated circuits, geographic indications, industrial designs, and trade secrets.

The major achievement of TRIPs for copyright industries is that it sets relatively high minimum standards for the enforcement of copyrights for all WTO members “through civil actions for infringement and, at least in regard to copyright piracy, . . . in criminal actions and actions at the border.”²⁴ In addition, TRIPs is the first multilateral intellectual property agreement with a robust dispute resolution mechanism that is enforceable between governments.²⁵ According to U.S. industry representatives, the accomplishments of TRIPs cannot be understated since most of the 144 WTO members, including a number of developing countries, are currently obligated by the agreement with respect to copyrights.²⁶

Although TRIPs overcame many of the limitations of the previous international intellectual property agreements, it is built around the main international conventions administered by WIPO. For instance, with respect to copyrights, WTO members are required to comply with the provisions of the Berne Convention for copyright protection.²⁷ Further, as in U.S. law, computer software is to be protected as a literary work under the Berne Convention and the conditions under which databases are to be protected by copyright are clearly specified.

The WTO has several standards to objectively assess the TRIPs enforcement obligations for copyrighted products. Among these are standards that require members to provide “adequate” procedures, “effective” remedies that “constitute a deterrent to further infringements,” and procedures that are not “unreasonably costly” or that cause “unreasonable delays.” Specific remedies that must be available include the authority of courts to stop infringing imports (injunctive relief), damages “adequate to compensate for the injury the right holder has suffered,” and preventive remedies, including possible seizure, forfeiture, and destruction of infringing goods, when such infringement is done with criminal intent. Most importantly, criminal remedies must be available for copyright piracy occurring on a commercial scale.

²³ The Uruguay Round Trade Agreements entered into force on Jan. 1, 1995, creating the WTO. See the WTO Internet site located at <http://www.wto.org>.

²⁴ Benedicte Callan, *Pirates on the High Seas: The United States and Global Intellectual Property Rights* (New York: Council on Foreign Relations, 1998), p. 19; and USTR, *2003 Trade Policy Agenda and 2002 Annual Report*, p. 103.

²⁵ It should be noted, however, that the regional North American Free-Trade Agreement (NAFTA), among the United States, Canada, and Mexico, which had preceded by a year the conclusion of the Uruguay Round Agreements establishing the WTO, was the first trade agreement to establish mutual obligations on its members to provide minimum standards of IPR protection and enforcement, including civil and criminal penalties in certain instances. Generally, the NAFTA provisions are very similar to the TRIPs provisions, and in some instances exceed the TRIPs requirements.

²⁶ U.S. industry representatives, telephone and written communications with USITC staff, Jan. 2003.

²⁷ Copyright obligations are based on the Berne Convention for the Protection of Literary and Artistic Works (1971) and the Rome Convention (1961). Computer programs, databases, sound recordings, movies, and performances are protected for 50 years. Broadcasts receive 20 years of protection. Rental rights (the rights to authorize or prohibit commercial renting) are provided for performers, producers, and broadcasting companies.

Digital Piracy and the WIPO Internet Treaties

TRIPs was finalized prior to consideration of digital piracy, the area currently of greatest concern to the copyright industries. Digital piracy takes two primary forms.²⁸ The first is the replication and distribution of illegal copies of tangible media, most frequently of the optical disc variety (CDs and DVDs). Also included in this category is the unauthorized use of the content on discs across multiple users. This problem occurs around the world (including in the United States) with varying degrees of severity. The second form of digital piracy is the transmission of copyright-protected data over the Internet, as information can just as easily be sent across the world as it can be sent across the country. In both cases, digital piracy is an international problem.

The digital world facilitates generation of perfect copies quickly and efficiently, at negligible cost. Companies naturally have taken advantage of these characteristics to distribute their content easily (at low cost) and in a format that consumers value. Yet, the very qualities that make the digital format so attractive to the copyright industry also have the potential for illicit use. Thus, almost anyone with the incentive to do so can become an illegal distributor.²⁹

In response to growing concerns over digital piracy, the United States and a number of other countries signed the WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT) in 1996, often referred to as the “Internet Treaties” (box 1). Both treaties require member countries to provide a basic framework of rights, allowing creators to control and be compensated for the many ways in which their creative content can be used by others in digital networks. The United States implemented the WIPO treaties by adopting the Digital Millennium Copyright Act of 1998 (DMCA).³⁰

²⁸ There are other possible forms of digital piracy in addition to those discussed here. However, they are less common and therefore do not receive full attention in this article. For more in-depth discussions concerning digital piracy, see National Academy of Sciences (NAS), *The Digital Dilemma, Intellectual Property in the Information Age* (Washington, DC: National Academy Press, 2000); and Internet sites of IIPA, BSA, MPAA, and RIAA, located at <http://www.iipa.org>, <http://www.bsa.org>, <http://www.mpaa.org>, and <http://www.riaa.org>, respectively.

²⁹ This concept is discussed in more detail in NAS, *The Digital Dilemma*, 2000.

³⁰ The DMCA provides new standards for the protection of copyrights in the digital realm. Among other provisions, the DMCA makes it illegal to circumvent antipiracy measures built into works, including most commercial software, music, and other content on CDs and DVDs. It outlaws the act of circumvention of controls used to prevent unauthorized access to works, and the act as well as the production, sale, or distribution of code-breaking devices used to illegally copy or make other copyright use of protected works. Under the DMCA, service providers are expected to remove material from users’ web sites that they know, are made aware, or should know constitute copyright infringement. Further, the legislation requires that “webcasters” pay licensing fees to record companies. For violators, the DMCA provides for civil, administrative, and criminal remedies. Chris Gibson, *WIPO Internet Copyright Treaties Coming Into Force* (London: Steptoe & Johnson, 2002), pp. 1-4; Library of Congress, “Rulemaking on Exemptions from the Prohibition on Circumvention of Technological Measures that Control Access to Copyrighted Works,” Apr. 30, 2002, pp. 1-3, found at <http://www.loc.gov>, retrieved Apr. 22, 2003; and UCLA Online Institute for Cyberspace Law and Policy, “The Digital Millennium Copyright Act,” Feb. 8, 2001, pp. 1-2, found at <http://www.gseis.ucla.edu>, retrieved July 27, 2002.

Box 1**The WIPO Internet Treaties**

The WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT) are often referred to as the “Internet Treaties” because they provide new international standards for the protection of copyrights and related rights in the digital age. The two treaties entered into force on March 6 and May 20, 2002, respectively, once the required minimum 30 countries had ratified each.

- ◆ Both treaties make clear that the traditional intellectual property right of reproduction (copying) continues to apply in the digital environment, including the storage of material in digital form in an electronic medium.
- ◆ The treaties establish the right holders’ right to control the digital transmission of their works.
- ◆ The treaties ensure that right holders can use technology to protect their rights online. The treaties’ “anti-circumvention” provisions address security and piracy risks, such as those posed by “hacking,” by requiring member countries to provide adequate legal protection and remedies against the circumvention of technical measures, such as encryption.
- ◆ A new “rights management” provision in the treaties requires member countries to prohibit the deliberate alteration or deletion of electronic rights management information. This is the information that can be embedded into the digital code of a creative work and used to identify the work, its author, performer or owner, the terms and conditions for its use, and any other relevant attributes.

Source: Chris Gibson, *WIPO Internet Copyright Treaties Coming Into Force* (London: Steptoe & Johnson, 2002); and United States Trade Representative official, Washington International Trade Association, National Foreign Trade Council, and Global Business Dialogue Program: “TRIPS Implementation: Intellectual Property and the WTO,” Washington, DC, July 17, 2002.

Outlook

According to U.S. industry representatives, the growth of digital technology (optical discs and the Internet) has brought new opportunities and challenges for the copyright industries, whose products will increasingly be globally traded using these new forms of media and distribution.³¹ However, they state that unless the Internet is safeguarded from the proliferation of IPR piracy, “the medium will never reach its full potential to contribute to global economic growth and culture.”³²

Thus far, only 30 countries, or less than one-fourth of the members of the WTO, have signed the WIPO Internet Treaties, and many of those have not yet converted the treaty provisions into law by passing implementing domestic legislation, as the United States has done.³³ U.S. industry representatives state that if countries delay the implementation of these changes, the adverse impact on the protection of copyrighted

³¹ U.S. industry representatives, in-person and telephone interviews by USITC staff, June 2002-Apr. 2003.

³² IIPA, “Copyright Industries Release Report on Piracy in 63 Countries and Continue to Press their Global Trade Priorities for 2003,” *IIPA Press Release*, Feb. 13, 2003, p. 4, found at <http://www.iipa.org>, retrieved June 17, 2003.

³³ This article primarily focuses on the impact of overseas copyright infringement on U.S. trade, international trade agreements, and U.S. trade strategies to address overseas piracy. For more detailed information on problems of domestic piracy and protection of copyright under U.S. copyright law, see the footnote above on the Digital Millennium Copyright Act; and Johnson and Walworth, *Protecting U.S. Intellectual Property Rights and the Challenges of Digital Piracy*, pp. 10-12.

material on the Internet could be irreversible and, in turn, slow the growth of electronic commerce.³⁴ Consequently, the domestic copyright industry has called on the U.S. Government to assist it in securing full implementation of the new WIPO Internet Treaties by all countries.

In response, the USTR has made ratification and implementation of the WCT and WPPT a key element of its unilateral, bilateral, and multilateral trade strategies with respect to IPR.³⁵ For instance, during the past several years, the United States has used its Special 301³⁶ unilateral process for addressing inadequate IPR protection by foreign trading partners to persuade countries that have not yet signed the WIPO Internet Treaties to do so; and those who have done so, to expeditiously implement the provisions in their domestic laws and regulations. The U.S. copyright industry has also taken advantage of recent bilateral free trade agreements (FTAs) signed by the United States with Singapore and Chile to incorporate key elements of the WIPO Internet Treaties in the IPR chapters of the agreements.³⁷ The principal U.S. trade advisory committee representing IPR interests strongly supports the IPR provisions of these FTAs, including their references to the WIPO treaties, on the grounds that they establish precedents to be included in future FTAs, “which can raise the level of protection and enforcement globally.”³⁸ ■

³⁴ U.S. industry representatives, in-person and telephone interviews by USITC staff, June-Aug. 2002 and Apr.-July 2003.

³⁵ USTR, “Internet Piracy and the WIPO Copyright Treaties,” *2003 Trade Policy Agenda and 2002 Annual Report*, Mar. 2003, pp. 239-240.

³⁶ Under provisions of Special 301, USTR issues an annual report to identify countries that deny adequate and effective protection of IPR, or deny fair and equitable market access to U.S. persons or firms that rely on intellectual property protection. Countries with laws, policies, or practices that have the greatest adverse effects on relevant U.S. producers or products must be designated as priority foreign countries unless USTR finds that the countries are entering into good faith negotiations or are making significant progress in bilateral or multilateral negotiations to provide adequate and effective IPR protection. Priority foreign countries are subject to investigation and, if necessary, trade sanctions or other actions by USTR under Section 301 provisions. For more information on unilateral actions taken by the United States to address overseas piracy, see the discussions on Section 301 and Special 301 in USTR, *2003 Trade Policy Agenda and 2002 Annual Report*, Mar. 2003, pp. 233-239; and Johnson and Walworth, *Protecting U.S. Intellectual Property Rights and the Challenges of Digital Piracy*, pp. 16-20.

³⁷ USTR, “Free Trade with Singapore,” *Trade Facts*, Dec. 16, 2002, pp. 1 and 5-7; and USTR, “Free Trade with Chile,” Dec. 11, 2003, pp. 5-6, found at <http://www.ustr.gov>.

³⁸ Industry Functional Advisory Group on Intellectual Property Rights for Trade Policy Matters, *The U.S.-Singapore Free Trade Agreement: The Intellectual Property Provisions*, Feb. 28, 2003, found at <http://www.ustr.gov>, retrieved Mar. 13, 2003.

The Measurement and Effects of Nontariff Barriers to Trade in Basic Telecommunication Services

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Using econometric methods, this analysis develops quantity impacts of impediments to trade in voice telephone services.² Quantity impacts are estimates of the difference between trade volumes in the presence of nontariff barriers (NTBs) and trade volumes in the absence of such barriers. These impacts, estimated on the basis of market, demographic, and policy variables, establish a baseline from which the achievements of future trade rounds, including the Doha Round, could be compared. In a departure from previous literature in this area, this article draws on documents appended or pertaining to the General Agreement on Trade in Services (GATS) to identify NTBs to trade in basic telecommunication services, and to estimate quantity impacts on this basis. Although previous literature has avoided the use of GATS schedules to develop policy variables for reasons that are discussed in the article, it is the GATS schedules and associated documents that will, in the end, reveal the extent of liberalization achieved by negotiation.

The article finds that market access and national treatment commitments scheduled by the World Trade Organization (WTO) members under the GATS, when complemented by commitments to pro-competitive regulatory principles and strict adherence to scheduling guidelines, may be formulated into meaningful policy variables. The model specification described in the article explains 84 to 85 percent of variation in market penetration, measured in mainlines per hundred persons. Further, policy variables derived from GATS commitments are found to be statistically significant, as are variables for income and private sector ownership.

The measurement of nontariff barriers to trade in services, and the gains associated with removing such barriers, has been of keen interest for the past several years. This is due in part to the ongoing Doha Round negotiations in the WTO, where services liberalization is part of the built-in agenda, and in part to growing recognition of the prominence of the service sector in overall economic activity. The following facts justify such interest:

- The service sector typically accounts for between 60 percent and 80 percent of gross domestic product (GDP) in developed and developing countries alike, and represents approximately the same share of private sector employment.

¹ The views expressed in this article are the authors'. They are not the views of the USITC as a whole or any individual Commissioner.

² Voice telephone services have been selected because nontariff barriers tend to be heaviest in this subsector, likely because these services are readily identified as a public good by business and residential users and because they are a major source of telecommunications revenue.

- Infrastructure services industries, including telecommunications, finance, energy, and transportation, exert an economy-wide influence as they constitute inputs to all other economic activities and facilitate trade. The efficiency with which these services are provided influences the global competitive posture of all firms availed of their services.
- Global service exports measured \$1.5 trillion in 2001,³ representing 19 percent of global cross-border trade flows.⁴
- During 1980-2001, cross-border exports of commercial services increased at an average annual rate of 7.2 percent, while exports of merchandise increased by 5.7 percent.⁵
- Sales of services through overseas affiliates have exceeded cross-border exports by a widening margin since 1996.⁶ In 2000, foreign affiliates of U.S. parent firms sold services valued at \$393 billion, 40 percent greater than cross-border exports of \$278 billion.⁷

This article estimates the impact of nontariff barriers to international trade in voice telephone services. In a departure from previous work in the area, the article presents policy variables derived from commitments to market access, national treatment, and pro-competitive regulatory principles appended to the General Agreement on Trade in Services (GATS), rather than formulating policy variables based on alternative information sources. GATS commitments have been chosen in the interest of establishing a measure of trade liberalization achieved through negotiation.

The Group on Basic Telecommunications (GBT) Agreement⁸

Schedules of Commitments

Supplemental schedules of specific commitments for basic telecommunication services were appended to the GATS on February 8, 1998, with the adoption of the Fourth Protocol to the GATS.⁹ The supplemental schedules, along with initial GATS schedules that entered into force on January 1, 1995, contain much of the detail of the GBT Agreement.¹⁰

³ Organization for Economic Cooperation and Development (OECD), *OECD Statistics on International Trade in Services: Partner Country Data and Summary Analysis, 1999-2000*, July 2002, p. 8.

⁴ WTO, *A Review of Statistics on Trade Flows in Services: Note by the Secretariat, Addendum, S/C/W/2/Add. 1*, Oct. 27, 2000, p. 3.

⁵ WTO, "International Trade Statistics," various years, found at http://www.wto.org/english/res_e/statis_e/statis_e.htm, retrieved Oct. 28, 2002.

⁶ As of May 2003, the United States is the only country that tracks and publishes data on services sold through affiliates. Julian Arkell, *STATS ON FATS: Statistics on Foreign Affiliate Trade in Services - The New International Statistical Standard* (Chevy Chase, MD: Mark Twain Institute, 2002), p. 17.

⁷ U.S. Department of Commerce (USDOC), Bureau of Economic Analysis (BEA), "U.S. International Services: Cross-Border Trade in 2001 and Sales through Affiliates in 2000," *Survey of Current Business*, Oct. 2001, p. 67.

⁸ GBT was formed in Apr. 1996 to continue negotiations after the agreement reached by its predecessor, The Negotiating Group on Basic Telecommunications (NGBT), was deemed insufficient by the United States.

⁹ WTO, *Fourth Protocol to the General Agreement on Trade in Services*, S/L/20, Apr. 30, 1996.

¹⁰ It is important to take the initial schedules into account because important horizontal (i.e., cross-sectoral) limitations on foreign investment and temporary entry and stay (of services personnel) are found there. Horizontal commitments must be read together with sector-specific commitments to identify potential business opportunities and pertinent restrictions.

In the supplemental telecommunication schedules, one finds market access, national treatment,¹¹ and additional commitments pertaining to seven basic telecommunication service sectors: voice telephone services, packet-switched data transmission services, circuit-switched data transmission services, telex services, telegraph services, facsimile services, and private leased circuit services. Member countries schedule commitments by sector and mode of supply (i.e., cross-border supply, consumption abroad, commercial presence, and movement of natural persons). Due to the positive listing methodology employed in the GATS, member countries can schedule commitments to all, none, or a combination of basic telecommunication sectors. Commitments are of two types. Full commitments (also called bindings) indicate that there are no limitations on foreign participation in terms of market entry or regulatory treatment. Partial commitments indicate that limitations exist, and briefly summarize the nature of the limitation.

Others who have endeavored to measure NTBs in services have tended to formulate policy variables by drawing on information sources other than the GATS schedules. One explanation for this is the difference in research objectives. Other research has tended to focus on trade liberalization, however it is achieved. This article focuses on liberalization achieved through negotiations. In service negotiations, liberalization is achieved when countries agree to bind¹² newly liberalized practices or trade liberalizing practices planned for the future.

A second reason why other researchers have not formulated policy variables by drawing on GATS schedules is that these schedules have information gaps that hinder efforts to measure the effect of NTBs. One important gap is that GATS commitments do not address some issues that strongly influence the competitive environment, thereby calling into question whether commitments guarantee effective market access. The following section indicates the manner in which the GBT Agreement fills these gaps. Another difficulty with the GATS is that, where no commitment has been scheduled, it remains unclear whether or not a trade impediment exists. Unbound limitations are identified by the absence of an entry for the sector of interest (voice telecommunication services in this instance) or by the word “unbound.” No information on regulatory policy, whether liberal or not, is provided in the schedules. The GBT Agreement does not address this shortcoming.

Additional GBT Components

Telecommunication schedules are complemented by two additional documents that fill information gaps typically found in schedules: a note circulated by the GBT Chairman,¹³ and the regulatory reference paper.¹⁴ In combination, these documents assist firms in identifying regulations or practices that may enhance the value of market access and national treatment commitments. The note issued by the GBT Chairman on January 16, 1997, provides useful guidance on scheduling and interpreting basic telecommunication commitments, though it lacks legal status. The note stipulates that market access and national treatment commitments on basic telecommunication services, unless otherwise stated in the schedules, encompass local, long-distance, and international services; for public and non-public use; on a facilities and resale basis; through any means of technology (e.g., cable, cellular, and satellite). With these stipulations, the note ensures that commitments are scheduled in a manner that accurately reflects regulatory rules and practices, among which there is broad diversity across countries. For instance, the U.S. telecommunications regime draws important

¹¹ National treatment usually accords to foreign firms the same rights and obligations accorded to domestic firms.

¹² A commitment to market access or national treatment is also referred to as a binding.

¹³ WTO, *Note by the Chairman - Revision*, S/GBT/W/2/Rev. 1, Jan. 16, 1997.

¹⁴ WTO, *Telecommunication Services: Reference Paper*, found at http://www.wto.org/en...top_e/serv_e/telecom_e/te123_e.htm, retrieved Feb. 27, 2003.

distinctions between local and long-distance service providers, assigning different rights and obligations to each, whereas in Japan, key distinctions are drawn between facilities-based service providers and resellers. By virtue of the note, basic telecommunication service commitments were rendered more transparent and practical in terms of identifying business opportunities.

The reference paper is considered by many observers as one of the major achievements of the GBT Agreement, and perhaps of the entire Uruguay Round of services negotiations. The reference paper was intended to safeguard the value of market access commitments by seeking to render specific regulatory practices competitively neutral. In this sense, the reference paper effectively addresses the intent of Article VI(4) of the GATS framework, which pertains to domestic regulation. Article VI(4) requires that technical standards and licensing requirements not constitute unnecessary barriers to trade in services and that pertaining disciplines are (1) based on objective and transparent criteria, such as competence and the ability to supply the service; (2) not more burdensome than necessary to ensure the quality of the service; and (3) in the case of licensing procedures, not in themselves a restriction on the supply of the service. The reference paper embodies these broad principles, but makes them specific to basic telecommunication services. Countries could bind to all or part of the reference paper.¹⁵ In binding to the entire reference paper, countries committed to:

- prevent anti-competitive practices, including cross-subsidization among other practices;
- provide interconnection on a timely basis, and upon request, under nondiscriminatory terms, conditions, and quality, with cost-oriented rates that are transparent, reasonable, and sufficiently unbundled (so that competing suppliers need not pay for services or facilities they do not require);
- assure that universal service obligations are administered in a transparent, nondiscriminatory, and competitively neutral manner;
- assure public availability of licensing criteria, with timely notification of the terms and conditions of licensing and reasons for the denial of licenses upon request;
- maintain or create independent and impartial regulators not accountable to any supplier of basic telecommunication services; and
- allocate scarce resources, including frequencies, numbers, and rights of way, in an objective, timely, transparent, and nondiscriminatory manner.

Literature Review

Efforts to measure NTBs on services are relatively new, with most work dated after completion of the Uruguay Round. Marko (1998), among the first to approach the GBT Agreement in a quantitative fashion, computes frequency measures for 69 GBT signatories based on GATS market access and national treatment commitments for all four modes of supply. Marko uses two methods to compute the measures, first by considering only full commitments, and second by constructing a five-point weighting system to assess partial commitments scheduled by member countries. Marko estimates that 45 percent of the basic

¹⁵ Bindings to the principles set forth in the reference paper could take effect upon the GBT Agreement's entry into force, or at a later date specified by the member country.

telecommunication services markets represented by GBT signatories is open to free trade, reflecting how much remains to be done despite the GBT Agreement.¹⁶

Warren (2000) takes the quantitative approach further, performing regression analysis on market (income per capita, service quality, and unmet demand), demographic (housing density), and policy variables of his own construction in an attempt to explain market penetration, measured as mainlines¹⁷ per 100 persons, in 136 countries. Warren constructs four policy variables associated with market access (MA) and national treatment (NT) mostly from data provided by the International Telecommunication Union. The variable MA/Trade captures policies that impede market access of *all potential entrants (domestic and foreign)* by restricting provision of cross-border telecommunication services; MA/Invest, policies that discriminate against *all potential entrants (domestic and foreign)* seeking to supply services through partially or wholly owned foreign affiliates; NT/Trade, policies that impede market access of *potential foreign entrants* by restricting provision of cross-border services; and NT/Invest, policies that discriminate against *potential foreign entrants* seeking to supply services through foreign-invested affiliates. In regressions performed by Warren, he reports that the latter 3 policy variables appear to be statistically significant, along with income per capita, unmet demand, and service quality, and that these variables jointly explain 88 to 89 percent of variation in market penetration.¹⁸

Methodology

This analysis uses ordinary least squares (OLS) to estimate the relationship between market penetration in the year 2000,¹⁹ measured by mainlines per hundred persons,²⁰ and selected market, demographic, and policy variables in 67 countries. Although market penetration does not measure the quantity of basic telecommunication services consumed, it does measure the capacity over which consumption, including inbound and outbound international calls, could take place. Further, low market penetration tends to be associated with state-owned and -operated telecommunication monopolies. In fact, it is low market penetration that has motivated many countries to open their markets to foreign investment in the expectation, or under the requirement, that better capitalized carriers would increase market penetration rates. National calling minutes or international calling minutes may be superior variables for measuring quantity, but data are not available for many of the 67 countries of interest here.

In explaining market penetration, we estimate a reduced-form of supply and demand factors. On the demand side, we anticipate that telephone service is a normal good, so that income should have a positive impact on market penetration. On the supply side, increased population density may be a proxy for reduced cost per household of establishing telecommunication networks (so we would expect a positive impact on market penetration). Also supply-related, the role of the private sector in the telecommunications industry would be expected to be cost-reducing, leading to a positive impact on penetration although, as noted below,

¹⁶ Mary Marko, *An Evaluation of the Basic Telecommunications Services Agreement*, CIES Policy Discussion Paper 98/09, Dec. 1998.

¹⁷ A mainline is a telephone line connecting a subscriber's terminal equipment to the public switched network and which has a dedicated port in the telephone exchange equipment.

¹⁸ Tony Warren, "The Impact on Output of Impediments to Trade and Investment in Telecommunication Services," ch. in *Impediments to Trade in Services: Measurement and Policy Implications*, eds. Christopher Findlay and Tony Warren (London: Routledge Foundation, 2000), pp. 85-100.

¹⁹ Market penetration data for the year 2000 were used to allow time for commitments that became binding in 1998 to exert influence over telecommunication service markets.

²⁰ One issue that is not formally addressed is the relationship between fixed and mobile telecommunications usage. While the focus here is on fixed mainline penetration, some preliminary work suggests that similar results may hold for mobile phone penetration.

the link may be more complicated than this, especially in developing economies. Similarly, market reform - defined as the passage of telecommunication reform legislation and establishment of an independent regulator - should increase market penetration. Finally, the policy measures which are the focus of this article are intended to increase penetration, though it is an empirical question as to their impact.

We define the independent variables as follows:

- **LOG(Y)**, the natural log of GDP per capita in 1998, resulting in a semi-log specification;²¹
- **PS**, the share of the incumbent telecommunications carrier held by the private sector in each country as of 1998;
- **PSOCD**, the share of the incumbent telecommunications carrier held by the private sector in OECD countries in 1998 (set to zero for non-OECD firms);
- **PD**, for population density in 1998;
- **REFORM**, a dummy variable that equals 1 if a country had undertaken telecommunication market reform by 1998, and 0 otherwise; and
- policy variables **GATSPOLICY**, **MAPOLICY**, and **NTPOLICY**, explained below.

The three policy variables are highly correlated and therefore their effects are examined via three separate specifications. **GATSPOLICY** is a composite policy variable that reflects a scoring of market access and national treatment commitments (taking values from 0 to 1); the scope of commitments, referring to the share of basic telecommunication sub-sectors bound (taking values from 0 to 1);²² reference paper bindings, referring to the share of reference paper principles bound (taking values from 0 to 1); and the depth of commitments, referring to the extent to which all commitments scheduled applied to local, long-distance, and international services over public and non-public works; wireline, cellular, and satellite networks; and resale and facilities-based networks²³ (taking values from 0 to 1). Market access and national treatment commitments are scored by the degree to which they promote or impede trade, as suggested by an OECD document published in 2001.²⁴ For each of the four modes of supply, this document usefully separates the types of NTBs commonly found in schedules into three categories: those having little or no restrictive effect, accorded a score of 0.75; restrictive effect, accorded a score of 0.5; and prohibitive or highly restrictive effect, accorded a score of 0.25. To extend this scoring system, entries in the schedules that are unbound (signifying no binding) are accorded a score of 0.0,²⁵ and full commitments (signifying the absence of limitations) are accorded a score of 1.0.

²¹ The natural log of Y was selected because a scatter diagram of the data suggested that mainlines per hundred increased at a decreasing rate as income increased.

²² The scope of basic telecommunication services bound by countries enters into the equation because it is more economical to provide telecommunication services in a market if a variety of services can be provided over new or acquired network capacity. Like the GBT Chairman's note and the reference paper, the scope of commitments affects the value of market access commitments.

²³ If all 4 elements of the GBT Chairman's note were satisfied for all commitments, the country received a score of 1; if 3, then a score of 0.75; if 2, then a score of 0.5; if 1, then a score of 0.25; and if none, then a score of 0.

²⁴ OECD, Working Party of the Trade Committee, "Assessing Barriers to Trade in Services: Revised Consolidated List of Cross-Sectoral Barriers," TD/TC/WP(99)58/FINAL, Feb. 28, 2001.

²⁵ The absence of a commitment does not necessarily indicate the presence of a NTB, but the absence does reduce the legal certainty and transparency ideally provided by schedules, and permits the implementation of higher barriers without penalty.

Proceeding through signatories' schedules of commitments, scores are assigned to market access and national treatment commitments on voice telephone services for each of the four modes of supply, resulting in 8 scores ranging from 0 to 1. These scores are summed, and then multiplied²⁶ by the product of the scores for scope, reference paper principles, and depth, resulting in a final score that ranges from 0 to 8 for the variable GATSPOLICY. Mathematically, GATSPOLICY is equal to:

$[CBMA+CBNT+CAMA+CANT+CPMA+CBNT+MPMA+MPNT]*Scope*Depth*Reference\ Paper$, where:

CBMA = score for commitment on cross-border market access (taking values of 0 to 1);

CBNT = score for commitment on cross-border national treatment (0 to 1);

CAMA = score for commitment on consumption abroad market access (0 to 1);

CANT = score for commitment on consumption abroad national treatment (0 to 1);

CPMA = score for commitment on commercial presence market access (0 to 1);

CPNT = score for commitment on commercial presence national treatment (0 to 1);

MPMA = score for commitment on movement of persons market access (0 to 1);

MPNT = score for commitment on movement of persons national treatment (0 to 1);

Scope = score for scope of basic telecommunication services bound in schedule (0 to 1);

Depth = score for extent of adherence to Chairman's note (0 to 1); and

Reference Paper = score for extent of adherence to the reference paper (0 to 1).

The variables MAPOLICY, which reflects only market access commitments for the four modes of supply, and NTPOLICY, which reflects only the national treatment commitments, are calculated in the same manner. For these variables, final scores range from 0 to 4.

Econometric Results

Specifications 1 through 4 (table 1) appear to explain 84 to 85 percent of variation in market penetration, and GDP per capita (Y), private ownership (PS and PSOECD), GATSPOLICY, and MAPOLICY have statistically significant coefficients. Among these specifications, the second yields the strongest result among the policy variables. In this specification, GDP per capita, which explains most of the variation in network penetration, is statistically significant at the 1-percent level, and indicates that if GDP per capita increased by 1 percent, then market penetration would increase by 0.11 mainlines per hundred. Estimated coefficients for private ownership of incumbent telecommunication carriers suggest that such holdings affect lesser developed countries and developed countries differently. Looking across all 67 countries in the sample, the coefficient of PS, which is statistically significant at the 1-percent level, indicates that an increase in private sector ownership of 1 percentage point would reduce market penetration by 0.12 mainlines per hundred. Perhaps the best explanation of this is that, once private investors begin to exercise some operational control, they are apt to require that additions to basic telecommunication infrastructure generate returns that justify construction expenditures. This could reduce mainlines per hundred, at least initially. Alternative explanations are that private participation in many developed and developing countries' basic telecommunication markets has only recently been permitted, and so the benefits of private participation have not yet taken hold, or that the coefficient is simply picking up lower pre-existing penetration rates that are sometimes associated with past government-owned and -operated incumbents.

²⁶ It has been noted that multiplication of the scores is relatively rigid in that a score of zero for any one of the elements comprising the policy variable, namely those reflecting the extent of adherence to the GBT Chairman's note and the reference paper, results in an overall policy score of zero. In recognition of this, regressions were performed using policy variables that were formulated by adding scores for commitments, scope, the extent of adherence to the GBT Chairman's note, and the extent of adherence to the reference paper. Little or no change in goodness-of-fit (adjusted R-squared) or statistical significance resulted.

Table 1
Econometric results estimated on the basis of the specified market, demographic,
and policy variables

Variable	Specification 1	Specification 2	Specification 3	Specification 4
GATSPOLICY	1.16* (1.45)	(¹) (¹)	(¹) (¹)	(¹) (¹)
MAPOLICY	(¹) (¹)	2.80** (1.75)	(¹) (¹)	3.03* (1.71)
NTPOLICY	(¹) (¹)	(¹) (¹)	1.42 (1.14)	-0.26 (-0.19)
Log(Y)	11.61*** (6.81)	11.27*** (6.56)	12.13*** (7.75)	11.27*** (6.54)
PS	-0.12*** (-3.98)	-0.12*** (-4.00)	-0.12*** (-3.90)	-0.12*** (-3.90)
PSOECD	0.18*** (3.76)	0.18*** (3.73)	0.19*** (3.85)	0.18*** (3.73)
PD	0.00 (1.26)	0.00* (1.39)	0.00 (1.07)	0.00* (1.33)
REFORM	-1.33 (-0.65)	-1.85 (-0.89)	-0.94 (-0.45)	-1.92 (-0.91)
Adj. R ²	0.84	0.85	0.84	0.84

¹ Not applicable.

Note: T-statistics are in parentheses. Significance levels are determined by a one-sided t-test after correction for heteroskedasticity. The following indicates the level of statistical significance found for each independent variable:

* = The estimated coefficient has a 10 percent level of significance

** = The estimated coefficient has a 5 percent level of significance.

*** = The estimated coefficient has a 1 percent level of significance.

Source: Compiled by the U.S. International Trade Commission.

In OECD countries, estimated coefficients suggest that private participation increases market penetration, with a 1-percentage point increase in private holdings driving network penetration up by 0.18 mainlines per hundred. This effect, which is also statistically significant at the 1-percent level, may reflect longer standing private participation in these markets, and correspondingly higher market penetration. An alternative explanation is that higher incomes simply tend to be associated with higher mainlines per hundred; OECD countries can simply afford better telecommunication systems. Interaction of the variables PS and PSOECD suggests that the net effect of private holdings is positive, with a 1-percentage point increase in private holdings driving network penetration up by 0.06 mainlines per hundred.

The estimated coefficients for MAPOLICY and GATSPOLICY appear statistically significant at the 5-percent and 10-percent level, respectively, while that for NTPOLICY does not appear significant. Several factors seem important in this respect. First, scheduling guidelines issued to WTO member countries during the Uruguay Round defined market access limitations, but not national treatment limitations. This may have assisted countries in more readily identifying and scheduling market access barriers, and hindered identification of national treatment barriers. Second, by scheduling convention, where a measure was identified as being a limitation on both market access and national treatment, countries were directed to

capture the measures in the market access column alone, increasing the amount of information about nontariff barriers in the market access commitments while reducing such information in national treatment commitments. Last, as noted above, the GBT Agreement promoted the scheduling of effective market access commitments by formulating agreed pro-competitive regulatory principles, and by controlling for practical impediments to market access identified in the GBT Chairman's note.

The estimated coefficient of PD is statistically significant at the 10-percent level, though the coefficient itself is near zero, and the variable REFORM did not prove statistically significant. With respect to the former, a possible explanation is that a fair number of developing economies with low market penetration rates have high population densities. For instance, Bangladesh, India, and El Salvador rank among the 10 most densely populated countries in this sample. With respect to the latter, the principal difficulty may be one of measurement. It is difficult to specifically define what constitutes reform, and to differentiate between genuine reforms and "paper" reforms.

Quantity Impacts

Given these econometric results, it is possible to simulate the implied quantity effects of impediments to trade in voice telephone services. Because the market access policy variable appears to be most robust, quantity impacts are computed by multiplying the estimated coefficient of MAPOLICY by the difference between the highest possible score for the variable (i.e., 4) and the market access policy scores computed for each country, which range in value from 0 to 4. Quantity impacts for all 67 markets are presented in table 2. The quantity impacts show that the adoption of fully liberal market access policies would increase market penetration rates in relatively restrictive countries, such as Bangladesh and Brazil, by a great deal, specifically by 11.2 mainlines per hundred. In less restrictive countries, where market access policies are nearly fully liberalized, as in many OECD markets, market penetration would increase by a relatively small amount if market access policies were fully liberalized.

Conclusion

Evolving developments in voice telephone services could provide a future opportunity to refine this analysis by factoring in the policy commitments to packet- and circuit-switched data transmission, since it is now believed that data transmission volumes approximately match voice transmissions. Use of such variables would provide for more comprehensive analysis, perhaps yielding insights relevant to electronic commerce. It would also be worthwhile to explore cellular communications more thoroughly as this communication appears to be a significant complement to, and especially in developing countries a substitute for, wireline networks. Incorporation of cellular communications would provide a forward-looking dimension to the analysis, providing a useful baseline from which to measure the effects of liberalizing emerging communication technologies. Finally, further refinements to this methodology might be considered after conclusion of the Doha Round of GATS negotiations, when analysis of new telecommunication commitments may yield estimates of lower quantity impacts, providing a measure of liberalization bound in GATS commitments.

Measuring Effects of NTBs in Voice Telephone Services

Table 2
Quantity impacts: Predicted change in mainlines and percent change in mainlines due to full liberalization, 2000

Country	Change in mainlines		Country	Change in mainlines	
	<i>Per hundred</i>	<i>Percent</i>		<i>Per hundred</i>	<i>Percent</i>
Albania	7.52	192	Italy	1.40	3
Argentina	8.20	38	Jamaica	9.10	46
Australia	2.80	5	Japan	4.00	7
Austria	1.40	3	Korea	4.20	9
Bangladesh	11.20	3,111	Luxembourg	1.40	2
Barbados	7.00	16	Malaysia	11.20	56
Belgium	1.40	3	Mauritius	11.20	48
Belize	4.90	33	Mexico	7.70	62
Bolivia	10.50	174	Morocco	11.20	223
Brazil	11.20	62	Netherlands	1.40	2
Brunei Darussalam	10.75	44	New Zealand	2.80	6
Bulgaria	7.52	21	Norway	0.70	1
Canada	5.60	8	Pakistan	11.20	519
Chile	4.90	22	Papua New Guinea	6.30	467
Colombia	7.60	45	Peru	7.70	115
Cote d'Ivoire	7.60	427	Philippines	11.05	276
Croatia	9.10	25	Poland	8.05	29
Cyprus	11.20	17	Portugal	7.00	16
Czech Republic	7.00	19	Romania	7.00	40
Denmark	1.40	2	Senegal	9.40	435
Ecuador	11.20	112	Singapore	7.93	16
El Salvador	4.00	40	South Africa	9.10	80
Finland	3.50	6	Spain	2.80	7
France	1.40	2	Sri Lanka	10.90	268
Germany	1.40	2	Suriname	10.30	59
Greece	7.00	13	Sweden	1.40	2
Guatemala	2.80	49	Switzerland	4.20	6
Hong Kong, China	6.70	11	Thailand	11.20	121
Hungary	7.00	19	Trinidad & Tobago	6.40	28
Iceland	1.40	2	Tunisia	11.20	125
India	11.20	350	United States.	2.80	4
Indonesia	6.62	211	United Kingdom	1.40	2
Ireland	7.00	17	Venezuela	10.40	96
Israel	9.20	19			

Source: Compiled by the U.S. International Trade Commission.

#

APPENDIX A

Key Performance Indicators of Selected Industries and Regions¹

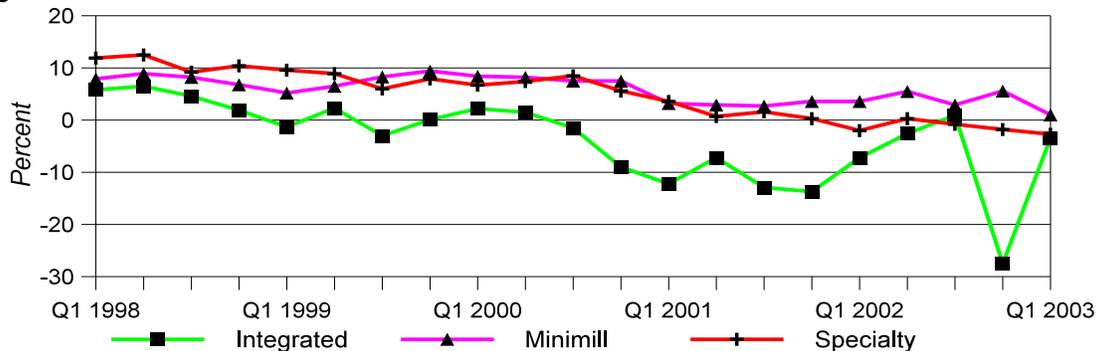
Title	Author ¹	Page
Steel	Harry Lenchitz (202) 205-2737 <i>hlenchitz@usitc.gov</i>	A-2
		A-3
Automobiles	Laura A. Polly (202) 205-3408 <i>polly@usitc.gov</i>	A-4
Unwrought Aluminum	Judith-Anne Webster (202) 205-3489 <i>webster@usitc.gov</i>	A-5
Flat Glass	Vincent DeSapio (202) 205-3435 <i>desapio@usitc.gov</i>	A-6
Services	Cynthia Payne (202) 205-3410 <i>payne@usitc.gov</i>	A-7
North American Trade	Audry Tafoya ² Ruben Mata (202) 205-3403 <i>mata@usitc.gov</i>	A-8
		A-9

¹ The data and views presented for the following indicators are compiled from the industry sources noted and are those of the authors. They are not the views of the United States International Trade Commission as a whole or of any individual Commissioner. Nothing contained in this information based on published sources should be construed to indicate how the Commission would find in an investigation conducted under any statutory authority.

² Research assistance provided by Audry Tafoya, intern from the Center for North American Studies, American University.

STEEL

Figure A-1
Operating income trends down for minimill and specialty producers during first quarter 2003¹



¹Operating income as a percent of sales. Integrated group contains 5 firms. Minimill group contains 7 firms. Specialty group contains 4 firms.

Note.--First quarter 2003 integrated group includes 1 previously untracked firm, and no longer includes 1 previously tracked firm, reflecting ownership changes in the industry.

Source: Individual company financial statements.

- The U.S. Bankruptcy Court for the Northern District of West Virginia gave its final approval to Weirton Steel Corp. for a \$225 million debtor-in-possession (DIP) financing facility on June 16, 2003. Weirton had been operating under interim DIP financing since filing a voluntary petition for reorganization under Chapter 11 bankruptcy in May, 2003. See <http://www.weirton.com>
- The United Steelworkers of America (USWA) announced that union members at six former Bethlehem Steel locations ratified a labor contract with the new owners of the facilities, International Steel Group (ISG), on June 16, 2003. The agreement brings the former Bethlehem employees into the contract that covers former LTV and Acme Steel employees now employed by ISG. See <http://www.uswa.org>
- Wheeling-Pittsburgh Corporation (WPC) formally exited bankruptcy on August 1, 2003, after signing a new labor agreement with the United Steel Workers of America (USWA). A new labor agreement was one of the Emergency Steel Loan Guarantee Board's conditions when it approved WPC's \$250 million loan guarantee application in March 2003. See <http://www.wpsc.com> and <http://www.uswa.org>
- United States Steel Corporation (USS) signed a letter of intent with International Steel Group Inc. (ISG) to exchange the assets of its plate business, including the plate mill at Gary Works, for the assets of ISG's No. 2 pickle line at Indiana Harbor Works, on August 13, 2003. The transaction is expected to close in the fourth quarter of 2003. See <http://www.uss.com>

Table A-1

Imports decrease and exports increase during first quarter 2003 compared to fourth quarter 2002, and also compared to first quarter year ago

Item	Q4 2002	Percentage change, Q1 2003 from		Percentage change, Q1 2003 from Q1 2002
		Q4 2002	Q1 2003 ¹	
Producers' shipments (1,000 short tons)	24,358	6.9	26,037	8.8
Finished imports (1,000 short tons)	6,418	-20.3	5,113	-12.6
Ingots, blooms, billets, and slabs (1,000 short tons)	2,258	-41.1	1,331	-43.9
Exports (1,000 short tons)	1,581	25.6	1,986	34.9
Apparent supply, finished (1,000 short tons)	29,195	-0.1	29,164	3.0
Ratio of finished imports to apparent supply (percent)	22.0	² -4.5	17.5	² 3.2

¹ Preliminary.

² Percentage point change.

Note.--Because of rounding, figures may not add to the totals shown.

Source: American Iron and Steel Institute.

STEEL

Table A-2
Steel service centers: Shipments increase and inventories decrease during first quarter 2003 compared to fourth quarter 2002, consistent with seasonal demand trends

Item	Dec. 2002	Mar. 2003	Percentage change, Mar. 2003 from		Q1 2002	Q1 2003	Percentage change, Q1 2003 from Q1 2002
			Dec. 2002	Q1 2002			
Shipments (1,000 short tons)	3,213	4,102	23.9	12,416	11,702	-5.8	
Ending inventories (1,000 short tons) . . .	15,117	14,044	-7.1	13,222	14,044	6.2	
Inventories on hand (months)	4.7	3.4	(¹)	3.2	3.4	(¹)	

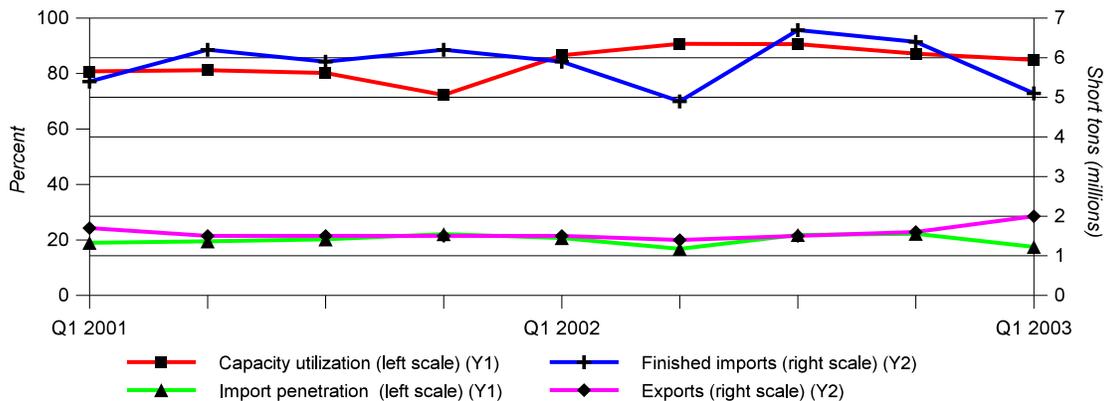
¹ Not applicable.

Note.—Metals Service Center Institute data collection and presentation methods have been updated. Data presented for Dec. 2002 and first quarter 2002 have been updated, and differ from previously published data.

Source: Metals Service Center Institute.

- U.S. service center steel shipments for first quarter 2003 were down, and inventories were up, compared to shipments and inventories for first quarter 2002 (table A-2), according to the Metals Service Center Institute. See <http://www.ssci.org>
- The American Institute for International Steel import market survey (June 2003) predicts a drop in import orders for the next 3 to 5 months for most steel products, including semifinished, hot and cold rolled, corrosion resistant, and structurals, while import orders for cut-to-length plate, wire rod, and pipe and tube remain essentially unchanged. See <http://www.aiis.org>
- World crude steel production for the first 6 months of 2003 was 513 million tons, an increase of 8.2 percent compared with the first 6 months of 2002, according to the International Iron and Steel Institute. China produced 114 million tons, accounting for more than 22 percent of world production thus far for 2003. See <http://www.worldsteel.org>
- Domestic capability utilization continued to decline during first quarter 2003 (Figure A-2). The drop in capability utilization was largely driven by the results of integrated producers, whose shipments were down by almost 10 percent from fourth quarter 2002. Modest increases in shipments by minimill and specialty producers did little to increase their capability utilization. See <http://www.steel.org>

Figure A-2
Steel mill products, all grades: Capability utilization drops below 90 percent during fourth quarter 2002 but remains well above capability utilization during fourth quarter 2001



Note.—Capacity utilization is the raw steel tonnage produced divided by the tonnage capability to produce raw steel for a sustained full order book.

Source: American Iron and Steel Institute.

AUTOMOBILES

Table A-3
U.S. sales of new passenger vehicles (cars and light trucks), domestic and imported, and share of U.S. market accounted for by sales of total imports and Japanese imports, by specified periods, January 2002-June 2003

Item	Apr.-June 2003	Jan.-June 2003	Percentage change	
			Apr.-June 2003 from Jan.-Mar. 2003	Jan.-June 2003 from Jan.-June 2002
U.S. sales of domestic passenger vehicles (1,000 units) ¹	3,602	6,594	20.4	-3.4
U.S. sales of imported passenger vehicles (1,000 units) ²	863	1,638	11.4	1.6
Total U.S. sales (1,000 units) ¹⁻²	4,465	8,232	18.5	-2.4
Ratio of U.S. sales of imported passenger vehicles to total U.S. sales (percent) ¹⁻²	19.3	19.9	-6.1	4.1
U.S. sales of Japanese imports as a share of the total U.S. market (percent) ¹	10.1	10.6	-10.9	5.2

¹ Domestic passenger vehicles include U.S.-, Canadian-, and Mexican-built cars and light trucks sold in the United States.

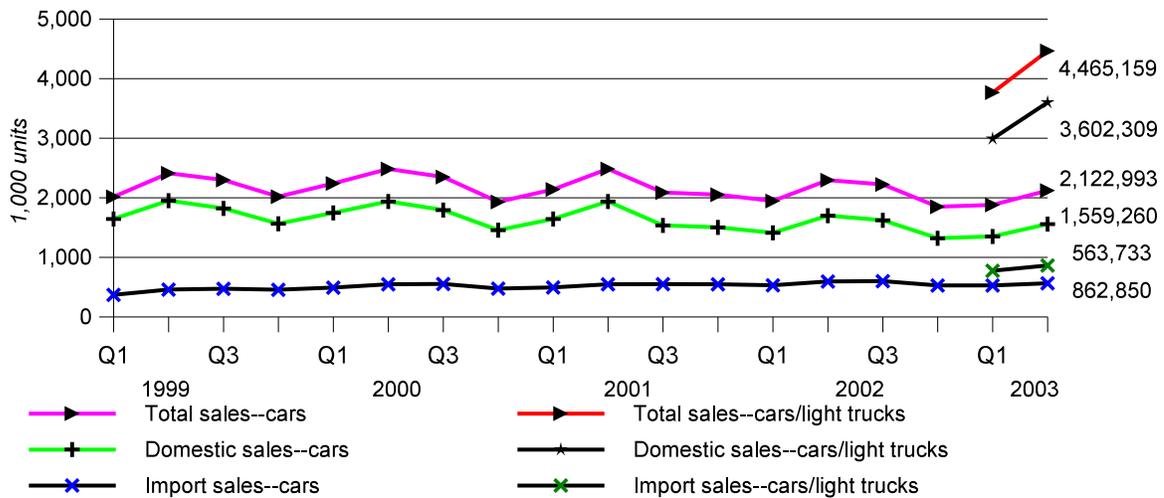
² Imported passenger vehicles do not include cars and light trucks supplied by Canada and Mexico.

Note.—Data for 2003 forward include cars and light trucks; year-to-date data for 2002 also include cars and light trucks.

Source: Compiled from data obtained from *Automotive News*.

- For the first half of 2003, light trucks accounted for 51 percent of total passenger vehicle sales in the United States, 56 percent of domestic passenger vehicle sales, and 33 percent of import vehicle sales. During the same period, imports from Japan of light trucks accounted for 10 percent of total U.S. light truck sales.
- General Motors, Ford, and DaimlerChrysler have been the market leaders in light trucks; however, Japanese automakers have made significant recent investments in their light truck manufacturing capacity in the United States. For example, in May 2003, Nissan opened a new assembly plant in Canton, MS for minivan, pickup truck, and SUV production.
- U.S. industry officials claim that, since 2000, the weak yen has contributed to the intense competition for U.S. market share, and that the unfavorable currency conditions caused General Motors, Ford, and DaimlerChrysler to lose a combined 8.4 percentage points of domestic market share, which translates into over 1.6 million lost passenger vehicle sales worth over \$35 billion.

Figure A-3
U.S. sales of new passenger vehicles (cars and light trucks) increased in the second quarter 2003; sales of domestic passenger vehicles as a percentage of total U.S. sales gain significantly compared to first quarter 2003

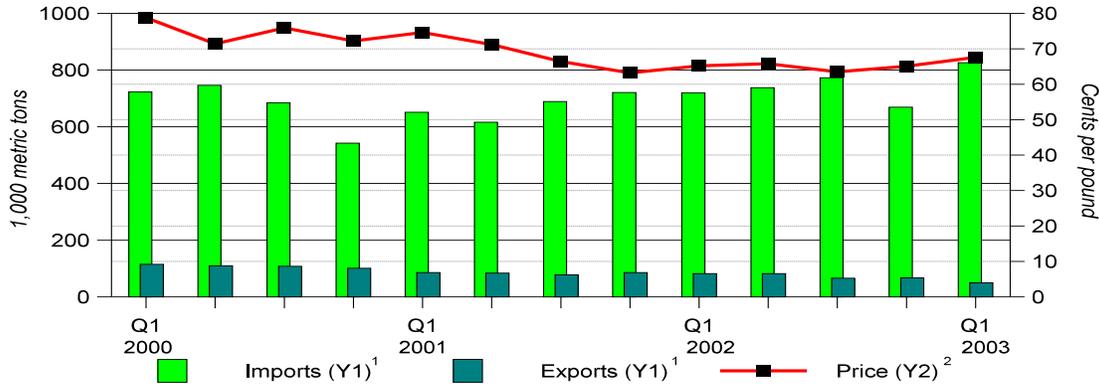


Note.—Domestic sales include U.S.-, Canadian-, and Mexican-built vehicles sold in the United States; these same units are not included in import sales. From first quarter 2003 forward, data are shown for sales of cars only as well as cars and light trucks combined (passenger vehicles).

Source: *Automotive News*; prepared by the Office of Industries.

UNWROUGHT ALUMINUM¹

Figure A-4
Despite a 24-percent increase in first quarter imports, largely supplied by Russia during March 2003, prices reached their highest quarterly average since the second quarter 2001



¹ Unwrought aluminum and aluminum alloys.

² Quarterly average of the monthly U.S. market price of primary aluminum ingots.

Source: Compiled by USITC staff based on data obtained from the U.S. Geological Survey.

- Imports from Russia increased significantly in March as shipments delayed by freezing weather at the Port of St. Petersburg arrived in the United States after a spring thaw allowed port operations to resume.
- Rising prices for unwrought aluminum in the first quarter of 2003 reflect the high cost of alumina, declining production in the Pacific Northwest, and concern on the metal market over supply constraints that might result during the war with Iraq.
- Current developments indicate that consumption of U.S.-made unwrought aluminum and semifabricated aluminum products will likely increase as car manufacturers continue to replace iron and steel with aluminum due to its lighter weight and improved fuel efficiency. For example, Toyota plans to increase production of its truck engines at its Alabama facility (consuming 15-million pounds more of U.S.-supplied aluminum annually), and Ford has decided to use aluminum alloys smelted in the Midwest for the 2004 F-150's rack and pinion steering housings along with aluminum front axle carriers and tubes on its standard-size 150's which will be made in the United States.

Table A-4

Reduced production and rising input costs in first quarter 2003, moved aluminum prices upward to 5 cents over the 12-month low of 62.6 cents per pound in August 2002

Item	Q1 2002	Q4 2002	Q1 2003	Percentage change	
				Q1 2003 from Q1 2002	Q1 2003 from Q4 2002
Primary production (1,000 metric tons)	627	708	700	11.6	-1.1
Secondary recovery (1,000 metric tons)	735r	741r	721	-1.9	-2.7
Imports (1,000 metric tons)	720	669	826	14.7	23.5
Import penetration (percent)	36.0	32.6	37.6	11.6	15.0
Exports (1,000 metric tons)	82	67	50	-39.0	-25.4
Average nominal price (cents/lb)	65.2	65.1	67.6	3.7	3.8
LME inventory level (1,000 metric tons)	1,029	1,243	1,318	28.0	6.0

¹ Percentage point change

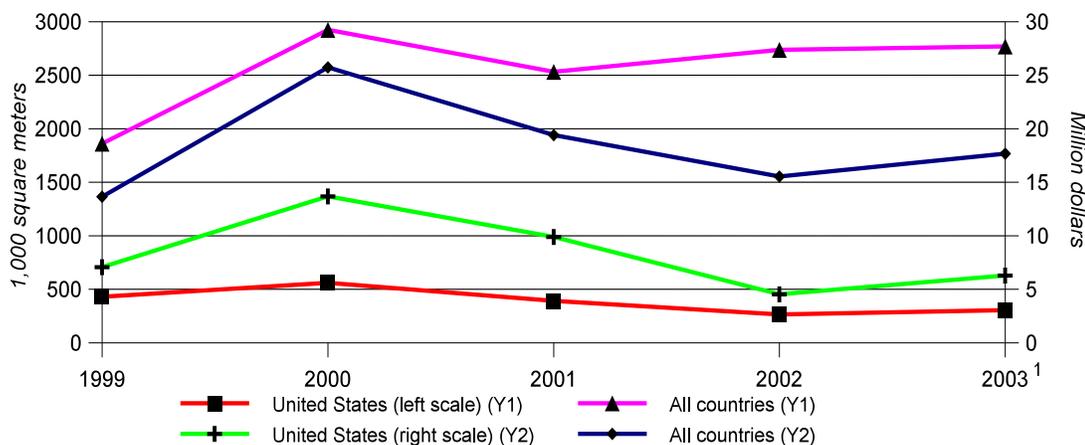
Note.—Revised data indicated by “r.”

Sources: Compiled from data obtained from U.S. Geological Survey and World Bureau of Metal Statistics.

¹ Product coverage includes only unwrought aluminum and certain aluminum alloys for improved data comparability.

FLAT GLASS

Figure A-5
Japanese monthly average imports show increase during first 5 months of 2003



¹ Data for Jan.-May (Latest available data).

Source: Compiled from "World Trade Atlas: Japan" at <http://www.globaltradeatlas.com> on Mar. 20, 2003 which uses official statistics provided by the Government of Japan.

Background

- Although the U.S.-Japanese agreement on Japanese market access for imports of flat glass which sought to increase access and sales of foreign flat glass in Japan expired on December 31, 1999,¹ the U.S. Government continues to urge the Japanese Government to take steps to promote access and competition in its glass market and continues to work with U.S. industry to achieve these goals.² The U.S. Government has had some success in urging Japan to modify regulations that would facilitate use of energy-efficient glass in Japan.
- U.S. and Japanese negotiators have agreed that Japan's Ministry of Trade and Industry (MITI), in conjunction with the Japan Fair Trade Commission (JFTC), should monitor Japanese flat glass manufacturers and the glass distribution system in Japan to promote competition in the sector.³

Current

- Greater Japanese demand for imported flat glass, encouraged by a somewhat more positive outlook for the Japanese economy, increased average monthly Japanese imports from all countries by 28 percent for the first 5 months of 2003 to 2.8 million square meters compared with the same period of 2002. The average monthly value of total Japanese flat glass imports increased 39 percent during the first 5 months of 2003 to \$17.7 million compared with the average monthly value for the comparable period in 2002.
- Japanese imports from the United States increased by quantity and value during the first 5 months of 2003 compared to the same period in 2002 (up 29 percent to 305,000 square meters and 93 percent to \$6.3 million, respectively). Average monthly imports from the United States for full-year 2002 had decreased 32 percent in quantity and 54 percent in value compared with full-year 2001.

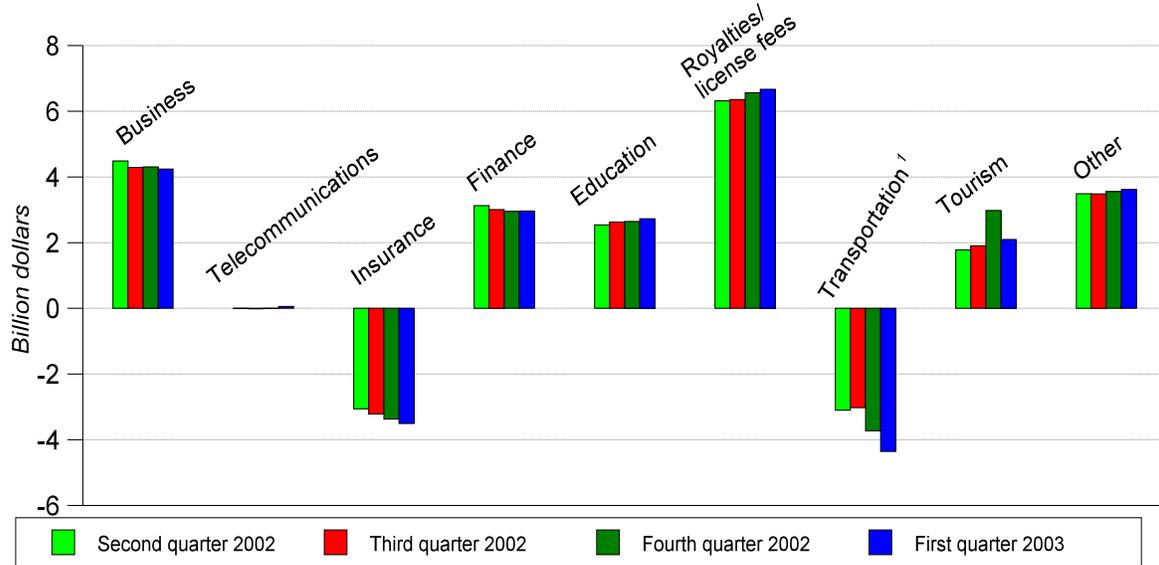
¹ Office of the U.S. Trade Representative (USTR), *The President's 1999 Annual Report on the Trade Agreements Program*, p. 227, downloaded from <http://www.ustr.gov/reports/tpa/2000index.html> on Mar. 3, 2000.

² U.S. Department of State cable, *2003 National Trade Estimate Report - Japan*, message reference No. 8640, prepared by U.S. Embassy, Tokyo, Dec. 16, 2002.

³ USTR, *Annual Submission by the Government of the United States to the Government of Japan on Deregulation and Competition Policy*, Oct. 12, 2000, p. 32.

SERVICES

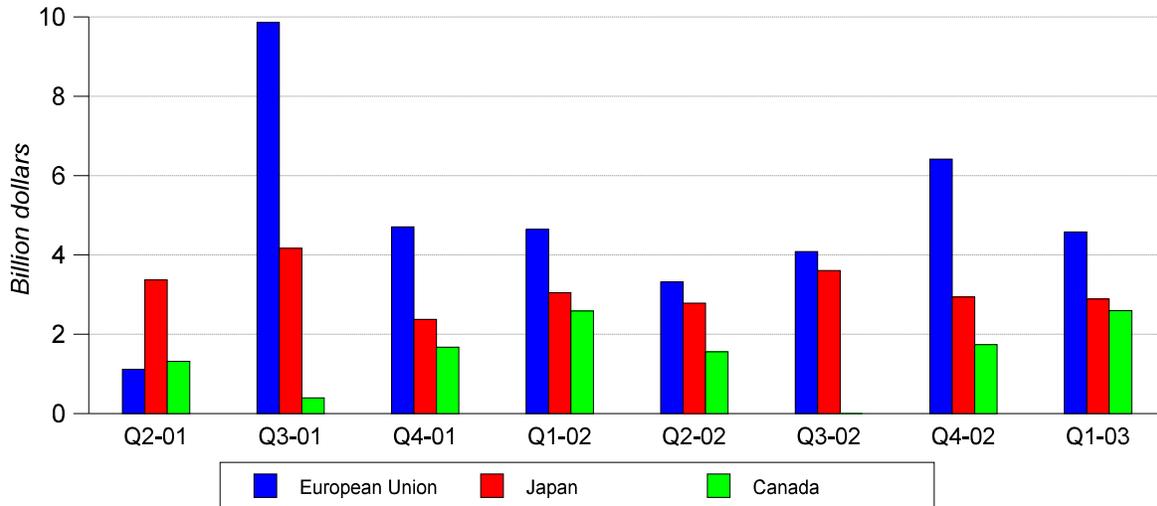
Figure A-6
 Balance on U.S. service trade accounts, by quarter, 2002 and 2003



¹ Includes passenger fares, freight and port services.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, July 2003, pp. 76-77.

Figure A-7
 Surpluses on cross-border U.S. services transactions with selected trading partners, by quarter, 2001-2003¹



¹ Private-sector transactions only; military shipments and other public-sector transactions have been excluded.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, July 2002, pp. 104-107; Jan. 2003, pp. 42-45; Oct. 2002, pp. 60-63; July 2002, pp. 78-81; and Apr. 2002, pp. 68-71.

NORTH AMERICAN TRADE HIGHLIGHTS

U.S. trade with its North American partners is highlighted in table A-5. The following is a summary of key developments during the first quarter 2003.

- Total U.S. imports from Mexico increased 8 percent from the first quarter 2002 to the first quarter of 2003, reaching \$134 billion. This growth reflects a moderate quarter to quarter increase of 1.9 percent in the U.S. gross domestic product that was driven largely by crude petroleum, which in turn accounted for 70 percent of the expansion in the total value of imports. The higher 2003 price for crude oil was due in part to uncertainty about oil supply from the Middle East, Nigeria, and Venezuela, and the onset of the Iraq war in late March 2003. The significance of petroleum in U.S.-Mexico trade was emblematic of total U.S. trade in the first quarter 2003, as three-fourths of the \$6.2-billion increase in the U.S. trade deficit with all partners during January-March 2003 was attributable to petroleum imports.¹
- Total U.S. imports from Canada grew by 10 percent despite a 5.3 percent year-to-year increase in value of the Canadian dollar ² (to 73 cents) relative to the U.S. dollar. For many products, the appreciation in the Canadian dollar results in U.S. consumers paying more for imports from Canada. In contrast to U.S.-Mexico trade, petroleum accounted for 31 percent of the increase in U.S. imports from Canada in first quarter 2003.
- Total U.S. exports to Mexico decreased by 3 percent, despite a 0.9-percent quarter-to-quarter growth in the Mexican manufacturing industry.³ Total U.S. exports to Canada increased by 7 percent January-March 2003, largely attributable to a strong increase in Canadian consumer expenditures that rose 3.5 percent quarter to quarter.
- Harsh winter weather in portions of the Eastern United States in 2003 compared with the relatively mild winter of 2002 led to a slowdown in housing construction in that region. That, in turn, dampened U.S. imports of forest products from Canada, which decreased by 9 percent in the first quarter 2003.
- The value of U.S. imports of Canadian automobiles was reduced slightly during January-March 2003, reflecting the sluggish U.S. automobile market. U.S. vehicle purchases are at a 4½ year low ⁴ reportedly as a result of the slow U.S. economic recovery and overcapacity in the global auto industry. Despite offering consumers financial incentives and quality improvements to stimulate demand, these initiatives reportedly have reduced U.S. auto industry profits in order to maintain stability in sales volume.
- Mexican vehicle exports to the U.S. market decreased 7.7 percent in the first quarter of 2003,⁵ continuing a trend of negative growth in this export sector, which industry observers do not expect to improve in the immediate future. This is due, in part, to the differentiated nature of North American automobile production with Mexico's focus on subcompact and mid-size automobiles rather than light trucks and SUVs which is the strength of the U.S. industry.⁶ However, the downward trend in Mexican auto exports was countered by significant growth in Mexican auto parts exports.⁷ The combined value of U.S. imports of seats, wiring harnesses, engines, pumps, ignitions, and other motor-vehicle parts from Mexico increased from \$3.7 billion in first quarter of 2002 to \$4.7 billion in first quarter of 2003, a 17-percent increase.⁸

¹ Diana I. Gregg, "Trade Balance," found at <http://www.bea.gov/bea/newsrel/trans103.pdf>, retrieved on June 20, 2003.

² Terry Weber, "Productivity Dips in First Quarter," *The Globe and Mail*, June 12, 2003, found at <http://www.theglobeandmail.com/servlet/story/RTGAM.20030612.wbprod0612/BNStory/Business>, retrieved on June 13, 2003.

³ *The Dismal Scientist*, "GDP Analysis - Mexico," found at <http://www.economy.com/dismal/pro/release> retrieved on June 5, 2003.

⁴ Warren Jestin and Aron Gampel, "Global Outlook," Scotiabank, found at http://scotiacapital.com/English/bus_econ/busglobe.pdf, retrieved on July 9, 2003.

⁵ "Economic Summary," *Mexico Watch*, Mar. 1, 2003, vol. 9, No. 3, p. 3.

⁶ EIU Executive Briefing, "United States of America: Automotive Forecast," found at http://80-eb.eiu.com.proxyau.wrlc.org/index.asp?layout=show_article&article_id=1656135565, retrieved on June 26, 2003.

⁷ Carlos Agoitia, "Productos Automotrices - Evolución Reciente y Perspectivas," April 2003, found at http://www.bancomext.com/Bancomext/publicasecciones/secciones/2508/PRODUCTOS_AUTOMOTRICzES_2002.pdf, retrieved on June 19, 2003.

⁸ Official statistics of the U.S. Department of Commerce.

NORTH AMERICAN TRADE

Table A-5
North American trade, 1998-2002, January-March 2002, and January-March 2003

Item	1998	1999	2000	2001	2002	January-March		Percent change 2002/03
						2002	2003	
Value (million dollars)								
U.S.-Mexico trade:								
Total imports from Mexico	93,017	109,018	134,734	130,509	134,121	31,056	33,489	8
U.S. imports under NAFTA:								
Total value	68,326	71,317	83,995	81,162	84,747	19,559	21,627	11
Percent of total imports	73	65	62	62	63	63	65	12
Total exports to Mexico	75,369	81,381	100,442	90,537	86,076	20,184	19,593	-3
U.S. merchandise trade balance with Mexico ²	-17,648	-27,637	-34,292	-39,971	-48,045	-10,873	-13,896	-28
U.S. -Canada trade:								
Total imports from Canada	174,685	198,242	229,060	216,836	210,518	50,610	55,636	10
U.S. imports under NAFTA:								
Total value	111,675	115,715	123,052	113,179	115,807	27,301	28,651	5
Percent of total imports	64	58	54	52	55	54	51	1-3
Total exports to Canada	137,768	145,731	155,601	144,621	142,543	34,031	36,412	7
U.S. merchandise trade balance with Canada ³	-36,918	-52,511	-73,459	-72,215	-67,975	-16,579	-19,225	-16

¹Percentage point change.

² The negative (-) symbol indicates a loss or trade deficit. The \$48.0-billion deficit in U.S. merchandise trade with Mexico in 2002 was partially offset by a \$4.7-billion U.S. surplus in bilateral services trade.

³ The \$68.0-billion deficit in U.S. merchandise trade with Canada in 2002 was partially offset by a \$5.8-billion U.S. surplus in bilateral services trade. During the first quarter of 2003 the U.S. surplus in bilateral services trade was \$2.6 billion, not seasonally adjusted.

Source: Compiled by USITC staff from official statistics of the U.S. Department of Commerce. Statistics on U.S. services trade with Canada and Mexico are based on preliminary data provided in U.S. Department of Commerce, Bureau of Economic Analysis, "U.S. International Transactions Accounts Data," tables 10 and 10a, found at http://www.BEA.DOC.GOV/BEA/International/BP_web/list.CFM?ANON=92.

- Within the Mexican manufacturing sector, the industries with the strongest quarter-to-quarter growth were basic metallic products (12.6 percent); non-metallic metals (7.3 percent); construction (5.9 percent); chemicals (5.7 percent); and paper, printing, and publishing (3.9 percent). Growth in these industries, which are less dependent on imported components for production, can be contrasted to a 3.3-percent decrease in Mexican textile exports.⁹
- In addition to crude petroleum, natural gas is a significant part of U.S. trade with its North American partners. Electricity companies are making greater use of natural gas to fuel their power generation plants, leading to increased demand and prices for natural gas in the United States.¹⁰ This is reflected in the \$3.1-billion rise in U.S. imports of natural gas from Canada during January-March 2003. Domestic demand for natural gas also is rising in Mexico with the expansion of energy-intensive manufacturing.

⁹ *The Dismal Scientist*, "GDP Analysis - Mexico," found at <http://www.economy.com/dismal/pro/release>, retrieved on June 5, 2003.

¹⁰ Joseph M. Dukert, "New Initiatives in North American Energy Cooperation," International Association for Energy Economics Newsletter, Apr. 2003.