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Chemical trade by the Central European countries: Difficulties of sector transition
Commercialization of hybrid automobiles: Prospective demand for light metals

CONTENTS

CONTENTS—*Continued*

Page

#

Apparel: Andean Countries Seek Parity with Caribbean Basin Countries to Remain Competitive in the U.S. Market

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The Andean Trade Preference Act (ATPA) beneficiary countries are a small, but growing source of textile and apparel articles for the United States despite lacking duty-free entry under the ATPA program. The increased importance of "time to market" has prompted many U.S. apparel producers with global operating strategies to source more from the Western Hemisphere rather than Asia. Colombia and Peru, the leading ATPA suppliers of textiles and apparel to the United States, have expressed concern that the newly enacted United States-Caribbean Basin Trade Partnership Act (CBTPA), which essentially granted NAFTA-equivalent trade preferences to certain textile and apparel articles of the Caribbean Basin countries, may weaken their ability to compete in exporting apparel to the United States, their most important market. This article examines U.S.-ATPA trade; recent developments in the ATPA countries' textile and apparel sectors; the implications of the CBTPA for trade, employment, and foreign investment in ATPA countries; and recently introduced legislation that would allow the ATPA countries to compete more effectively with Mexico and the Caribbean Basin countries.

The ATPA was enacted in 1991 to expand economic alternatives for the four beneficiary countries--Bolivia, Colombia, Ecuador, and Peru--in their fight against drug production and trafficking. This 10-year program, scheduled to expire on December 4, 2001, provides most goods originating in the ATPA countries with duty-free access to the U.S. market and reduced duties on leather apparel and certain other leather goods such as luggage and flat goods (e.g., wallets). However, most textile and apparel articles are ineligible for ATPA tariff preferences. On March 13, 2001, the Andean Trade Preference Expansion Act (S. 525) was introduced to provide duty-free treatment to imports of certain apparel from the Andean countries similar to that granted to beneficiary countries under the Caribbean Basin Economic Recovery Act (CBERA), as amended by the newly enacted CBTPA.[2]

U.S. imports of all merchandise from the ATPA countries have grown significantly since the implementation of the ATPA, by 124 percent, from $5.0 billion in 1991 to $11.1 billion in 2000. Some 60 percent of the imports in 2000 from ATPA-eligible countries were goods that entered free of duty. Imports of textiles and apparel (sector goods) from the ATPA countries

[1] The views expressed in this article are those of the author. They are not the views of the U.S. International Trade Commission as a whole or of any individual Commissioner.

[2] For more information on this legislation, see later section, "Legislation: Concerns About Competitive Disadvantages."

also grew rapidly (despite their ineligibility for preferential tariff treatment), rising by 157 percent during 1991-2000 to $892 million.

The ATPA Textile and Apparel Sector

The ATPA countries are relatively small suppliers of textiles and apparel to the United States, accounting for 1.4 percent of total U.S. imports of sector goods by value in 2000. In contrast, the United States is the principal market for their exports of such goods that are concentrated in apparel, and accounted for 93 percent of U.S. sector imports from the region in 2000. Since almost all U.S. apparel imports from the region are from Colombia and Peru, this article focuses primarily on recent developments in U.S. apparel trade with these countries.

U.S. apparel imports from Colombia and Peru exhibit significantly different patterns of growth and product composition. Between 1996 and 2000, imports from Colombia rose by 31 percent to $409 million (table 1) and the country's share of U.S. apparel imports from ATPA countries fell from 65 percent to 49 percent (figure 1). In contrast, imports from Peru during the period grew much faster, by 161 percent, to $383 million, and from a 31 percent share in 1996 to a 46-percent share in 2000. On a product basis, the majority of apparel imports from Colombia are assembled from U.S.-made and-cut components whereas apparel imports from Peru are almost entirely of non-U.S. parts, most likely Peruvian-made fabrics. About 56 percent of U.S. apparel imports from Colombia in 2000 entered under the 9802.00.80 provision[3] of the Harmonized Tariff Schedule of the United States (HTS) (table 2), which provides a duty exemption for U.S. components that are returned to the United States as parts of goods assembled abroad. Of the $227 million in apparel imports from Colombia that entered under HTS provision 9802.00.80 in 2000, the U.S. content accounted for 55 percent of the total value of these imports. In contrast, 0.4 percent of U.S. imports from Peru entered under HTS provision in 2000, and the U.S. content (accounting for just 2 percent of the total value of these imports) comprised primarily minor trimmings such as buttons or labels.

Table 1
Apparel: U.S. imports from Andean Trade Preference Act countries, 1996-2000

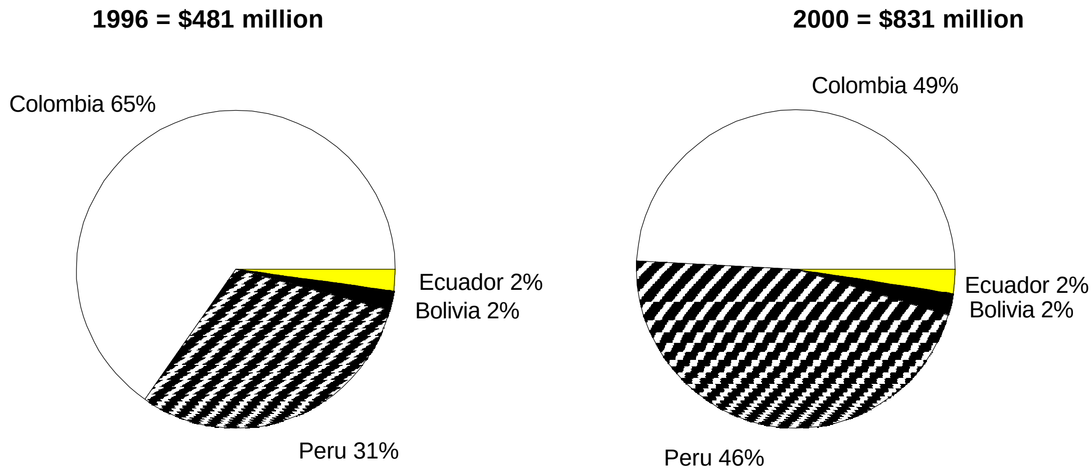
(*1,000 dollars*)

Country	1996	1997	1998	1999	2000
Colombia	317,713	347,433	360,173	369,700	409,451
Peru	146,798	193,235	222,542	305,773	382,866
Ecuador	9,807	12,527	13,048	16,624	19,834
Bolivia	12,104	12,337	17,066	15,592	18,982
Total	480,422	565,532	612,829	707,689	831,133

Source: Compiled from official statistics of the U.S. Department of Commerce.

[3] HTS provision 9802.00.80 was formerly the "807" provision.

Figure 1
Apparel: Percentage distribution of U.S. imports from Andean Trade Preference Act countries, 1996 and 2000



Note.--Calculation based on rounded data; figures may not add to 100 percent.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 2
Apparel: U.S. imports for consumption[1] from ATPA beneficiary countries, by customs value and value of U.S. components, 2000

Country	Total customs value	HTS 9802 trade: Customs value	HTS 9802 trade: Value of U.S. content	HTS 9802 trade: Share of U.S. content
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*Percent*
Bolivia	18,766	1,441	402	28
Colombia	407,268	226,756	124,362	55
Ecuador	18,962	7,165	5,475	76
Peru	382,381	1,601	29	2
Total	827,377	236,963	130,267	55

[1] Articles of apparel and clothing accessories, knitted or crocheted (HTS ch. 61) and not knitted or crocheted (HTS ch. 62).

Source: Compiled from official statistics of the U.S. Department of Commerce.

Colombia

Colombia's apparel industry employs an estimated 300,000 workers.[4] A number of U.S. apparel firms have production-sharing arrangements with "maquilas" in Colombia, which reportedly assemble about $250 million of garments annually for U.S. firms.[5] The maquilas, almost all of which are Colombian-owned, offer cost-competitive goods, low labor costs (wages estimated to be 90 cents per hour),[6] competitive lead times, lower shipping costs than Asian suppliers, quality needlework, modern technological capabilities, and production flexibility.[7] Some 90 maquilas that assemble apparel are concentrated in free-trade zones (FTZs) in Medellin, Cali, Bogota, and the Atlantic Coastal region of Barranquilla (where about six new plants have been established in the past 3 years).[8]

The relatively slow growth in U.S. apparel imports from Colombia during 1996-2000 is reportedly attributable to several factors, including domestic political and economic unrest; increased price competition from Asian countries following the 1997-98 East Asian financial crisis; and greater competition from Mexico, which benefits from unfettered access to the U.S. apparel market under NAFTA. Recently, a few U.S. apparel firms reportedly announced plans to move apparel assembly work from Colombia to the CBERA countries because of the new trade benefits for these countries.[9]

Colombia is the only ATPA country currently subject to U.S. import quotas on textiles and apparel.[10] In 2000, Colombia filled only 57 percent of its quota on men's and boys' wool suits and none of its quota on printcloth; these two products represented just 1 percent of U.S. textile and apparel imports from Colombia that year. The major apparel imports from Colombia in 2000 were cotton trousers and slacks (31 percent of the total) and wool apparel (13 percent) (figure 2).

[4] Jordan K. Speer, "17th Annual Comparative Analysis: Sourcing-Latin America," *Bobbin*, Nov. 2000, special insert. For more information, see *www.bobbin.com.*

[5] Edward Alden and James Wilson, "Bogota Jobs Plea to U.S. Trade Preferences Special Treatment for Caribbean May Penalize Colombia," *Financial Times*, Sept. 21, 2000, p. 5.

[6] Representative of Proexport-Colombia, Miami, FL, Email communication to Commission staff, Nov. 13, 2000.

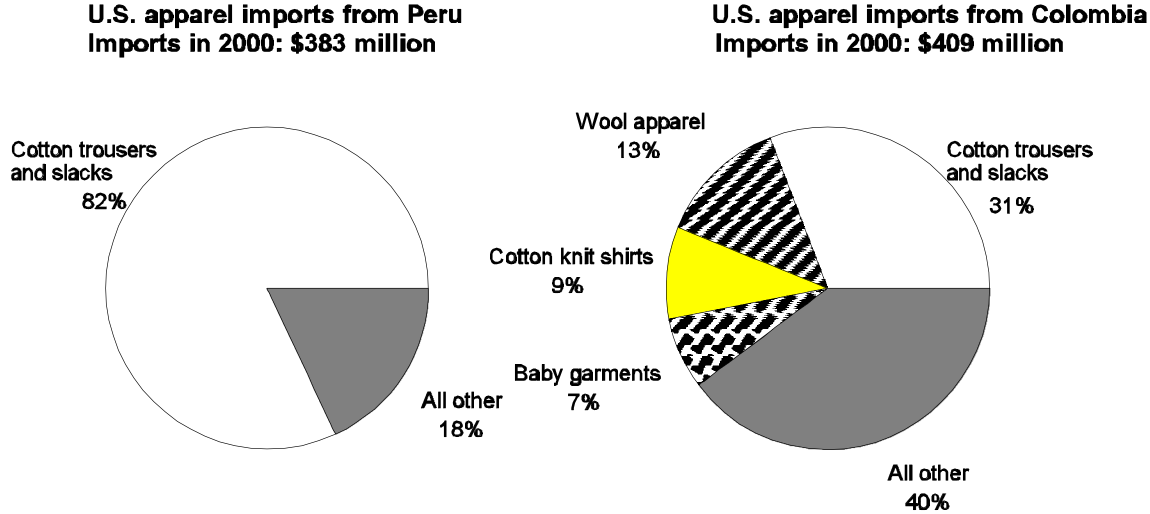
[7] Colombia's shipping costs are higher than those of CBERA countries; most goods from Colombia are shipped by air. Representative of a leading U.S. apparel producer, telephone interview by Commission staff, Nov. 20, 2000.

[8] Representative of Proexport-Colombia, Email communication to Commission staff Nov. 13, 2000.

[9] See the next section for information on these trade benefits. See also "Bogota Jobs Plea," *Financial Times*, Sept. 21, 2000.

[10] In 1995, the United States established quotas and "special access limits" (SALs) for underwear and women's suits from Colombia. The SALs were established under HTS 9802.00.80 and provided, in addition to reduced duties, greater market access for such garments that were assembled from U.S.-made and -cut fabric. The quotas and SALs for the underwear and women's suits expired in Dec. 1997.

Figure 2
Apparel: Percentage distribution of leading products, U.S. imports from Colombia and Peru, 2000



Source: Compiled from official statistics of the U.S. Department of Commerce.

Peru

The textile and apparel industry is Peru's largest source of export earnings and manufacturing employment, according to a report of the Peruvian-based Association of Apparel Exporters to the United States (EXPORAMERICA).[11] In 1999, Peru's exports of textiles and apparel (including fibers) of $580 million accounted for almost 10 percent of its total exports and 31 percent of its manufactures exports. The textile and apparel industry employed about 180,500 workers, or 32 percent of the Peruvian manufacturing workforce,[12] and the cotton-growing sector employed an estimated 144,000 workers. The EXPORAMERICA report notes that the textile and apparel industry is one of Peru's most developed sectors and that the industry is vertically integrated from the production of raw materials (mostly cotton and also alpaca fibers) and intermediate textiles (yarns and fabrics) to the manufacture of finished goods, mainly apparel.[13] The reports indicates that the industry could easily expand output because of a relatively high level of idle plant capacity, which averaged 26 percent in textiles and 30

[11] EXPORAMERICA, "Inclusion of Textiles and Apparel in the Andean Trade Preference Act: Contribution to the Battle Against Coca Production and Illegal Drug Trafficking," Sept. 2000.

[12] The EXPORAMERICA report states that 1995 is the most recent year for which textile and apparel employment data are available; however, it indicates that the labor situation in 1999 was similar to that in 1995, based on production levels.

[13] U.S. Department of State telegram No. 704, "Peruvian Aide Memoire on Bilateral Trade Issues," prepared by U.S. Embassy, Lima, Nov. 29, 2000; and "Peru Moda: The Second International Business Roundtable of the Peruvian Textiles and Apparel Industry," *Apparel Industry Internacional*, May 1999, found at Internet address *http://www.aiimag.com/aiieng/archives/0599/May99stor5.html*, retrieved Nov. 1, 2000.

percent in apparel in 1997. Preliminary data for 1999, however, show that average idle plant capacity in the textile and apparel industry declined by about 15 percent.

The Peruvian textile and apparel industry consists of many small, primarily apparel assembly operations and several large producers of apparel for export that are integrated back to the production of fabric and, in some cases, yarn. The industry has access to large quantities of locally grown quality cotton--namely, tanquis cotton (a long fiber) and pima cotton (a fine, extra-long fiber). The availability of pima cotton (the finer and longer the fiber, the finer generally is the yarn) is an important competitive advantage for Peru, which reportedly exports 60 percent of its apparel production. About 80 percent of Peru's apparel exports goes to the United States and 14 percent goes to the European Union. Several U.S. firms, including apparel merchandiser Liz Claiborne Inc. and catalog merchant Land's End, have developed niche markets in the United States for knit tops made in Peru from pima cotton. Cotton knit shirts accounted for 82 percent of U.S. apparel imports from Peru in 2000 (see figure 2).

The textile and apparel industry in Peru faces several major competitive challenges in the U.S. market, including rising production costs and growing competition from Asia and Mexico.[14] The average trade-weighted tariff on U.S. apparel imports from Peru is 18 percent ad valorem whereas Mexico benefits from duty-free access to the U.S. market under NAFTA for qualifying goods. In addition, Peru's cotton production has been shrinking because of a switch to more profitable crops such as asparagus and tomatoes, a lack of technical support and financing, and because of the damage caused to a number of Peru's cotton fields by the recent El Nino weather conditions.[15] These economic factors have contributed to the concerns raised by Peru's textile and apparel industry representatives about the potential for diversion of apparel trade from Peru to the CBERA countries as a result of the implementation of new U.S. trade benefits for those countries.

Bolivia

The textile and apparel industry is a major economic sector and source of employment in Bolivia. Concentrated in La Paz, Santa Cruz, and Cochabamba, the industry reportedly employs an estimated 22 percent of Bolivia's workforce and consists of about 10,000 companies, the majority of which are small, family-run operations.[16] The industry is based on cotton textiles, although it uses significant quantities of locally produced specialty wool and other fine animal hairs from Bolivia's indigenous llamas and alpaca sheep. Bolivia's relatively nascent textile and apparel industry reportedly lacks leading-edge technology but is making efforts to enhance worker training.[17] Bolivia's apparel sector reportedly grew by

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[14] Mercedes Cortazar, "Economic Crisis Strangles Peru's Industry," *Apparel Industry Internacional*, July 1999, found at Internet address *http://www.aiimag.com/aiieng/archives/0799/jul99stor5.html,* retrieved Nov. 1, 2000.

[15] Eduardo Orozco, "Peru's Prized Cotton Industry Unravels," Reuters, Mar. 2, 2001, found at Internet address *http://just-style.com,* retrieved Mar. 2, 2001.

[16] U.S. Department of State telegram No. 3788, "Bolivians Propose Tariff and Quota-Free Access to U.S. Textiles Market," prepared by U.S. Embassy, La Paz, Aug. 11, 2000.

[17] Ibid; and Ursula Arguedas, "Bolivia," *Apparel Industry Internacional*, Oct. 1998, found at Internet address *http://www.aiimag.com/aiieng/archives/1098/ ostor9.html,* retrieved Sept. 19, 2000.

20 percent during 1991-99; however, the country's 1999 economic crisis has led to job losses in the manufacturing sector and lower output in the apparel industry.[18]

U.S. apparel imports from Bolivia increased by 57 percent during 1996-2000 to $19.0 million (see table 1). Some 62 percent of U.S. imports from Bolivia in 2000 consisted of cotton knit shirts; the remainder were mostly of wool apparel. Garments from Bolivia that entered the United States under HTS provision 9802.00.80 accounted for 8 percent of total apparel imports from that country in 2000.

Ecuador

Ecuador's textile and apparel industry is relatively small, accounting for 1 percent of the country's total exports in 1997.[19] The apparel assembly operations in Ecuador are located in the FTZs.[20] U.S. apparel imports from Ecuador doubled during 1996-2000 to $19.8 million (see table 1); they consisted of cotton knit shirts, cotton trousers, manmade-fiber apparel, and wool sweaters. About 40 percent of the imports in 2000, or $7.2 million, entered under HTS provision 9802.00.80 (see table 2); the U.S. content represented 76 percent of the total value of these imports.

Implications of CBTPA for Trade, Employment, and Foreign Investment in Beneficiary Countries

The CBTPA, implemented by Presidential Proclamation 7351 of October 2, 2000, provides duty-free and quota-free treatment for U.S. imports of apparel assembled in CBERA countries from fabrics produced in the United States from U.S. yarns. Such preferential treatment is also available for certain knit apparel assembled in CBERA countries from "regional knit fabrics," provided that these fabrics are produced from U.S. yarns. The trade preferences are capped at 4.2 million dozen for outerwear T-shirts and 250 million square meter equivalents for other knit apparel (e.g., underwear) for the 1-year period beginning on October 1. Both caps are to be increased by 16 percent annually through September 30, 2004 and remain at those levels through September 30, 2008, or by such other amounts as may be provided by law.

As narrowing profit margins force U.S. apparel producers to offer lower prices, faster turnaround time, and better quality in order to compete, industry representatives anticipate that the new trade benefits will lead to cost savings for U.S. apparel firms and create more business opportunities for U.S. apparel importers, retailers, consumers, and foreign trading partners.[21] Trade sources project that the potential duty savings will range from $700 million

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[18] U.S. Department of State telegram No. 3788, "Bolivians Propose Tariff and Quota-Free Access."

[19] "Ecuador's Trade," found at Internet address *http://www.ecuador.org/ecuadortrade.html,* retrieved Dec. 21, 2000.

[20] U.S. Department of State telegram No. 143925, "Input for Draft 2000 Triennial Report to Congress for Ecuador," prepared by U.S. Embassy, Quito, Aug. 31, 2000.

[21] Thomas G. Travis, "The 28-Minute Brief: Understanding and Complying with Trade Regulations Key to Successful Global Sourcing Strategy," *DNR,* Oct. 6, 2000, p. 21; and Brenda (continued...)

to $1.4 billion over the next 5 years.[22] U.S. textile producers would benefit as new trade benefits help to stimulate real growth for U.S. exports of yarns and fabrics to CBERA countries. According to one report, U.S. yarn and fabric makers could experience annual sales increases in CBERA countries of as much as $8.5 billion over the next few years.[23] U.S. apparel producers reportedly expect to gain a stronger sourcing foothold in the Western Hemisphere and to establish operations and business relationships with CBERA manufacturers in order to compete more effectively with Asian producers, who seldom use U.S. materials and who will gain access to the U.S. market free of quota restrictions in 2005.[24]

Likewise, the CBERA countries anticipate the new trade benefits to spur apparel investment in their textile and apparel industries. For example, Honduras expects its maquila industry to resume its rapid growth, following a slowdown resulting from increased competition from Mexico under NAFTA.[25] Sources in Honduras indicate that their textile and apparel industry, which currently numbers about 200 companies (of which 92 are U.S. firms)[26] expects factory output and production capacity to double, new factories to be built as more investment flows into the country,[27] and existing factories to expand as manufacturing operations such as cutting and stone washing are added. Apparel employment in Honduras reportedly is projected to double from 120,000 to 240,000 workers over the next 5 years.

Sources in the Dominican Republic, the second-largest CBERA apparel exporter to the United States with more than 300 textile, apparel, and footwear companies and 200,000 apparel workers, anticipate that the CBTPA will boost the country's textile and apparel trade by 20

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[21] (...continued)
Lloyd, "Global Sourcing Focus of Less-Attended Bobbin Americas," *DNR*, Sept. 20, 2000.

[22] Lisa C. Rabon, *Bobbin*, "CBI Trade Enhancements: Landmark Victory Signals Start of Investment Race," July 2000, pp. 24-30, and "CBI Apparel Outlook: The Shape of Things to Come," Aug. 2000; and Holly Welling, "Carribean Boon: Lurching After NAFTA," *Apparel Industry Magazine*, Aug. 2000, found at Internet address *http://www.aimagazine.com/archives*, retrieved Aug. 11, 2000.

[23] Gail A. Raiman, "North Carolina Textile Leaders Briefed on Industry Opportunities in the Caribbean," American Textile Manufacturers Institute, news release, Oct. 13, 2000, found at Internet address *http://www.atmi.org*, retrieved Mar. 12, 2001.

[24] According to a trade source, U.S. apparel producers are considering bringing more of their production back to the Western Hemisphere. See Stan Gellers, "With CBI, the Price is Right in the Caribbean," *DNR*, Oct. 2, 2000, p. 6; and Cotton Incorporated, "The Caribbean Basin Initiative: What Will it Mean for U.S. Cotton Apparel Trade?" Nov. 27, 2000, found at Internet address *http://www.textileweb...09027D EO8293+*, retrieved Dec. 7, 2000.

[25] Country sources reported that a loss of competitiveness to Mexico because of NAFTA likely contributed to the closing of six maquila factories in Honduras, two of which were U.S.-owned. See U.S. Department of State telegram No. 1919, "Honduras Ecstatic Over CBI Enhancement Law," prepared by U.S. Embassy, Tegucigalpa, May 3, 2000.

[26] Country sources report that the CBERA program helped stimulate significant investment in the CBERA countries. They attribute an estimated $1.05 billion in both national and foreign investment in the Honduran maquila sector in 1998 to CBERA benefits. See U.S. Department of State telegram No. 2023, "Tegucigalpa - USITC Annual Caribbean Investment Survey," prepared by U.S. Embassy, Tegucigalpa, June 15, 1999.

[27] U.S. investment in the Honduran textile and apparel sector at the end of 1999 totaled an estimated $322 million. See U.S. Department of State telegram No. 2559, "Investment Climate Statement for Honduras," prepared by U.S. Embassy, Tegucigalpa, July 25, 2000.

to 25 percent and create 35,000 new jobs.[28] Foreign investment in El Salvador's maquila industry is expected to grow by $750 million in the next 3 years and its apparel industry is anticipated to gain 150,000 jobs over the next 5 years.[29] In Guatemala, the CBTPA will reportedly help create 15,000 new jobs, boost exports by 20 percent, attract increased investment in the maquiladora sector, and encourage some companies to transfer apparel operations from Mexico to Guatemala.[30] Industry sources also believe that the CBTPA will encourage additional Asian textile investment in the CBERA region to expand their access to the U.S. market. A number of Asian firms have already established or invested in apparel producing facilities in the CBERA countries because of their proximity to the United States.[31] It is uncertain at this point whether Asian investors would begin to use U.S. components to produce apparel for export to the U.S. market.

Legislation: Concerns About Competitive Disadvantages

The ATPA countries have expressed concern that the implementation of the CBTPA in October 2000 will weaken their competitiveness in the U.S. apparel market and lead to a loss of apparel trade to the CBERA countries. At a minimum, absent equivalent tariff benefits, the ATPA countries will have a price disadvantage for their goods. The average trade-weighted U.S. duty on apparel from the ATPA countries was 17.6 percent ad valorem in 2000.[32]

Apparel industry sources in Colombia have expressed concern about the potential loss of contracts, and plant closures, and production cutbacks attributable to trade preferences now granted to the CBERA countries.[33] Motivated by the tariff benefits under the CBTPA, some

[28] "The Dominican Republic Expects New Growth in Apparel Production," *Emerging Textiles,* Oct. 11, 2000, found at Internet address *http://www.emergingtextiles.com/cgi-bin/more.cgi/garments11100.html*, retrieved Oct. 13, 2000; and U.S. Department of State telegram No. 1979, "Dominican Republic Expects Major Impact from CBI Enhancement," prepared by U.S. Embassy, Santo Domingo, May 19, 2000.

[29] U.S. Department of State telegram No. 1663, "Salvadorans Pleased with CBI Passage: See It as an Opportunity to Compete in Their Most Important Market," prepared by U.S. Embassy, San Salvador, May 17, 2000.

[30] U.S. Department of State telegram No. 92865, "Impact of CBI Enhancement," prepared by U.S. Embassy, Guatemala City, May 23, 2000.

[31] Lisa C. Rabon, "CBI Apparel Outlook," *Bobbin,* Aug. 2000; and "Taiwan's Textile Companies to Massively Invest in Central America," *Emerging Textiles*, Sept. 14, 2000, found at Internet address *http://www.emergingtextiles.com/cgi-bin/more.cgi/garments140900A.html*, retrieved Sept. 15, 2000.

[32] Some industry representatives in Colombia have alleged that certain apparel producers have been attempting to stay competitive by absorbing duty costs, but cannot continue to do so and pay salaries for much longer. See U.S. Department of State telegram No. 10235, "Time Running Out for Colombian Garment Industry," U.S. Embassy, Bogota, Nov. 20, 2000.

[33] Sources in Colombia reported that no new orders were placed at the Colombia booth at the 2000 Bobbin Americas Show (a major apparel trade show held annually in Atlanta). They also alleged that workers who are being laid off in anticipation of an industry slowdown are being recruited by illegal narcotrafficking organizations. See U.S. Department of State telegram No. 10235, "Time Running Out for Colombian Garment Industry;" and Republic of Colombia,

(continued...)

U.S. apparel producers have announced plans to switch their apparel sourcing from ATPA suppliers to CBERA contractors.[34] Among the most immediate potential impacts that could occur from Colombia's loss of competitiveness with the CBERA countries are (1) a decline in foreign investment and a diminished alternative to drug production in Colombia and (2) a further decline in production-sharing trade with the United States that has occurred since 1997. U.S. imports of apparel from Colombia under HTS provision 9802.00.80 in 1997 declined 12 percent from $257 million in 1997 to $227 million in 2000. U.S. exports of apparel to Colombia (the majority of which are believed to be cut parts for apparel assembly) decreased by 40 percent from 1997 to 2000. According to a U.S. industry source, these declines can be attributed to a shift in production-sharing trade to Mexico and the Caribbean Basin countries.[35] Some apparel industry sources in Colombia claim that increased competition from the CBERA countries could jeopardize thousands of apparel jobs in the Colombian industry and lead to a loss of $250 million in apparel exports to the United States.[36] Such losses would exacerbate Colombia's recent economic difficulties, reflected in an unemployment rate of almost 20 percent and the worst recession in 20 years.[37]

Industry sources in Peru claim that the CBTPA now puts their textile and apparel industry at a competitive disadvantage with the CBERA countries in the U.S. market, and they support adding preferential treatment for textiles and apparel to the ATPA. The Peruvian industry sources assert that investment in the textile and apparel sector generates more jobs than any other sector in Peru and that having CBTPA-equivalent access to the U.S. apparel market is vital to Peru's ability to compete with other Latin American and Asian exporters.[38] Industry sources in Peru also estimate that if the ATPA included duty-free treatment for textiles and apparel, Peru's textile and apparel sector would grow by 40 percent and would generate 32,000 direct new jobs and 78,000 indirect new jobs.[39]

On June 29, 2000, the Plan Colombia Trade Act (S. 2823) was introduced in the United States Senate to amend the ATPA by granting preferential treatment to apparel articles from the ATPA countries. This bill would have provided for 1 year of duty-free and quota-free treatment to imports of apparel (1) assembled in ATPA countries from fabrics wholly made and cut in the United States of U.S. yarns or (2) cut and assembled in ATPA countries from

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[33] (...continued)
"Colombia's Apparel Industry Faces Devastation Without CBI Parity Legislation," press release, Oct. 10, 2000.

[34] Liz Claiborne Inc. indicated that it may relocate production from Colombia to CBERA countries because of lower costs made possible by the CBTPA. Official of Liz Claiborne, telephone interview by Commission staff, Nov. 20, 2000. Land's End claimed that it does not plan to terminate its sourcing from Peru at this time, because it has developed close working relationships with its suppliers there and is reluctant to terminate such relationships on the basis of price alone. Import manager for Land's End, telephone interview by Commission staff, Dec. 6, 2000.

[35] Representative of the American Apparel and Footwear Manufacturers Association, Email communication to Commission staff, Jan. 26, 2001.

[36] Representatives of Colombian Trade Bureau, Washington, DC, draft of a talking points paper, facsimile to Commission staff, Dec. 19, 2000.

[37] Representative of Proexport-Colombia, Email communication to Commission staff.

[38] U.S. Department of State telegram No. 2462, "ExporAmerica Renews Push for Apparel in ATPA," prepared by U.S. Embassy, Lima, Apr. 24, 2000.

[39] U.S. Department of State telegram No. 5903, "Report on ATPA and Peru," prepared by U.S. Embassy, Lima, Oct. 4, 2000.

fabrics wholly made in the United States of U.S. yarns, and sewn together with U.S. thread. No action was taken on this legislation, however, before the 106th Congress adjourned in November 2000.

Representatives of the Colombian Trade Bureau initiated efforts in January 2001 to encourage reintroduction of the legislation into the 107th Congress that would grant trade preferences to textiles and apparel for the ATPA countries.[40] Discussions between the presidents of Colombia and the United States at their February 27, 2001, meeting included how to improve access to the U.S. market for Colombia's exports of textiles and apparel and renewal and enhancement of the ATPA beyond its December 2001 expiration.[41]

On March 13, 2001, the Andean Trade Preference Expansion Act (ATPEA), S. 525, was introduced to renew trade benefits for 5 years for products currently covered by the ATPA and to expand the preferences to cover apparel and other products currently excluded from benefits. Because drug trafficking remains a concern of the Andean countries, particularly Colombia, the bill sponsors have reportedly framed the bill as an "important part of U.S. efforts to combat the Colombian drug trade, because the expansion of industries spurred by the trade benefits will provide jobs for former drug workers."[42]

Under the ATPEA, quota-free and duty-free treatment is granted to apparel items from the Andean countries that meet the following criteria:[43]

- Apparel articles assembled in one or more ATPEA beneficiary countries from fabrics wholly formed and cut in the United States, from yarns wholly formed in the United States, that are - (i) entered under subheading 9802.00.80 of the HTS; or (ii) entered under chapter 61 or 62 of the HTS, even if such articles were subject to certain finishing operations such as stone-washing, enzyme-washing, perma-pressing, etc.

- Apparel articles cut and assembled in one or more ATPEA beneficiary countries from fabric wholly formed in the United States from yarns wholly formed in the United States, if such articles are assembled in one or more such countries with thread formed in the United States.

- Apparel articles (i) knit-to-shape from U.S. yarns; or (ii) assembled in an ATPEA beneficiary country from components knit-to-shape in an ATPEA beneficiary country from U.S. yarns; or (iii) assembled in an ATPEA beneficiary country from components knit-to-shape in the United States.

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[40] Representative of the Colombian Trade Bureau, Washington, DC, Email communication to Commission staff, Jan. 20, 2001.

[41] White House,"Remarks by President Bush and President Pastrana of Colombia," press release, Feb. 27, 2001, found at Internet address *http://www.whitehouse.gov/news/releases/2001/02/20010227.html,* retrieved Mar. 12, 2001.

[42] "Andean Trade Bill a Likely Target of Efforts to Amend CBI Trade Law," found at Internet address http://www.insidetrade.com/sec-cgi/as_web.exe?SEC_current+B+trade011111, retrieved Mar. 16, 2001.

[43] U.S. Senate, *Andean Trade Preference Expansion Act,* 107th Cong., 1st sess., S. 525, Mar. 13, 2001.

- A limited amount of apparel assembled from regional fabric, up to 70 million square meter equivalents in the first year and increasing each year by 16 percent, compounded annually, from fabric made from U.S. yarns;

Although Peru's textile and apparel industry supports adding textiles and apparel to the ATPA, the industry opposed the legislation introduced in 2000 to renew and enhance the ATPA because of the requirement that the garments be assembled of U.S. materials.[44] Since the recently introduced legislation, S. 525, contains the same requirements concerning the use of U.S. fabric and yarn, it is likely that Peru's textile and apparel industry will voice the same concerns as it did in the previous Congress. Whereas Colombia uses large quantities of U.S. components in the production of apparel for export to the United States, Peru uses very little U.S. content in its apparel production.[45] Similar sentiments have been expressed by the Government of Bolivia. According to a government representative, Bolivia "would like apparel and textile tariff preferences to be included in the Andean Trade Preference Act" and is concerned that S. 2823 is "heavily tilted toward maquila regimes which. . . would benefit Colombia more than Bolivia."[46] Although the ATPEA allows duty-free access for a limited amount of apparel assembled from regional fabric, the fabric must still be made from U.S. yarn.

Outlook

During the past several years, U.S. apparel companies with global operating strategies have viewed the ATPA countries as an attractive sourcing alternative to Asian countries. Like Mexico and the CBERA countries, the ATPA countries offer low labor costs and an ample supply of skilled workers, as well as competitive shipping costs and rapid delivery times to the port of Miami. The ATPA countries offer government incentives (substantial reduction of tariffs and the elimination of most import license requirements, simplified import and export procedures to attract foreign investment)[47] and have the capability to produce high value-added garments in a range of styles and fashions. Increased investment in apparel and textile manufacturing and information technology in the ATPA countries in recent years has also yielded higher productivity and enhanced product quality.

[44] U.S. Department of State telegram No. 170, "ATPA IPR, BIT Top Peru's Trade Agenda," prepared by U.S. Embassy, Lima, Jan. 10, 2001.

[45] U.S. Department of State telegram No. 7041, "Peruvian Aide Memoire on Bilateral Trade Issues."

[46] U.S. Department of State telegram No. 001044, "Bolivia Will Consider U.S. Proposal on FTAA Financial Services Negotiating Group," prepared by U.S. Embassy, La Paz, Mar. 9, 2001.

[47] Since 1990, Colombia has substantially reduced trade and investment barriers under its "Apertura" (Opening) Economic Liberalization Plan followed by the Colombia Government. See U.S. Department of State telegram No. 008239, "USTR Report to Congress on Andean Trade Preferences Act-Colombia," prepared by U.S. Embassy, Bogota, Sept. 19, 2000.

Despite the above positive developments, however, U.S. and ATPA industry sources note that the competitive position of the textile and apparel industries in the ATPA countries could be weakened if they are not granted CBTPA-equivalent trade preferences and there could be further shifts in U.S. imports of apparel from Colombia to the CBERA and to Mexico.[48] In addition, industry sources contend that the expected expanded offering of full-package programs[49] by CBERA suppliers would likely further widen the competitive gap between the ATPA countries and their CBERA neighbors, increasing concerns about a loss of apparel trade, foreign investment, and employment, and vulnerability to rising drug trafficking and drug-related violence.[50] For example, sources in Colombia have estimated that without CBTPA-parity, Colombia could lose as many as 50,000 direct and 120,000 indirect jobs as well as lose as much as $370 million in sales of apparel goods.[51] Similarly, EXPORAMERICA in Peru states that Peru's ability to export textiles and apparel to the United States will be at risk because apparel goods from its competitors in Mexico, the Caribbean, and Central America will receive U.S. duty-free entry and also because U.S. quotas for China and other Asian countries will be eliminated in 2005 as part of World Trade Organization commitments.**#**

[48] Representative of the American Apparel and Footwear Manufacturers Association, Email communication sent to Commission staff, Jan. 26, 2001.

[49] Some CBERA producers began offering full-package programs (these typically refer to the type of sourcing arrangements that can provide the entire range of garment manufacturing from apparel design to all steps of textile production to distribution of the finished garment or any combination of these operations) to compete more effectively with Asian suppliers who have provided such programs for years, and to enhance their competitive advantage after NAFTA. See Lisa C. Rabon, "CBI Trade Enhancements."

[50] Republic of Colombia, "Colombia's Apparel Industry Faces Devastation Without CBI Parity Legislation;" and Senator Bob Graham, summary of the "Plan Colombia Trade Act," July, 6, 2000, p. 3.

[51] Representative of Proexport-Colombia, Email communication to Commission staff.

Chemical Trade by the Central European Countries: Difficulties of Sector Transition

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Following liberation from Soviet domination after the fall of the Berlin Wall in 1989, the Visograd countries (the Czech Republic,[2] Poland, Hungary, and Slovakia[2]) of Central Europe quickly decided to adopt multiparty democratic forms of government, to abandon central planning, and to undertake the transition to market economies. Privatization was the centerpiece of transition programs developed to reform the industrial sectors of Central Europe. An important component of the industrial base of these countries under communist rule was the chemical industry. Privatization of the chemical industry sectors is nearly completed in the Czech Republic and Hungary, but is still progressing in Poland and Slovakia. Although the bilateral global trade flows in chemical products by the Visograd countries have increased considerably in recent years, to $19.5 billion, a growing trend for each country has been larger trade deficits in this sector. This article examines progress and problems associated with the transition to privatization of these principal producers in Central Europe,[3] impacts on trade in chemical products by these countries, and their prospects for the future.

Prior to World War II, Czechoslovakia, Hungary, and Poland had thriving chemical industries. However, their chemical industries stagnated during the years 1940-90, owing to centralized control exerted initially by German and Soviet occupation forces and later by domestic governments. During this period, economic planners and plant managers were concerned with meeting externally established production requirements rather than the forces of a competitive market environment. As a result, industrial production of chemicals by these Central European (CE) countries fell sharply, following the general economic collapse associated with the rapid dismantling of communism. The early period of transition to market economies and general economic restructuring disrupted existing markets as established consuming industries declined or even disappeared,[4] and as downstream production found no

[1] The views expressed in this article are those of the authors. They are not the views of the U.S. International Trade Commission as a whole or of any individual Commissioner.

[2] The former Czechoslovakia split into the Czech Republic and the Slovak Republic (Slovakia) pursuant to a referendum of the citizenry on Jan. 1, 1993.

[3] The focus is on Central European external trade in chemicals rather than trade among the four Visograd countries, which is not particularly large, inasmuch as their industries are not integrated across national boundaries.

[4] Under central planning, industries that consumed chemicals were not required to locate suppliers of inputs for their production processes, nor did customers have a choice of chemical-product providers.

ready markets.[5] Even in more recent years, production of chemicals by the CE countries has been characterized by industry observers as "erratic"[6] (table 1), partly due to the transition problems and to long-established global trade links for these countries.[7]

Table 1
Annual change in chemical production for Central European countries, 1996-2000

(*Percent*)

Country	1996	1997	1998	1999	2000[1]
Czech Republic	9.8	3.9	- 1.9	- 2.0	2.0
Hungary	0.9	3.4	- 8.0	- 5.0	3.0
Poland	6.7	12.0	- 2.8	0	3.0
Slovakia	2.4	- 3.2	0	- 2.0	0

[1] Estimate.

Source: *Chemical & Engineering News*, Dec. 13, 1999, p. 25.

Each CE country applied to join the European Union (EU) to stimulate and reinforce its conversion to market-based, free-enterprise economies.[8] In 1997, the Economic Commission for Europe summarized the major challenges facing the CE chemical industries as follows:[9]

- Centralized planning led to a chemical industry structure based on large-scale production enterprises with little innovation, and research lacking integration with production goals.

- Performance was measured in tonnage produced rather than income generated, which provided little incentive to develop marketing techniques, after-sales service, or direct assistance to customers.

- From a technical standpoint, the industry is characterized by obsolete production technology; poor environmental protection; high energy waste; and lack of new investment for maintenance, modernization, pollution abatement, and environmental remediation.

- From a commercial standpoint, there is widespread lack of market knowledge, marketing skills, and marketing infrastructure. Likewise, there is widespread lack

[5] European Chemical Industry Council (CEFIC), "Survey of the Polish Chemical Industry," *Economic Bulletin*, June 1996; and Organization for Economic Cooperation and Development (OECD), *Designing New Trade Policies in the Transition Economies,* Paris: OECD, 1997, pp. 143-145.

[6] *Chemical & Engineering News*, Dec. 13, 1999, p. 25.

[7] See the following sections on CE chemicals trade.

[8] The Czech Republic, Hungary, and Poland were accepted into the "first tier" of countries applying for EU membership, whereas Slovakia is among the "second tier" of countries that are not as far along in reaching EU standards for admission of new members.

[9] Economic Commission for Europe, *Structural and Ownership Changes in the Chemical Industry of Countries in Transition,* Geneva: Economic Commission for Europe, Nov. 1997, pp. 1-3.

of understanding of the need to satisfy customers, the importance of developing new products, and the need to cultivate new customers. Moreover, very few CE companies have a commercial image or a reputation for product quality, reliability, customer service, or innovative solutions to customers' problems and requirements.

- From a management standpoint, the imperative did not exist to develop anything other than technical and production management skills, resulting in deficient marketing, financial, and general management skills and experience–all vital attributes in a competitive market economy.

Industry sources suggest that the conditions cited above continue to present major hurdles. Although the CE chemical industries are beginning to make some progress in upgrading facilities, closing obsolete plants, installing pollution-abatement equipment, and adopting less polluting production processes, all have a considerable way to go in meeting EU standards.[10] A recent Organization for Economic Cooperation and Development (OECD) report indicates that it may take 20 years or more to meet current EU environmental standards which, notwithstanding, are themselves still evolving and advancing.[11]

Transition to Private Enterprise in the CE Chemical Industry

The transition from central planning of state-controlled chemical plants to private market-oriented operations has been a mixed picture in the CE countries. The chemical industries in the Czech Republic and Hungary were fairly rapidly privatized. These industries consist predominantly of small and medium-sized factories, producing a variety of relatively high-valued specialty and fine chemical products[12] in small lots by batch processes. Firms with less than 50 employees were readily privatized,[13] inasmuch as the required capital could be raised from personal savings, loans, and deferred payment plans, while production and marketing could follow their course from before privatization with few changes. In Hungary, the process was reported to be a relatively easy transition as domestic entrepreneurs were successful in

[10] U.S. Agency for International Development, *Environmental Conditions in Central Europe*, U.S. Department of Commerce, Central and Eastern Europe Business Information Center, May 1998; and Patricia Layman, "Environment in Central, Eastern Europe Improves, But Problems Remain," *Chemical & Engineering News*, Nov. 29, 1999, p. 18f.

[11] Centre for Co-operation with Non-Members, *Environment in the Transition to a Market Economy: Progress in Central and Eastern Europe and the New Independent States*, Paris: OECD, 1999.

[12] Specialty chemical products principally comprise low-technology formulated products ("package goods"), often with substantial consumer usage (e.g., paints and varnishes, soaps and detergents, cosmetics, etc.). Fine chemical products are generally of complex molecular structure, must be of high purity for most applications (e.g., perfumery ingredients, pharmaceutical active ingredients or intermediates, dyes, etc.), or both.

[13] Generally, the small chemical plants (the preponderance in terms of numbers, but representing considerably less than one-half the national value of chemicals output and employment) have been successfully privatized. Various trade sources.

attracting capital, improvising marketing and management skills, and guiding companies to concentrate on their most saleable products.[14]

The chemical industries in the other CE countries, which industry sources generally characterize by large-scale production works without associated marketing, financing, or management expertise, are still in various stages of transition to private ownership, secondary reorganization, or both, following difficulties in their initial privatization.[15] A large proportion of the output of chemicals in Poland and Slovakia were lower value basic chemicals.[16] These chemicals typically were produced in large quantities by antiquated, integrated continuous-process plants and obsolete production technologies which were not cost-competitive.[17] These large chemical plants pose a number of severe hurdles to successful privatization, particularly difficulties in raising capital not only for the purchase of the facilities but also for process upgrades, pollution control, environmental remediation, pension liabilities, and other social costs.[18] Raising the hundreds of millions or even billions of dollars needed is extremely difficult in a fledgling market economy with more pressing demands on capital and minimal established financial institutions.

With a few exceptions, the CE chemical industries have not attracted much foreign investment interest partly because of their questionable long-term viability and potential liability issues, but also because the manufacture of basic chemicals is not in the current strategic business plans of many international companies. Notable among the exceptions are the production of industrial gases, pharmaceuticals, and pesticides. Industrial gasses[19] do not pose pollution problems and were viewed as having excellent future growth prospects serving the CE metals-working industries. Pharmaceuticals and pesticides are produced in small batches by specialized facilities, and some international firms preferred to source certain types of these products from outside their home territories for environmental and public-relations reasons.[20] Moreover, the questionable long-term profitability of many plants and the difficulty of integrating these facilities into current corporate business strategies pose significant disincentives to prospective foreign investors who have more attractive investment alternatives.

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[14] Various trade sources.

[15] "Eastern Europe–a Mixed Bag of Results," *European Chemical News*, Jan. 10-16, 2000, p. 24.

[16] Basic chemicals, accounting for more than one-half (for example, about 60 percent in the EU) of all chemical products, are used as raw materials, ingredients in formulated products, or as processing reagents for other products that are subject to derived demand over which chemical producers have little influence or control. Production scale, market size, and technological efficiency are extremely important competitive considerations for basic chemicals. CEFIC, *Facts & Figures 1998*, p. A-1.4.

[17] Various trade sources.

[18] Social costs associated with any major restructuring (particularly downsizing of the workforce) would be particularly significant for a facility that is the economic mainstay of a community.

[19] Industrial gases are mostly derived by liquefaction and fractional distillation of air to produce nitrogen, oxygen, and argon, among others.

[20] Various trade sources.

CE Trade Deficits Widen in Chemical Products

The CE chemical producers, with the exception of those in Slovakia, increased their exports during 1994-99 (figure 1) at an average annual rate ranging from 4 percent to 7 percent; exports of all four producers totaled more than $5.7 billion in 1999. However, a greater reliance on chemical product imports by each country caused a growing trade deficit during the period. Imports of chemical products by each country increased by a range from 6 percent to 15 percent, reaching a total of $13.9 billion in 1999. The combined trade deficit for these countries during 1994-99 rose from over $3.2 billion to $8.2 billion in 1999.[21]

Both imports and exports by CE countries in almost all major product categories of chemicals have increased during 1994-99 (table 2);[22] however, the balance of trade for each country in nearly all the product categories in 1999 was negative. Exceptions include organic chemicals from the Czech Republic, fertilizers from Poland, and fertilizers and plastics in primary forms from Slovakia. These trends reflect, with few exceptions, the increasing difficulty of the CE chemical industry in meeting its own needs for modern chemical products while achieving only limited success in exporting the more basic chemical products that they manufacture (such as those toward the top of each product listing in table 2). An exception to the deficit trend is fertilizers, principally in Poland; although important, fertilizers do not generate a high value of exports as compared with many other product categories. The relatively higher value of trade in medicinal and pharmaceutical products, however, registers a large deficit for all CE countries despite some success by Hungary in exporting certain types of these products.

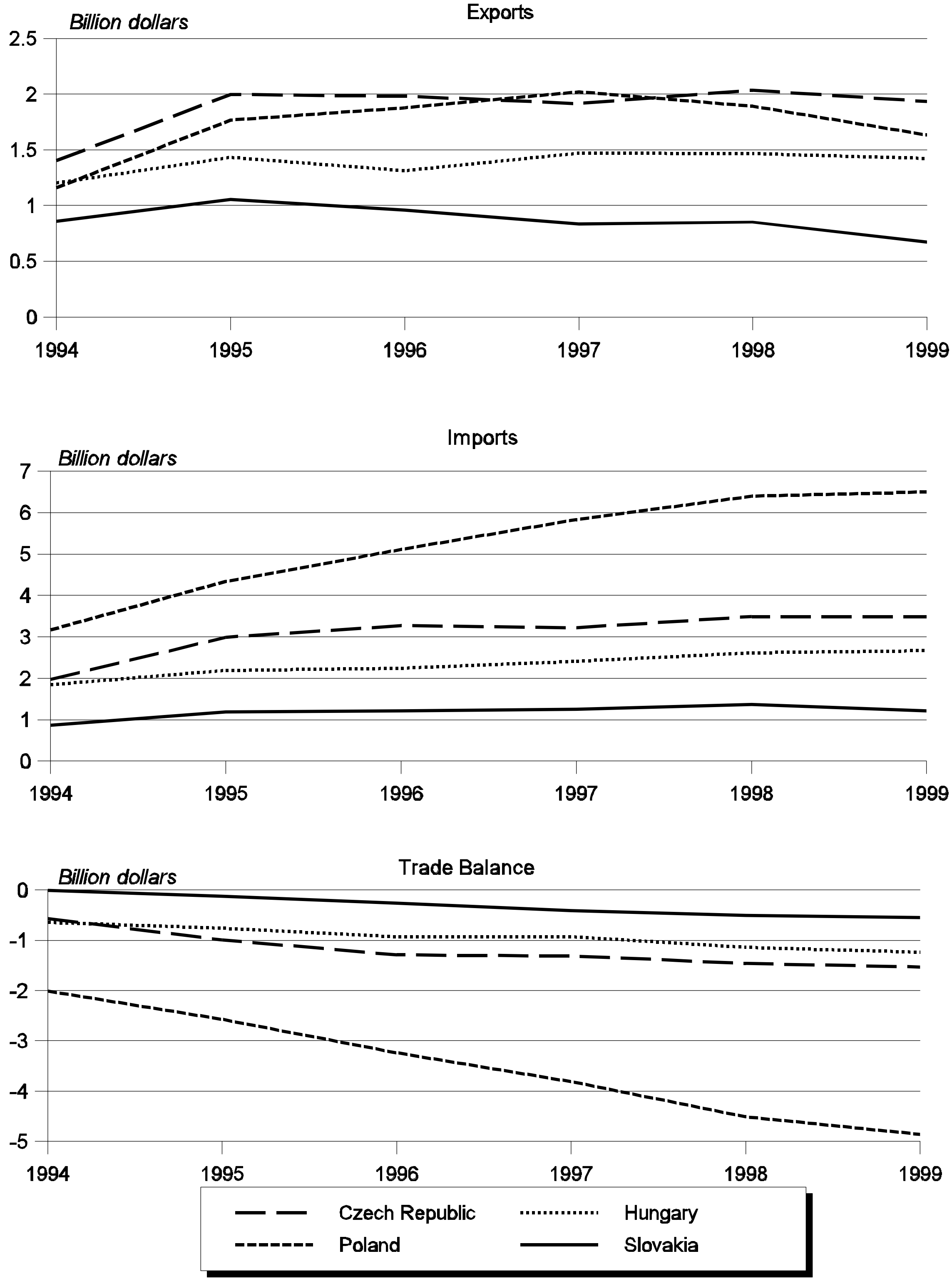
Czech Republic

Chemical exports from the Czech Republic during the years 1994-99 increased by approximately 7 percent annually. Although organic chemicals are the country's largest product category for exports, the growth during the period was driven primarily by exports of plastics in nonprimary forms and of detergents and cosmetics. Plastics in nonprimary forms were also a major chemical product imported into the Czech Republic in 1999, accounting for 16 percent of all chemical imports. Imports of plastics in nonprimary form are predominantly of the newer, more sophisticated modern polymers, whereas exports are of older plastics such as polyvinyl chloride (PVC) that pose significant environmental problems in their manufacture and disposal. Chemical imports into the Czech Republic increased by approximately 10 percent annually during the years 1994-99, led by growth in imports of plastics. Medicinal and pharmaceutical products, however, remained the largest product category for imports during this period. In 1999, the Czech Republic's trade deficit in chemical products reached nearly $1.6 billion, up from only $565 million in 1994, representing an average annual growth in the deficit of more than 19 percent over the period.

[21] Compiled from official statistics of the United Nations Statistics Division.

[22] The SITC chemical statistical categories shown in table 2 are quite broad, so the product rankings cannot be more precise.

Figure 1
Foreign trade in chemicals by the Visograd countries, 1994-99



Source: United Nations Statistics Division.

Table 2
Trade in chemical categories for the CE countries, 1999, and average annual change, 1994-99

	1999[1]			Average annual change, 1994-99[1]		
Country/category[2]	Exports	Imports	Balance	Exports[3]	Imports[3]	Balance[3]
	Million dollars			*Percent*		
Czech Republic:						
Fertilizers	45	55	(10)	- 6.7	- 3.1	(74.8)
Inorganic chemicals	148	253	(105)	4.1	5.4	(7.5)
Detergents and cosmetics	279	345	(66)	14.9	11.9	- (2.5)
Plastics, nonprimary forms	259	566	(307)	22.8	16.7	- (12.9)
Plastics, primary forms	265	478	(213)	- 0.8	15.4	(551.4)
Organic chemicals	473	269	204	0.8	- 0.2	2.1
Chemicals materials, miscellaneous	105	401	(296)	5.7	11.3	(13.7)
Dyes and colorants	156	321	(165)	1.4	8.7	(19 3)
Medicinal and pharmaceutical products	202	776	(574)	5.0	9.4	(11.3)
Hungary:						
Fertilizers	16	51	(35)	- 1.5	3.0	(6.7)
Inorganic chemicals	100	109	(9)	2.5	0.8	- (39.9)
Detergents and cosmetics	87	277	(190)	41.3	9.9	- (3.3)
Plastics, nonprimary forms	125	308	(184)	11.0	16.4	(21.2)
Plastics, primary forms	343	365	(22)	- 1.6	12.9	(84.2)
Organic chemicals	261	365	(104)	- 2.5	- 1.3	(4.5)
Chemicals materials, miscellaneous	161	382	(221)	9.6	7.7	- (6.7)
Dyes and colorants	42	210	(168)	19.9	10.4	- (8.5)
Medicinal and pharmaceutical products	290	597	(307)	2.8	6.5	(10.9)
Poland:						
Fertilizers	186	137	49	- 1.4	15.8	- 16.2
Inorganic chemicals	179	214	(35)	- 2.6	13.3	(82.6)
Detergents and cosmetics	314	664	(350)	35.4	15.7	- (5.3)
Plastics, nonprimary forms	135	879	(744)	31.5	19.3	- (17.6)
Plastics, primary forms	156	992	(836)	9.2	19.7	(22.5)
Organic chemicals	318	587	(269)	- ([4])	1.1	(3.4)
Chemicals materials, miscellaneous	123	895	(772)	11.1	16.2	(17.0)
Dyes and colorants	80	628	(548)	12.3	17.6	(18.5)
Medicinal and pharmaceutical products	145	1,504	(1,360)	- 5.2	16.4	(21.6)
Slovakia:						
Fertilizers	35	14	21	- 17.9	- 8.5	- 22.9
Inorganic chemicals	40	71	(31)	- 7.5	- 1.7	(14.2)
Detergents and cosmetics	43	113	(70)	1.1	7.0	(11.4)
Plastics, nonprimary forms	102	131	(30)	- 3.0	12.9	(74.4)
Plastics, primary forms	184	116	67	- 1.1	4.8	- 7.9
Organic chemicals	123	152	(30)	- 2.2	-4.5	- (15.2)
Chemicals materials, miscellaneous	47	159	(112)	- 13.1	9.6	(68.7)
Dyes and colorants	13	109	(96)	- 15.3	7.8	(16.0)
Medicinal and pharmaceutical products	85	350	(265)	- 8.9	14.1	(38.6)

[1] Calculated from unrounded data. A trade deficit is indicated by parentheses.
[2] Major chemical categories based on 2-digit SITC classifications. For each country, commodity and inorganic chemicals are nearer to the top and fine chemicals, that are more difficult to synthesize, are nearer to the bottom.
[3] A declining trend is shown by a minus sign. A trade surplus or deficit (parentheses) trend is either growing or shrinking (minus sign) by the average annual change indicated. Trends were estimated by log-linear regression; data were rescaled to estimate the trend in periods where the trade flow reversed sign.
[4] Less than 0.05 percent.

Source: Compiled from official statistics of the United Nations Statistical Division.

Hungary

Exports of chemical products from Hungary increased by 4 percent per year during 1994-99, reaching $1.4 billion in 1999. Producers registered their strongest export growth during the 5-year period in both the cosmetic and dyestuffs industries. Hungary's most important chemical exports in 1999, however, were plastics in primary forms, medicinal and pharmaceutical products, and organic chemicals. Although unlikely to serve as a model for widespread replication, the Hungarian chemical and pharmaceutical company, Gedeon Richter, reportedly agreed to manufacture the French abortifacient drug, RU-486[23] for distribution in the United States.[24] U.S. firms were reluctant to provide the controversial drug, being concerned about impacts on sales of other products; Planned Parenthood, the U.S. licensee, sought a foreign manufacturer.[25] Hungary's imports during 1994-99 increased at an annual rate of 7 percent, led by a 16-percent increase in imports of plastics in nonprimary forms. Hungary's trade deficit in chemical products grew to $1.2 billion in 1999, averaging nearly 14 percent annually during this period.

Poland

Polish exports of chemical products increased by 6 percent per year during 1994-99, primarily due to strong growth in detergents and cosmetics, which annually increased by 35 percent. In 1999, organic chemicals ranked as the leading chemical export from Poland, followed closely by detergents and cosmetics. Like Hungary and the Czech Republic, Poland's imports grew faster than its exports and averaged 15 percent per year during this period, causing its total chemical trade deficit to reach nearly $5 billion in 1999. Leading chemical imports include medicinal and pharmaceutical products, plastics (primary and nonprimary forms), and miscellaneous chemical materials.

Slovakia

Slovakia experienced the most disappointing performance in chemical export trade among the CE countries during 1994-99. Exports from Slovakia declined by 2 percent annually during this period to $671 million. Only one product category showed export growth during this period–detergents and cosmetics. At the same time, chemical imports by Slovakia during 1994-99, increased at a rate of 6 percent per year. Medicinal and pharmaceutical products was the leading Slovak chemical import by value in 1999. These trends largely reflect the

[23] RU-486 (mifepristone, U.S. trade name Mifeprex) has been popular in France and Italy, although it has been controversial in the United States and is not readily available, despite Food and Drug Administration (FDA) approval. According to the British Broadcasting Corporation (BBC), the French Government is making the drug available through school nurses to deal with an alarming rise in adolescent-age pregnancies. BBC News transcript, found at http://news.bbc.co.uk/hi/english/world/europe/ newsid_542000/542470.stm, retrieved Nov. 30, 1999.

[24] Margaret Talbot, "The Little White Bombshell," *New York Times Magazine*, July 11, 1999, p. 39ff.

[25] More recently, the FDA has proposed restrictive labeling requirements which industry observers indicate could result in further rounds of litigation, delaying widespread marketing. The FDA is also considering withdrawal of approval for misoprostol, normally used with mifepristone, potentially inhibiting U.S. market development of RU-486. Various trade sources.

industry structure in place before the partition of the former Czechoslovakia. Most of the basic-chemical plants were located in Slovakia and were in poor condition as well as poorly engineered by modern standards, whereas the more economically viable fine-chemicals and consumer-products plants were mainly located in the Czech Republic.[26] Moreover, Slovakia's markets for chemicals are primarily in Eastern European countries, which have fared far worse in their transition to market economies than did the CE countries, thereby reducing both their demand for chemical imports and their ability to pay with hard currency. Partly in consequence, Slovakia's trade deficit for chemical products increased at an annual rate of more than 100 percent during 1994-99, by far the largest deficit trend in the period among the four CE countries.

Global Trade Patterns for CE Chemicals

Although details differ for each country, common patterns of global trade are evident among the four prominent countries comprising the chemical industrial base in Central Europe (table 3). For each country, the EU is its most important source of chemical imports–in the 60-75 percent range. On the export side, except for Slovakia, the EU is also the most important export destination although the EU share is much smaller (less than 50 percent); however, Eastern Europe and the former Soviet Union still remain major destinations for chemical products exported from the CE countries. More distant regions are much less important by value of chemicals trade than nearer trade partners, as would be expected for undifferentiated commodity products; however, in some cases, such regions show high rates of growth from their small historical bases.

Prominence of the EU as the leading source of chemical imports for the CE market is due to a number of factors, including a more modern chemical product mix than the CE chemical industries, excess capacity to meet export demand, and close proximity with fairly good transportation facilities. As a result, the EU is the most economically competitive supplier.[27] In contrast, chemical exports from the CE countries to the EU are constrained by the CE industry's more basic chemical product mix of commodities readily available in the EU; by a lack of sustained, sophisticated marketing efforts; and by the inability of CE chemical producers to modernize their industry because the limited investment funds available must be directed to overcoming environmental deficits that require correction if the countries are to become members of the EU according to schedule.[28] Further, CE chemical exports directed eastward exhibit limited opportunity for growth because of the limited progress in industrial reform in Eastern Europe and Russia, the Eastern European reliance on state trading enterprises, and their stagnant national economies that do not generate reliable and growing demand for chemical products or the foreign exchange to pay for anything but the most vital imports.[29]

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[26] Economic Commission for Europe, *Structural and Ownership Changes in the Chemical Industry*, p. 124.

[27] "Demand Grows in Central Europe for EU Output," *Chemical Marketing Reporter*, Nov. 1997, p. 8.

[28] Natasha Alperowicz, "The European Union Takes Five," *Chemical Week*, Mar. 24, 1999, pp. 56-58.

[29] Patricia L. Layman, "Western Europe: Cycle Turns Upward Once Again for Chemical Industry," *Chemical & Engineering News*, Dec. 13, 1999, p. 25.

Table 3
International trade in chemicals, by principal Central Europe source and global destination, 1999

Country/region	Exports 1999	Exports Ratio to total	Exports Growth rate[1]	Imports 1999	Imports Ratio to total	Imports Growth rate[1]
	Million dollars	*-------Percent-------*		*Million dollars*	*-------Percent-------*	
Czech Republic						
European Union-15	895	46	3	2,455	70	13
Eastern Europe (excluding FSU)	729	38	4	506	14	- 1
Former Soviet Union (FSU)	129	7	13	55	2	- 3
Non-EU Western Europe[2]	38	2	4	153	4	3
North and South America	71	4	32	177	5	24
Asia (excluding Oceania)[3]	39	2	3	88	3	20
Middle East[4]	18	1	9	15	([5])	16
World total[6]	1,934	100	7	3,494	100	10
Hungary						
European Union-15	604	42	([5])	1,918	72	9
Eastern Europe (excluding FSU)	411	29	12	245	9	8
Former Soviet Union (FSU)	165	12	3	88	3	- 10
Non-EU Western Europe[2]	47	3	25	153	6	- 5
North and South America	69	5	7	135	5	23
Asia (excluding Oceania)[3]	58	4	- 13	105	4	19
Middle East[4]	58	4	3	19	([5])	10
World total[6]	1,424	100	4	2,664	100	7
Poland						
European Union-15	778	48	4	4,848	75	17
Eastern Europe (excluding FSU)	249	15	14	605	9	12
Former Soviet Union (FSU)	400	24	15	206	3	- 1
Non-EU Western Europe[2]	23	1	3	294	5	12
North and South America	72	4	- 8	316	5	19
Asia (excluding Oceania)[3]	92	6	- 2	194	3	23
Middle East[4]	9	1	8	32	([5])	9
World total[6]	1,636	100	6	6,500	100	15
Slovakia						
European Union-15	217	32	- 5	708	58	13
Eastern Europe (excluding FSU)	400	60	- 6	341	28	- 1
Former Soviet Union (FSU)	28	4	- 4	34	3	- 14
Non-EU Western Europe[2]	6	1	- 5	55	5	8
North and South America	11	2	([5])	43	4	- 4
Asia (excluding Oceania)[3]	4	1	- 22	22	2	21
Middle East[4]	2	([5])	- 8	6	([5])	- 3
World total[6]	671	100	- 2	1,216	100	6

[1] For the period 1994-99.
[2] Principally trade with Switzerland which has a significant fine chemicals industry.
[3] Asian-Pacific Rim and South Asia.
[4] Primarily trade with Saudi Arabia which has a large petrochemical industry.
[5] Less than 0.5 percent.
[6] Columns do not add to totals shown due to omission of other countries and regions, such as Oceania and the Baltic States, which tend to have relatively insignificant trade in chemical products with Central Europe.

Source: United Nations Statistical Division.

Outlook

According to several European chemical analysts, the CE countries' trade in chemicals will continue to be in deficit for the foreseeable future, given their older plants, lesser production efficiencies, and smaller domestic markets than those in Western Europe.[30] In the words of one strategist at an EU chemical company, "Europe is becoming a single market in which the relatively small Central and Eastern European producers will always have difficulties competing against the large Western European producers. Instead, Eastern European chemical companies will have to concentrate on dealing with specific regional needs or specialty products."[31] Further, an executive at a Polish chemical manufacturer noted, "the more advanced and specialized the chemical, the greater the tendency for it to be imported."[32]

Chemical firms producing specialty chemicals or serving niche markets in the CE countries are less affected by the scale and efficiency of the operation than are those producing commodity chemicals. These specialty-product firms are more concerned with the ability to incorporate the rapid technological advance in products (versus production processes) and to form closer ties with customers, particularly communicating effectively with customer's technical staff (diverse European languages make technical exchanges more difficult). In general, most CE chemical industries do not yet possess all these qualities, although the Czech Republic and Hungary, with more specialty and niche-market chemical industries, are in a better position than Poland and Slovakia, which have more commodity-oriented chemical industries.

In the short run, it appears that chemical firms in the CE countries must become more specialized and responsive to customer requirements if they are to remain a major force in the economic future of their countries. These companies must also overcome numerous technical, commercial, and managerial deficiencies if they are to prosper and be competitive with Western European firms in export markets.**#**

[30] These are important competitive considerations, as many chemicals are commodity products, in which scale of production, size of markets, and technological efficiency are extremely important. Alperowicz, "The European Union Takes Five."

[31] "Demand Grows in Central Europe for EU Output," *Chemical Marketing Reporter*.

[32] Ibid. This observation is reflected by trade data shown in table 2, as the highest valued import category for all CE countries is medicinal and pharmaceutical products.

Commercialization of Hybrid Automobiles: Prospective Demand for Light Metals

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Hybrid automobiles`[2] represent a major market-growth opportunity for manufacturers of light-weight nonferrous metals. These vehicles are designed to be much more fuel-efficient than current automobiles. Fuel efficiency requires lowering vehicle weight by substituting aluminum, magnesium, titanium, carbon- and glass-reinforced polymer composites, and ultra-light steel for traditional, heavier materials such as iron and steel. Wider acceptance of the light-weight metals in automotive applications could significantly increase overall demand for these metals, by nearly 20 percent of present consumption of aluminum to more than 100 percent of present consumption for magnesium and titanium.[3] However, the commercial success of hybrid automobiles will be affected by the price premium under which they will likely enter the market, and the difficult challenge of meeting fuel economy and tighter emissions standards. This article examines the progress made by U.S. and Japanese automakers in designing and producing hybrid vehicles, the problems and potential associated with increased use of light metals, and efforts underway to reduce production costs of light metals used in making hybrid vehicles.

Hybrid vehicle technology combines conventional and electrical propulsion systems[4] to reduce emission of greenhouse gases and improve fuel consumption, and offers consumers an extended mileage range and convenient refueling options. Most hybrid vehicles on the market or in development use a parallel configuration. Both a conventional engine and an electric propulsion system can be used to power the vehicle. An electric-only power mode can be used for short trips whereas the conventional engine provides power to the vehicle on longer trips, supplemented by an electric motor for additional power in climbing hills, rapid acceleration, and other periods of high demand. During acceleration, the two power sources operate in tandem for optimal performance.

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[1] The views expressed in this article are those of the author. They are not the views of the U.S. International Trade Commission as a whole or of any individual Commissioner.

[2] U.S. automakers are scheduled to enter the domestic market in 2003 with added versions of hybrid vehicles: DaimlerChrysler's Durango SUV and Citadel, Ford's Escape SUV, and General Motors' Chevrolet Triax. These vehicles are not discussed in this article because they are not anticipated to make extensive use of light-weight metals.

[3] Automotive demand presently accounts for a small, but growing percentage of total consumption of aluminum and magnesium, whereas no titanium is presently used in automobiles.

[4] The industry makes a distinction between "mild hybrid" and "full" hybrid vehicles. Mild hybrids have the ratio of on-board electric power to total power supplied lower than 23 percent, whereas full hybrid vehicles have the fraction of on-board electric power as high as 39 percent.

U.S. and Japanese Hybrid Vehicle Efforts

In September 1993, President Clinton and the chief executive officers of the major U.S. automakers announced the formation of the Partnership for a New Generation of Vehicles (PNGV). Involving the 3 major U.S. automakers (Ford Motor Co., General Motors, and DaimlerChrysler), 7 government agencies, and 20 national research laboratories, the announced long-term goals of the partnership are as follows:[5]

- To improve the productivity of the U.S. manufacturing base by upgraded manufacturing technology, including agile and flexible manufacturing and the reduction of cost and lead times, while reducing the environmental impact, or improving product quality, or both;
- To pursue and implement technology advances that lead to improved fuel efficiency and reduced emissions of standard vehicle designs, as well as better safety performance; and
- To develop a new generation of vehicles with fuel economies three times as efficient as now (80 miles per gallon of gasoline) while comparable in terms of size, utility and performance standards to vehicles on the market when the PNGV was formed (Chrysler Concorde, Ford Taurus, and Chevrolet Lumina).[6]

This program was expected to provide significant energy savings, environmental protection, and economic benefits to the nation. A significant improvement in vehicle fuel efficiency would represent major progress toward lessening U.S. reliance on foreign oil supplies, which accounted for nearly 50 percent of U.S. oil consumption at a cost of more than $40 billion in 1993.[7] Today, U.S. reliance on foreign oil supplies accounts for more than 50 percent of U.S. oil consumption at a cost of $80 to 90 billion.[8] The PNGV anticipated that "concept" vehicles would be introduced in the year 2000, while prototype commercial vehicles would enter the market in 2004. The three U.S. automakers spent approximately $980 million in 1999 on PNGV-related research.[9] In fiscal year 1999, the U.S. Government spent $232 million for PNGV-related research, of which $160 million was for research and development directly related to PNGV and coordinated by the technical teams.[10]

Early in the program, U.S. automakers decided that the best engine design available to achieve the PNGV fuel economy goal would be a hybrid-electric drive train design with a

[5] *Program Plan*, PNGV, Partnership For a New Generation of Vehicles, document released by Vice President Gore, Nov. 29, 1995.

[6] The target mass of a PNGV vehicle was set at 1,960 pounds, compared to an average 1994 vehicle weighing 3,240 pounds.

[7] *Program Plan*, pp. ES-1-ES-2.

[8] "U.S. Petroleum Consumption, Imports and Exports," Energy Information Administration, U.S. Department of Energy, Washington, DC, found at *http://www.eia.doe.gov/oil_gas/petroleum/info/*, retrieved April 4, 2001.

[9] PNGV, draft executive summary, U.S. Department of Commerce, p. 4.

[10] The remaining expenditures related to activity, such as fuel cell research, which is not directly related to PNGV but may be of long-term benefit to the program.

compression-ignition direct injection (CIDI or diesel) engine.[11] A major program goal was achieved in 2000 with the unveiling of the PNGV-concept cars--Ford's Prodigy, General Motor's Precept, and DaimlerChrysler's ESX3 (table 1). These concept cars demonstrated the technical feasibility of combining advanced hybrid engine technologies and innovative use of light materials (table 2) to achieve the fuel economy goals of the program. However, these vehicles do not necessarily represent the final versions scheduled for commercial production in 2004. Rather, they serve as an interim stage between company research program and final commercial design, for these vehicles may include components with no thus-far demonstrated and validated manufacturing processes and affordable costs.[12]

Japanese automakers Honda and Toyota introduced commercial versions of their hybrid vehicles in 2000[13] (see table 1). A principal difference with the U.S. PNGV hybrid cars is that the Japanese hybrid cars use a gasoline engine. Because of the lower thermal efficiency of the gasoline engine, the fuel consumption of these vehicles is slightly higher than for hybrid vehicles using a CIDI design. The Japanese hybrids tend to achieve less fuel economy than their diesel U.S. counterparts. On the other hand, the use of a gasoline engine makes it easier for Japanese hybrids to meet the more stringent U.S. Environmental Protection Agency (EPA) emissions standards without having to resort to expensive emissions-control equipment to clean the diesel emissions.[14]

U.S. sales of Honda's Insight, since its introduction, totaled 4,863 by April 200l, with average monthly sales in 2001 of between 300-400 vehicles. Toyota's sales of the Prius in the United States has been estimated at between 5,000-6,000 for the same period while worldwide sales of the Prius has topped 50,000 during the same period, with 90 percent of the vehicles having been sold in Japan.

The Potential Demand for Light Metals in Hybrid Vehicles

Projected annual material requirements were estimated by Oak Ridge National Laboratory (ORNL)[15] for various materials in the Ford P2000 (the predecessor of Ford Prodigy) and the Daimler-Chrysler ESX2 (the predecessor of the ESX3) (table 3).[16] ORNL concluded that

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[11] U.S. hybrid vehicles under development use a CIDI engine which has the highest thermal efficiency of existing internal combustion engines. Disadvantages of the CIDI engine include emission levels of particulate matter and nitrous oxides exceeding EPA standards.

[12] *Review of the Research Program of the Partnership for a New Generation of Vehicles,* Sixth Report, National Research Council, 2000, p. 2.

[13] Although the Japanese Government does not have a program comparable to the U.S. PNGV, the Japanese Government does provide extensive financial support in the form of R&D tax credits, and direct and local subsidies to automakers for the manufacture of hybrid vehicles.

[14] Feng An, Anant Vyas, John Anderson, and Danilo Santini, "Evaluating Commercial and Prototype HEVs," Argonne National Laboratory, 2000, p. 3.

[15] Sujit Das, T. Randall Curlee, Stanton W. Hadley, Donald W. Jones, Bruce E. Tonn, Amy K. Wolfe, *Supporting Infrastructure and Acceptability Issues Associated With Two New Generation Vehicles: P2000 and ESX2*, Oak Ridge National Laboratory, May 2000.

[16] Differences between material use in earlier and later versions of these PNGV cars are not significant.

Table 1
Comparison of hybrid automobile models`

Features	Ford Prodigy (U.S.)	General Motors Precept (U.S.)	DaimlerChrysler ESX3 (U.S.)	Honda Insight (Japan)	Toyota Prius (Japan)
Type	Mild hybrid	Full hybrid	Mild hybrid	Mild hybrid	Full hybrid
Engines	Diesel/electric	Diesel/electric	Diesel/electric	Gasoline/electric	Gasoline/electric
Weight (pounds)	2,387	2,587	2,250	1,856	2,765
Fuel economy (mpg)	[1]70	[1]80	[1]72	[1]76	[1]58
Other	Regenerative braking	Regenerative braking	Regenerative braking	Regenerative braking	Regenerative braking
Commercialization	Prototype only	Prototype only	Prototype only	Available Spring 2000 List price: $20,080	Available Spring 2000 List price: $20,450
Materials used:					
Aluminum	Engine and car body	Engine, chassis and body	Engine and chassis	Engine, body, frame, suspension	Engine, frame, suspension
Magnesium	Engine and transmission parts, seat assemblies, chassis	Minor amounts	Engine and transmission parts, seat assemblies, chassis	([2])	([2])
Titanium	Exhaust system components, fasteners	Exhaust system components, fasteners	Exhaust system components, coil suspension springs, fasteners	([2])	([2])
Other materials	Conventional	Conventional	Thermoplastic body panels and conventional	Conventional	Conventional

[1] Gasoline equivalent.
[2] Not available.

Sources: USITC staff telephone conversations with automobile industry officials; "More Details on Precept, GM's PNGV," Automotive Engineering International Online, found at *http://www.sae.org/automag/globalview_01-00/11.htm,* retrieved Jan. 18, 2001; "Dodge's Mild Hybrid," *Global Viewpoints*, Automotive Engineering International Online, found at *http://www.sae.org/automag/globalview,* retrieved Jan. 30, 2001; "Global Concepts, Dodge ESX3, "*Automotive Engineering International Online*, found at *http://www.sae.org/ automag/ globalconcepts-2/36.htm,* retrieved Jan. 18, 2001; and Will Ryu, "Honda Insight; Hybrid Gasoline-Electric Car," found at *http://arstechnica.com,* retrieved Jan. 22, 2001.

Table 2
Material composition for PNGV concept cars and for average year-1994 vehicle

Material	Average 1994 vehicle	Ford Prodigy	General Motors Precept	DaimlerChrysler ESX2
Wrought Aluminum	47	462	[1] 512	330
Cast Aluminum	159	271	([1])	120
Magnesium	6	86	7	122
Titanium	0	11	18	40
Ferrous	2,168	480	185	528
Plastics	223	270	110	485
Rubber	139	123	30	148
Glass	97	36	25	70
Lexan	0	30	([2])	20
Glass Fiber	19	([2])	([2])	60
Carbon Fiber	0	8	10	24
Lithium	0	([2])	([2])	30
Other	391	223	([2])	303
Total (weight per pound)	3,248	2,387	2,587	2,250

[1] Cast aluminum and aluminum sheet combined.
[2] Not available.

Sources: Sujit Das, T. Randall Curlee, Stanton W. Hadley, Donald W. Jones, Bruce E. Tonn, and Amy K. Wolfe, *Supporting Infrastructure and Acceptability Issues Associated With Two New Generation Vehicles: P2000 and ESX2, Oak Ridge National Laboratory*, Oak Ridge, TN, May 2000, p. 7; and from information supplied by U.S. automakers.

Table 3
Projected light-weight material requirements for PNGV hybrid vehicles, 2010, 2020 and total U.S. consumption (all uses) of light-weight materials, 1999

(*Thousand metric tons*)

Material	2010	2020	Total U.S. consumption, 1999
Aluminum	154-501	527-1,199	7,090
Magnesium	39-127	137-312	183
Titanium	10-33	36-82	71

Source: Sujit Das, T. Randall Curlee, Stanton W. Hadley, Donald W. Jones, Bruce E. Tonn, Amy K. Wolfe, *Supporting Infrastructure and Acceptability Issues Associated With Two New Generation Vehicles: P2000 and ESX2*, Oak Ridge National Laboratory, Oak Ridge, TN, May 2000, p. 8.

success of PNGV automobiles could represent a significant increase in demand for certain light metals. They further suggested more significant gains for these metals in the later years, as light-weight material requirements are initially low because of the low market penetration rates of PNGV automobiles but may be anticipated to account for increasing shares of the automobile market over time.

The accuracy of these forecasts depend on a number of variables related to the success of PNGV cars in penetrating the commercial market, not the least of which is the existing cost premium of light-weight material (table 4). Much of this success will depend on reducing the cost of producing the automobiles by reducing the cost of light-weight components, inasmuch as use of light-weight materials is also critical to meet the weight reduction and fuel

Table 4
Comparative costs of alloy aluminum, magnesium, and titanium and steel, by item

(*Price per pound*)

Item	Light-weight material	Estimated price of light-weight material	Conventional material replaced	Estimated price of conventional material replaced
Automotive body	Aluminum sheet	$1.50-1.60	Steel sheet	Less than $0.50
Power train (including engine and transmission)	Aluminum castings Magnesium castings	$0.70-0.80 $1.30-1.50	Iron and steel castings	Less than $0.50
Chassis (including suspension, brakes, and mounts)	Aluminum castings Magnesium castings	$0.70-0.80 $1.30-1.50	Steel castings	Less than $0.50
Exhaust system	Titanium sheet	$15.00-20.00	Aluminum sheet	$1.50-1.60

Note–When comparing the prices of these metals it should be noted that because of their reduced weight, fewer pounds of light-weight metals are needed to equal the same volume of iron or steel. Thus, these figures may somewhat overstate the cost differentials between lighter and heavier weight metals.

Source: USITC staff telephone conversations with automobile industry officials.

economy goals of the program.[17] However, it appears that potential automotive demand could represent a substantial increase in the consumption of titanium and magnesium metal, given the relatively small present sizes of the overall market for these metals. Potential PNGV-related demand in 2020 could equal or surpass total present demand for these metals (figure 1). In the case of aluminum, which represents a much larger market with a more diversified end-user base, PNGV-related demand could still account for a significant increase in demand, representing 7 to 17 percent of present aluminum consumption by the year 2020. The following is a discussion of some of the cost problems related to the substitution of aluminum, magnesium, and titanium in automobiles.

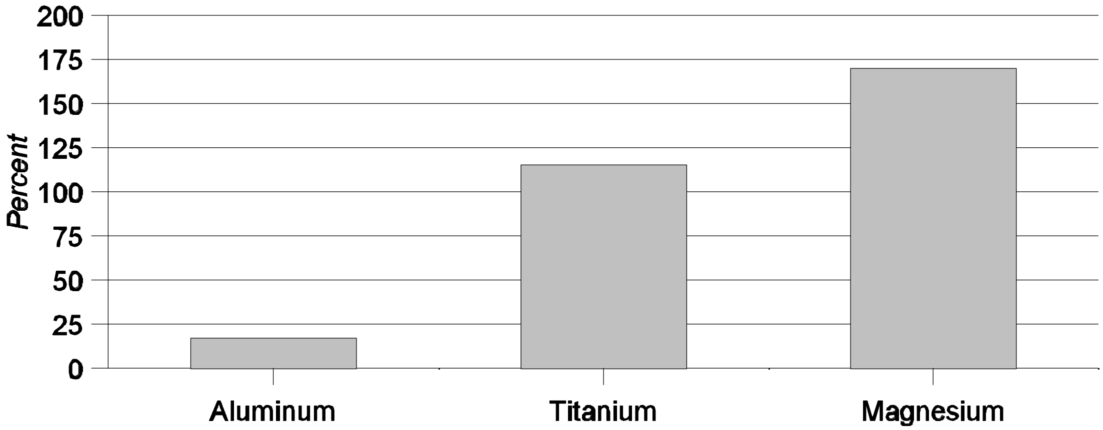
Aluminum

Having one-third the density of steel, aluminum is viewed as a promising material for PNGV vehicles, given the 50-percent reduction in the weight of both the body structure and chassis sought by design engineers. Average aluminum content in the year 2000 was nearly 280 pounds per vehicle, principally in the form of castings. The automobile body, accounting for nearly 25 percent of the total weight of a typical vehicle, offers the greatest potential for weight reductions. Since aluminum is lighter weight and widely available, the largest potential for growth is its use as sheet for body structures and closure panels (hoods, deck lids, fenders, heat exchangers, heat shields, and trim). A major factor presently limiting the use of aluminum sheet is that it costs at least three times as much as steel sheet[18] (see table 4). Another major factor limiting its use in body panels is that aluminum is more difficult

[17] *Review of the Research Program of the Partnership for a New Generation of Vehicles,* Sixth Report, National Research Council, 2000, p. 70.

[18] It must be noted that although raw material cost is an important factor in final component cost, it is not the only factor. Manufacturing cost of converting the raw material to finished component is also essential in determining final component cost.

Figure 1
Projected maximum increase in U.S. aluminum, titanium, and magnesium consumption for use in U.S. hybrid vehicles, by 2020, as a percentage of total U.S. consumption in 1999



Source: Compiled from official data of U.S. Geological Survey; and from data provided in Sujit Das, T. Randall Curlee, Stanton W. Hadley, Donald W. Jones, Bruce E. Tonn, and Amy K. Wolfe, *Supporting Infrastructure and Acceptability Issues Associated with Two Vehicles: P2000 and ESX2,* Oak Ridge National Laboratory, Oak Ridge, TN, May 2000, p. 9.

to weld and stamp than steel, and behaves differently when stressed, requiring the re-engineering of the body structure to meet safety and stiffness requirements, thereby adding to cost.[19]

The use of aluminum castings in PNGV cars faces similar cost-competitive problems. General Motors, in particular, makes extensive use of aluminum castings in the propulsion system and chassis of the Precept. However, the cost of aluminum cast parts is likely to remain higher than the steel castings or stampings they would replace because the physical infrastructure does not currently exist to produce them in great volume. In addition, because aluminum is a structurally weaker material than steel, certain "process enhancements" must be performed, such as increasing wall thickness or reducing porosity, before it can be used in certain structural components.[20] The capital investment in such production facilities is not likely without an indication that PNGV cars will do well enough in the market. At this point, investors have not appeared confident enough of the sales volumes of PNGV cars to justify the additional investment.[21]

Magnesium

Magnesium is the lightest of the structural metals; magnesium alloys are 75 percent lighter in weight than steel, 30 percent lighter than aluminum, and 20 percent lighter than polymer composites. In addition, due to outstanding castability, magnesium components can be cast closer to near-net-shape with thinner wall thicknesses, thereby reducing the amount of material used. Finally, magnesium is also easily machined, resulting in productivity increases. As a

[19] "The Battle of the Metals," Automotive Engineering International Online, found at *http://www. sae.org/automag/metals/10.htm*, retrieved Jan. 17, 2001.
[20] USITC staff telephone conversation with Tom Lobkovich, General Motors, Jan. 12, 2001.
[21] Ibid.

result, automotive manufacturers have sought to use more of the metal in PNGV applications. DaimlerChrysler and Ford have so far the most ambitious plans to use magnesium alloys. Major applications include interior components (seat back assembly and cross car beam), the power train (engine and transmission assembly), and suspension components (wheel assembly).

However, magnesium alloys are presently too expensive to compete with aluminum alloy castings in most applications (see table 4). The goal of the automotive industry is to bring the price of magnesium alloy ingot down to the level of aluminum alloy ingot.[22] Other obstacles to increased magnesium use include lack of component-relevant data on physical and mechanical properties of magnesium castings; lack of information on manufacturing cost for use by component producers, die casters, and raw material suppliers; high cost of component prototypes; and delays in the introduction of production quality prototypes for design and testing purposes.[23] Such obstacles are likely to be resolved as the automotive industry gains greater experience in the use of magnesium in components.

Titanium

Because of its high strength, low density, excellent corrosion resistance, and the relative worldwide abundance of titanium ores, titanium alloy mill products (bar, sheet, and powder) are being considered as a light-weight alternative to steel in engine and body/chassis applications (in connecting rods, valves, valve spring retainers, coil suspension springs, exhaust system components, and high-performance fasteners). Because of its high corrosion resistance at elevated temperatures, titanium is the only light-weight metal substitute for stainless steel in exhaust systems. At present, the use of titanium alloys in hybrid applications has been somewhat limited due to the high cost of the metal.[24] Titanium products are more expensive than both aluminum and steel (see table 4). Extensive use of titanium would raise the vehicle cost beyond the PNGV target price. The high cost of titanium components is related both to the high cost of raw materials (primarily ingot and bar) and the high cost of fabricating titanium components from raw materials, due to lack of high-volume production facilities that could reduce the average unit price.[25] For such components to be competitive with most steel components, titanium raw material would need to sell at $1 to $2 per pound[26] compared to nearly $8 per pound at present; and the price of titanium mill products would need to sell at $6 to $9 per pound for engine applications, and no more than $4 per pound for most other applications.[27]

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[22] USITC staff telephone conversation with Gerald Cole, Ford Motor Co., Jan. 25, 2001.

[23] Ibid.

[24] Ford Motor Co. uses small amounts of titanium in nuts and bolts for the Prodigy, DaimlerChrysler uses nearly 40 pounds of titanium in the exhaust system and valve springs of the ESX3 and General Motors uses most of its titanium in the exhaust system of the Precept (see table 1).

[25] Titanium cannot presently be produced at competitive prices for automobiles under the existing Kroll process for sponge-making and the vacuum-arc-remelting (VAR) process for ingot-making.

[26] A.M. Sherman, C.J. Sommer, and F.H. Froes, "The Use of Titanium in Production Automobiles: Potential and Challenges," *Journal of Metals*, May 1997, p. 41.

[27] A.D. Hartman, S.J. Gerdemann, and J.S. Hansen, "Producing Lower-Cost Titanium for Automotive Applications," *Journal of Metals*, Sept. 1998, p. 16.

Outlook for Lowering the Cost of Light Metals

Despite the successful achievement of a number of PNGV technical goals,[28] a number of significant barriers to commercialization of hybrid cars remain.[29] A principal obstacle is vehicle cost, a serious problem in virtually every area of hybrid vehicle production, inasmuch as the cost of most components is higher than the target costs established by manufacturers.[30] The PNGV is making a major research effort to reduce the cost of producing aluminum by developing continuous slab-casting technology. Industry experts estimate that implementation of such technology could eventually reduce the cost of aluminum sheet to a target price of $0.90-$1.10 per pound. However, the capital investment in such technology for the aluminum industry is not likely to occur without the likelihood of sufficient demand for aluminum sheet to justify the capital investment. At this point, investors do not appear confident enough of the anticipated sales volumes of PNGV cars to justify the investment in this technology.[31]

At present, China is the only country with the potential to produce magnesium ingot in large volumes at price levels competitive with aluminum.[32] However, much of the Chinese material reportedly is not yet certified for use by automakers due to lack of structural integrity. Capital investment to increase Chinese capacity and improve product quality has been contemplated by automakers eager to use more magnesium in their operations. However, the U.S. and Canadian magnesium producers are at present strongly opposed to permitting more imports of magnesium into the United States, and potential investors are not eager to invest in China until they can be assured that the product can be imported into the United States.[33] At this point, Norway's Hydro Magnesium is the only foreign magnesium company that has made a commitment to invest in the Chinese market. Hydro has begun to build a foundry to convert pure magnesium produced by Chinese smelters into automotive-grade magnesium alloy for

[28] Successful achievements of the PNGV program to date include rapid increases in average fuel economy; improvements in the efficiency and performance of hybrid engines; the fabrication and testing of light-weight automobile bodies; and the advancement of fuel cell, battery, and power electronics technologies.

[29] *Review of the Research Program of the Partnership for a New Generation of Vehicles,* Sixth Report, National Research Council, 2000, p. 79.

[30] Another major obstacle to emerge is the announcement of the new, tougher EPA Tier 2 emissions standards, which will make it unlikely that these vehicles will achieve the 80 mile per gallon standard established by the PNGV. These standards, announced at the end of 1999, are significantly more stringent than the standards that were in place when the PNGV program was launched. The initial design targets for nitrous oxide (NOx) and PM emissions at the start of the PNGV were 0.2 grams/mile NOx and 0.04 grams/mile PM. The new EPA Tier 2 standards mandate fleet averages of 0.07 grams/mile NOx and 0.01 grams/mile PM. The compression-ignition engine design, adopted by U.S. automakers as part of the hybrid vehicle concept to achieve the original PNGV fuel economy goal, is the least efficient for meeting the new EPA standards (due to the formation of certain exhaust gases related to the high compression pressures and temperatures required in the compression-ignition combustion process) without substantial exhaust gas treatment systems. These exhaust gas treatment systems are presently the subject of extensive PNGV research. *Review of the Research Program of the Partnership for a New Generation of Vehicles,* Sixth Report, National Research Council, 2000, p. 79.

[31] USITC staff telephone conversation with A.M. Sherman, USCAR, Jan. 11, 2001.

[32] USITC staff telephone conversation with Gerald Cole, Ford Motor Co., Jan. 25, 2001.

[33] Ibid.

the export market. Annual ingot capacity is expected to be just over 10,000 metric tons and the new foundry is expected to begin producing by early 2001.[34]

A major industry process technology initiative focusing on magnesium is the subject of an Advanced Technology Program[35] (ATP) grant. Led by Ford, and involving five nonrelated engineering and research organizations, the initiative seeks to develop low-cost magnesium die casting technology for automobiles. The 4-year, $7 million project will address many of the technical barriers to the use of magnesium in high-volume applications. The central goal of the program is to develop a multipoint injection system for introducing molten magnesium into die cavities at a controlled temperature and flow rate. In this way, component quality can be made more consistent and die casting yields can be improved beyond the current 60 percent rate, thereby reducing scrap generation by at least 10 percent. If successfully developed and commercialized, the technology is expected to cut the cost of magnesium automotive parts in half.[36]

In a project sponsored by USCAR through the U.S. Department of Energy,[37] Alcoa Corp. is researching a plasma heating technology to produce magnesium at its Northwest Alloys magnesium production facility in Addy, WA. The project seeks to reduce the cost of thermally produced pure magnesium by increasing the temperature to permit the process pressure to be raised to atmospheric pressure, rather than at below-atmospheric pressure, enabling a change in the blend of the raw materials used to reduce the cost of overall raw material feed. Data collected from Northwest Alloy's pilot plant operation in South Africa indicates a modest potential cost reduction of $0.03 per pound due to reduced consumption of dolomite, ferrosilicon, and aluminum raw materials.[38]

Probably the best technology currently available for eventually producing automotive-grade titanium ingot in large volumes is Electron-Beam (EB) processing. Electron-beam furnaces consist of a water-cooled copper hearth.[39] The resulting molten metal flows into a water-cooled copper mold at the other end of the furnace. Unlike the more costly vacuum-arc-remelting (VAR) process, both rectangular and round ingot molds can be used with an electron-beam furnace, eliminating the cost associated with converting round ingots into a form that can be rolled into titanium sheet. Additional advantages of the EB process compared to the VAR process include elimination of the highly labor- and capital-intensive electrode fabrication process; the ability of the EB process to use less expensive scrap feedstocks; the elimination of several costly arc-melting steps associated with VAR; and the

[34] Sandra Buchanan, "Magnesium Geared up for Growth," *Metal Bulleting Monthly*, Dec. 2000, p. 49.

[35] The ATP is administered by the National Institute of Standards and Technology (NIST).

[36] Cost-Reduced Magnesium Die Castings Using Heated Runners (CORMAG), Advanced Technology Program (ATP), Project Brief 00-00-4334, National Institute of Standards and Technology (NIST), U.S. Department of Commerce, Oct. 2000.

[37] The Advanced Magnetherm Project for Production of Primary Magnesium is jointly financed by the U.S. Department of Energy and Alcoa, Inc. Since the beginning of the project in fiscal 1999, total expenditures have amounted to $1.6 million.

[38] *Advanced Magnetherm Process for Production of Primary Magnesium*, Fiscal Year 2000 Progress Report, U.S. Department of Energy, Office of Advanced Automotive Technologies.

[39] Electronic controls move an electron heat beam from one point to another over the surface of the furnace while loose feed material in the form of titanium sponge or scrap is fed through the furnace.

ability to produce a purer ingot, free of the inclusions (impurities potentially causing quality problems) that occur in the VAR process.[40] In a non-hybrid-related development, General Motors announced that titanium, produced using EB technology, will be used for the first time commercially in the Corvette Z06 exhaust system.[41]

An exploratory project sponsored by USCAR is currently underway to solicit proposals from research institutions for possible funding of research projects designed to reduce the costs of titanium.[42] One recently announced technology that has attracted considerable attention, promising to cut the cost to one-fourth of the current amount, is an electrochemical process to produce titanium sponge.[43]

Despite the above developments, the costs of light-weight metals and composite materials are not projected to reach levels competitive with steel components by 2004. These higher costs are directly related to the lack of a technological process breakthrough that would enable these materials to be produced less expensively, and to insufficient demand that would justify the creation of the physical infrastructure to produce components in volumes sufficient to reduce their average production cost. In its annual review of the PNGV, the National Research Council concluded that the trade-offs between achieving maximum fuel economy and meeting the newer EPA emissions standards may eventually force the extension of the deadline for meeting the PNGV goals, allowing more time for the development of new cost-reducing materials technologies and new fuel economy technologies.[44]**#**

[40] A.D. Hartman, S.J. Gerdemann, and J.S. Hansen, "Producing Lower-Cost Titanium for Automotive Applications," *Journal of Metals*, Sept. 1998, p. 16-19.

[41] USITC staff telephone conversation with Kurt Faller, TIMET, Corp., Feb. 23, 2001.

[42] USITC staff telephone conversation with A.M. Sherman, USCAR, Jan. 31, 2001.

[43] Vicki Reynolds, "Researchers find way to slash titanium production costs," *American Metal Market*, Feb. 12, 2001, p. 14.,

[44] In particular, the fuel cell energy converter, the subject of intense research efforts, has been advanced as a technology that promises high fuel economy and produces very low emissions. *Review of the Research Program of the Partnership for a New Generation of Vehicles*, Sixth Report, National Research Council, 2000, p. 70.

APPENDIX A
KEY PERFORMANCE INDICATORS OF SELECTED INDUSTRIES AND REGIONS

☐ **STEEL** (Karl Tsuji, 202-205-3434/tsuji@usitc.gov)
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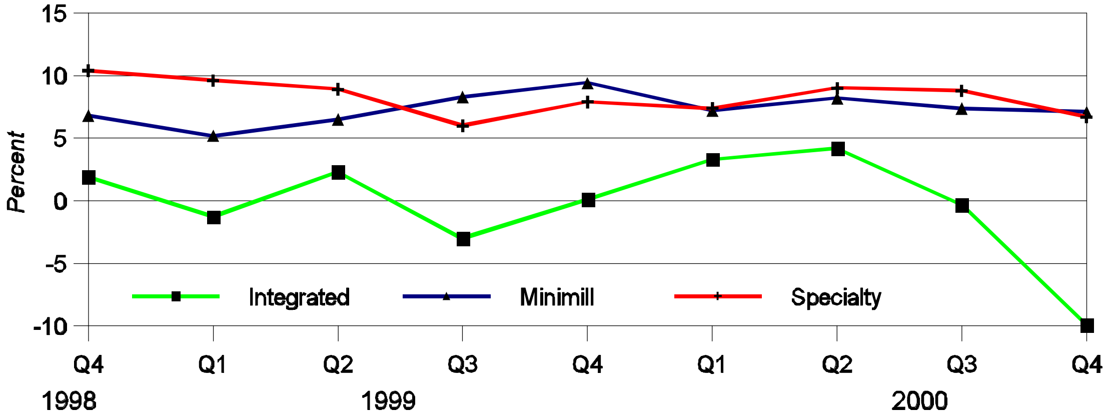
☐ **ALUMINUM** (Karl Tsuji, 202-205-3434/tsuji@usitc.gov)
☐ **FLAT GLASS** (James Lukes, 202-205-3426/lukes@usitc.gov)
☐ **SERVICES** (Tsedale Assefa, 202-205-2374/assefa@usitc.gov)
☐ **NORTH AMERICAN TRADE** (Ruben Mata, 202-205-3403/mata@usitc.gov)

STEEL

Figure A-1
Steel industry's profitability turns down as the U.S. economy slows in fourth quarter 2000



[1] Operating profit as a percent of sales. Integrated group contains 9 firms. Minimill group contains 8 firms. Specialty group contains 4 firms.

Source: Individual company financial statements.

- The U.S. steel industry's fourth quarter 2000 profit margins were adversely affected by declining order volumes, as economic activity slowed; falling steel prices to the lowest levels in 2 decades (which companies attributed to high domestic inventories and import competition); and escalating energy costs. Operating losses of integrated producers were particularly affected, as steelmaking was scaled-back below efficient production levels.
- The latest steel mill products firms to file for Chapter 11 bankruptcy protection include CSC, a specialty steel bar producer (January); Heartland Steel, a cold-rolling operation (January); and GS Industries, a producer of wire rod and grinding media (February). Nine other steel producers are currently operating under federal bankruptcy protection. Trico, a hot-rolled sheet producer, announced (March) plans to file for bankruptcy protection.
- Laclede emerged from 2 years of Chapter 11 bankruptcy (January) after securing a new revolving credit and term-loan program. Qualitech's special-bar quality operations were closed down in February, as its owners were unwilling to provide further financial backing, after the firms was previously (October) denied additional government-guaranteed loans for mill upgrades.
- Nucor signed a purchase agreement (March) for Auburn Steel's production facilities in Auburn, NY, to supply Nucor's Vulcraft joist mill in Chemung, NY, as part of its strategy to expand capacity in markets with a history of solid returns. Auburn's other bar mill in Lemont, IL, was closed down in February.

Table A-1
Slightly less semifinished (ingots, blooms, billets, and slabs) but more finished steel imported in 2000 compared with 1999

Item	Q4 2000	Percentage change, Q4 2000 from Q4 1999[1]	YTD 2000	Percentage change, YTD 2000 from YTD 1999[1]
Producers' shipments *(1,000 short tons)*	24,902	-9.2	108,702	4.6
Finished imports *(1,000 short tons)*	6,013	-12.2	29,401	8.3
Ingots, blooms, billets, and slabs *(1,000 short tons)*	1,471	-38.4	8,556	-0.3
Exports *(1,000 short tons)*	1,610	-0.2	6,529	20.3
Apparent supply, finished *(1,000 short tons)*	29,305	-10.3	131,574	4.7
Ratio of finished imports to apparent supply *(percent)*	20.5	[2]-0.4	22.3	[2]0.7

[1] Based on unrounded numbers.
[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
Continued decline in shipments, inventory shifts mixed for service centers

Item	Sept. 2000	Dec. 2000	Percentage change, Dec. 2000 from Sept. 2000[1]	Q4 1999	Q4 2000
Shipments *(1,000 short tons)*	2,327	1,882	-19.1	7,229	6,601
Ending inventories *(1,000 short tons)*	8,954	8,557	-4.4	8,443	8,557
Inventories on hand *(months)*	3.7	3.9	([2])	3.8	3.9

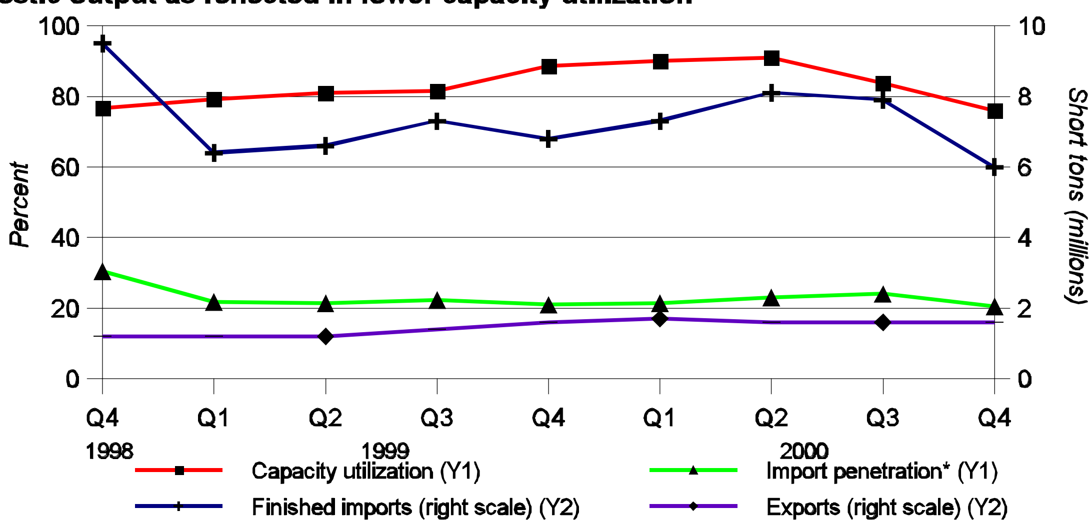
[1] Based on unrounded numbers.
[2] Not applicable.

Source: Steel Service Center Institute.

- According to the Steel Service Center Institute (SSCI), service centers shipped a total of 29.6 million tons of finished steel products in 2000, despite declining shipments for a third consecutive quarter. The 2000 shipment level was just above the 29.4 million tons shipped in 1999 and just short of the record 29.8 million tons shipped in 1998. Inventories at service centers declined from the previous quarter's record-setting level, although roughly

  65 percent of surveyed SSCI members indicated that current inventories were still too high compared to current shipment volumes.
- During the final quarter of 2000, import penetration of finished products fell, as lower imports of both semifinished and finished steel products overshadowed reductions in shipments and lower capacity utilization by domestic producers. However, the amount of finished products imported during full-year 2000 exceeded the previous year's total by nearly 2.3 million short tons (8.3 percent higher).
- According to the American Institute for International Steel (AIIS) March 2001 survey, a majority of AIIS member steel-importing companies in nearly every product group responded that their import levels would remain the same in the next 3-5 months, based on orders currently being placed. However, imports of semifinished steel and merchant bar were expected to be up in the next 3-5 months, according to a majority of surveyed AIIS members.

Figure A-2
Steel mill products, all grades: Imports and penetration down, despite lower domestic output as reflected in lower capacity utilization



* Finished import share of apparent open market supply.

Source: American Iron and Steel Institute.

AUTOMOBILES

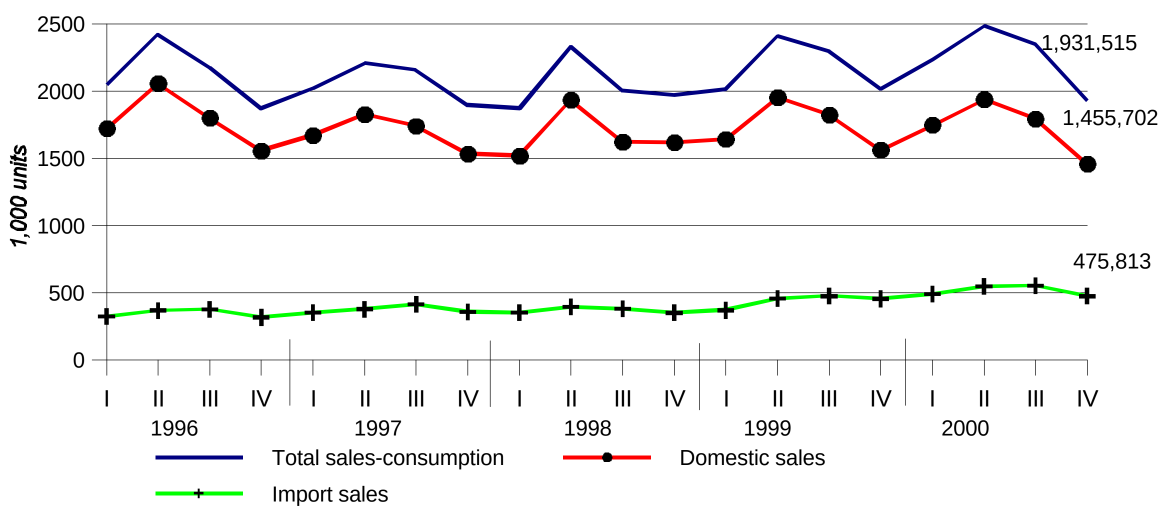
Table A-3
U.S. sales of new automobiles, domestic and imported, and share of U.S. market accounted for by sales of total imports and Japanese imports, by specified periods, January 1999-December 2000

Item	Oct.-Dec. 2000	Jan.-Dec. 2000	Percentage change: Oct.-Dec. 2000 from Jul.-Sep. 2000	Percentage change: Jan.-Dec. 2000 from Jan.-Dec. 1999
U.S. sales of domestic autos (*1,000 units*)[1]	1,456	6,937	-18.9	-0.7
U.S. sales of imported autos (*1,000 units*)[2]	476	2,069	-14.0	17.4
Total U.S. sales (*1,000 units*)[1, 2]	1,932	9,006	-17.7	2.9
Ratio of U.S. sales of imported autos to total U.S. sales (*percent*)[1, 2]	24.6	23.0	4.6	14.1
U.S. sales of Japanese imports as a share of the total U.S. market (*percent*)[1, 2]	11.0	10.5	0.6	9.8

[1] Domestic automobile sales include U.S.-, Canadian-, and Mexican-built automobiles sold in the United States.
[2] Imports do not include automobiles imported from Canada and Mexico.

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

Figure A-3
U.S. sales of new passenger automobiles decrease in fourth quarter 2000; sales of imports as a percentage of the U.S. market increase from previous quarter

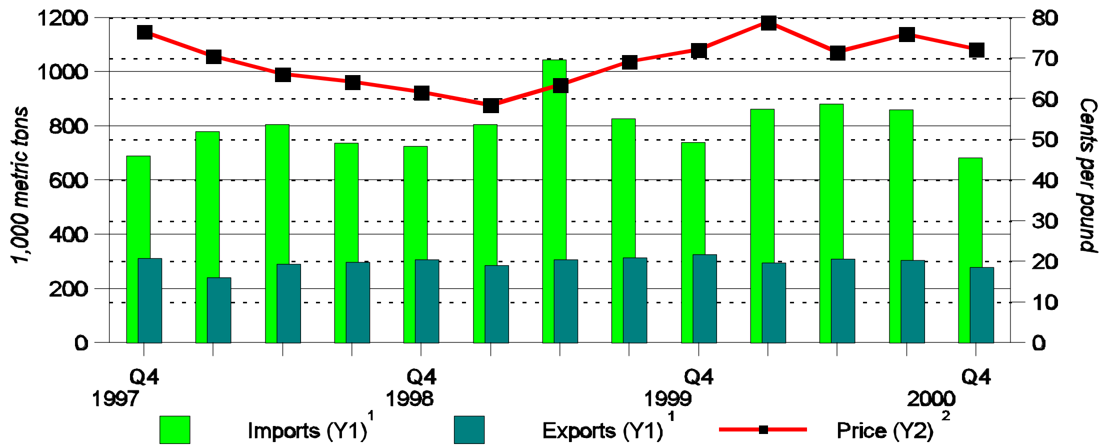


Note.–Domestic automobile sales include U.S.-, Canadian-, and Mexican-built automobiles sold in the United States; these same units are not included in import sales.

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

ALUMINUM

Figure A-4
U.S. aluminum prices and trade flows slip in fourth quarter 2000



[1] Crude forms (metals and alloys) and mill products (e.g., plates, sheets, and bars) for consumption.
[2] Quarterly average of the monthly U.S. market price of primary aluminum ingots.

Source: U.S. Geological Survey.

- Dampened demand due to slower economic growth in fourth quarter 2000, particularly in the United States, overshadowed concerns about exceptionally low inventory levels and producer cutbacks, as the quarterly price of primary aluminum fell by 3.7 cents per pound. Continued drawdown over the past 2 years has reduced London Metal Exchange inventories to the lowest levels since first quarter 1991.
- In the United States, as the manufacturing sector weakened in the second half of the year, shipments of unwrought aluminum and aluminum mill products dropped to 4-year lows by year's end. Moreover, high electricity prices encouraged Pacific Northwest smelters to cutback production and sell-off electricity allotments. By the end of 2000, almost two-thirds (just over 1 million metric tons) of the region's primary smelting capacity had been idled.
- Kaiser Aluminum Corp. idled the last of its U.S. smelting capacity by mid-December. Resales of electricity ($103.2 million net gain) provided Kaiser with a profitable fourth quarter 2000, by offsetting $14.5 million in net operating losses. However, following the late-September settlement of a 2-year labor dispute, organized labor began a campaign in February 2001 to seek a share of the sales proceeds.

Table A-4
Lower import penetration in fourth quarter 2000 for U.S. aluminum, as production cutbacks were overshadowed by declining import levels and continued drawdown of inventories

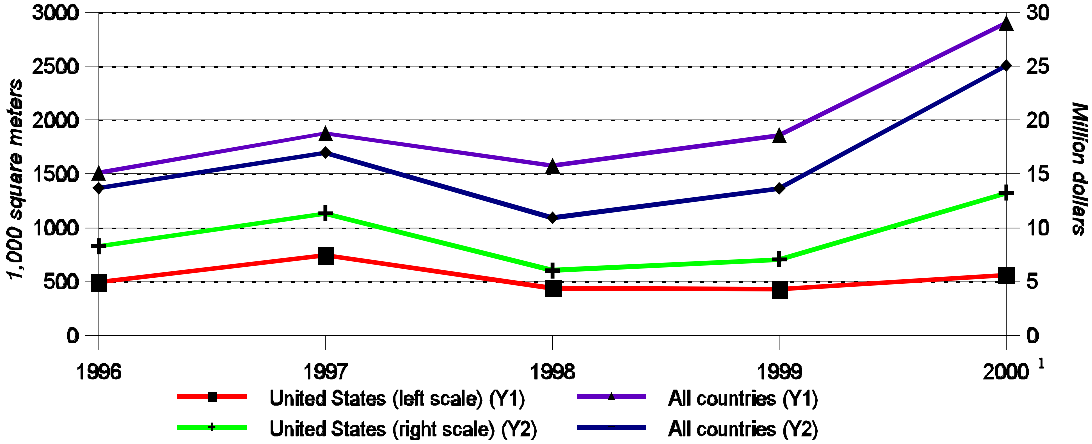
				Percentage change	
Item	Q4 1999	Q3 2000	Q4 2000	Q4 2000 from Q4 1999	Q4 2000 from Q3 2000
Primary production (*1,000 metric tons*)	967	883	880	-9.0	-0.3
Secondary recovery (*1,000 metric tons*)	867r	875r	765	-11.8	-12.6
Imports (*1,000 metric tons*)	739	859	682	-7.7	-20.6
Import penetration (*percent*)[1]	33.0	36.6r	32.7	[2]-0.3	[2]-3.9
Exports (*1,000 metric tons*)	324	303	277	-14.5	-8.6
Average nominal price (*¢/lb*)	72.0	75.9	72.2	0.3	-4.9
LME inventory level (*1,000 metric tons*)	775	361	322	-58.5	-10.8

[1] Calculations based on unrounded data
[2] 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.

FLAT GLASS

Figure A-5
Japanese imports increase from all sources



[1]Data for 2000 include Jan.-Nov. (lastest available data).

Source: Average monthly Japanese imports of flat glass compiled from official statistics of the Ministry of Trade and Industry, Japan.

Background

- The U.S.-Japanese agreement on Japanese market access for imports of flat glass sought to increase access and sales of foreign flat glass in Japan through such means as increased adoption of nondiscriminatory standards and expanded promotion of safety and insulating glass. The agreement covered the 1995-99 period and expired on December 31, 1999.[1] Although Japanese demand for imported glass improved in 1999, the U.S. share of the Japanese market declined as the quantity of imports from the United States fell by 2 percent.

Current

- Japanese demand for imported glass has continued to improve in 2000 (year-to-date). The average monthly quantity of Japanese imports from all countries increased by 56 percent during 2000 to 2.9 million square meters, while the average monthly value of such imports increased by 84 percent to $25.1 million. However, while imports from the United States increased by 30 percent to 561,000 square meters and by 87 percent to $13.3 million, respectively, the U.S. share of the market has declined; imports from the United States lost market share to less expensive imports from China, Thailand, Korea, China, Indonesia, and Malaysia.

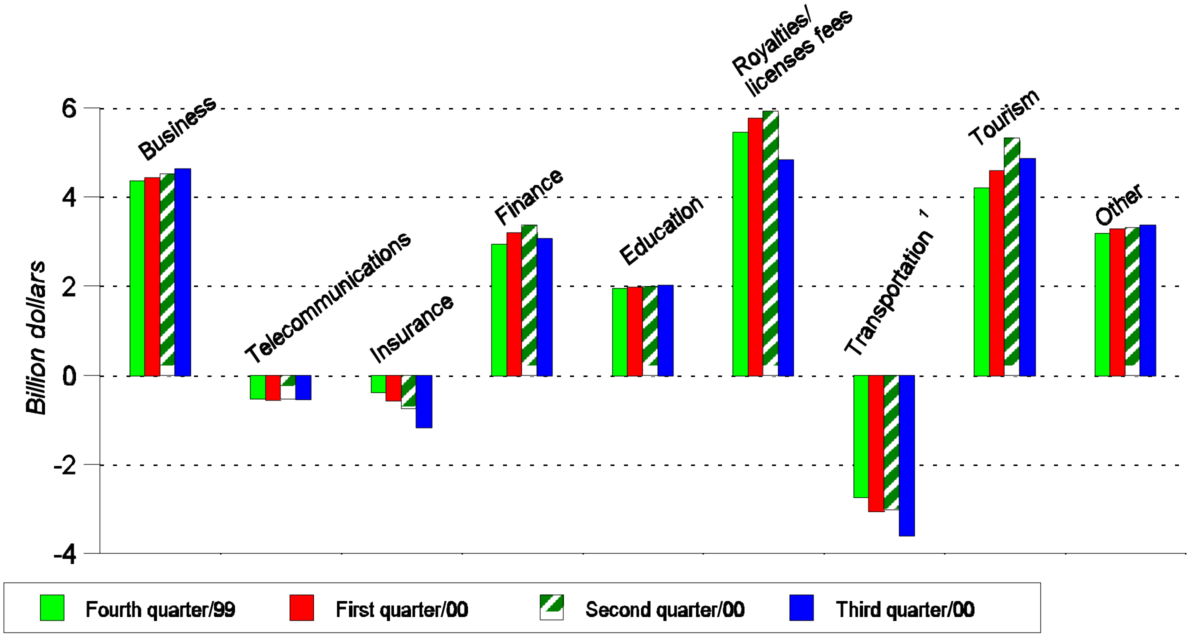
- There has been no indication that the Japanese Government has moderated its opposition to a renewal of the flat glass agreement. The United States has urged the Ministry of International Trade and Industry and the Japan Fair Trade Commission (JFTC) to actively take additional steps to monitor and promote competition in the flat glass sector and to prevent discriminatory barriers in the distribution system; and has called on the JFTC to examine the extent and form of financial interrelationships linking manufacturers and distributors.[2]

[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/2000/index.html* on Mar. 3, 2000.

[2] U.S. 2000 deregulation submission under the Enhanced Initiative, as reported in USTR "The President's 2000 Annual Report on the Trade Agreements Program," pp. 167-168, located at *www.ustr.gov/reports/2001.html*.

SERVICES

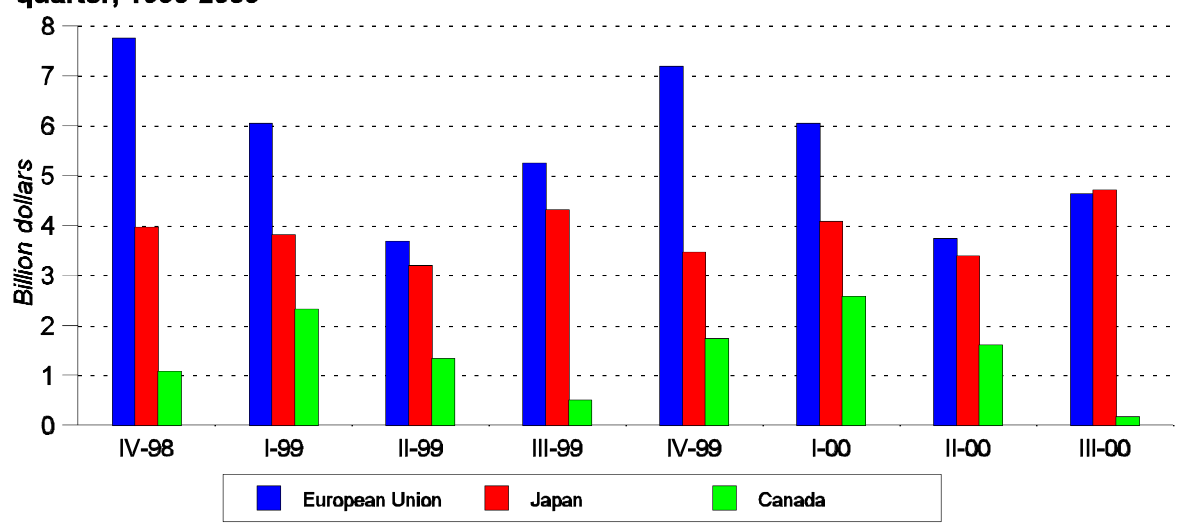
Figure A-6
Balance on U.S. service trade accounts, by quarter, 1999-2000



[1] Includes port fees.

Source: Bureau of Economic Analysis, *Survey of Current Business*, Jan. 2000, p. 61.

Figure A-7
Surpluses on cross-border U.S. services transactions with selected trading partners, by quarter, 1998-2000[1]



[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*, Jan. 2000, pp. 112-115; Apr. 2000, pp. 186-189; July 2000, pp. 116-119; Oct. 2000, pp. 112-115; Jan. 2001, pp. 68-71.

North American Trade

U.S. trade with its North American partners, and the use of U.S.-made components in Mexican assembly plants based on imports under the production-sharing tariff provisions of HTS chapter 98, are highlighted in table A-5. The following is a summary of key developments during 2000.

- As total 2000 U.S. trade with its NAFTA partners ($619 billion) increased by 16 percent ($84 billion) over 1999 levels, the U.S. merchandise trade deficit with Canada (-$73.5 billion) and Mexico (-$34.3 billion) together, expanded by 34 percent; and accounted for 22 percent of the U.S. merchandise trade deficit with all countries (-$493.1 billion). These trends reflect sustained demand for imported merchandise given the strong U.S. economy through the first 3 quarters of the year, and a sustained strong dollar contributing to weaker foreign demand for U.S. exports. The rate of increase in the trade deficit decelerated in the fourth quarter as real U.S. GDP growth slowed to 1 percent (on an annual basis) compared with 8.3 percent in the fourth quarter of 1999.

- Relatively high world petroleum prices contributed to the growth in the U.S. trade deficits with Canada and Mexico in 2000, as the average price per barrel increased from $17 in 1999 to $28 in 2000. Canada supplied 13 percent of total U.S. imports of crude petroleum in 2000 and 18 percent of U.S. imports of petroleum products. Mexico supplied 13 percent of the crude petroleum and 2 percent of the petroleum products. The rise in the value of crude petroleum imported from Mexico ($4.6 billion) accounted for 63 percent of the increase in the U.S. trade deficit with Mexico in 2000. For trade with Canada, the rise in crude petroleum imports ($6.1 billion) accounted for 29 percent of the deficit expansion.

- The increased integration of the North American economy, including cross-border rationalization of production, has contributed to the growth in the U.S. trade deficit with its NAFTA partners. Typically, capital-intensive parts and materials are exported from the United States to Canada and Mexico whereas more labor-intensive operations are performed in Mexico (and, to some extent, Canada where labor costs for manufacturing workers were 19 percent lower than U.S. costs in 1999 according to BLS). The value added to U.S.-origin parts and materials through foreign assembly and finishing operations amplifies the U.S. merchandise trade deficit.

- U.S. exports to Mexico rose by 23 percent ($19.1 billion) in 2000 compared with a 7 percent ($9.9 billion) increase in exports to Canada. Exports benefitted from continued foreign investment in Mexico’s export processing (maquiladora) industry, which created additional demand for U.S. capital goods and components, and a 7 percent GDP growth in Mexico that spurred U.S. exports of consumer and business-oriented technology products. Categories with the largest increases in exports to Mexico in 2000 were petroleum products and plastics; motor vehicles and parts; computers and telecommunications equipment; semiconductors and other integrated circuit apparatus; and fabrics. Top export increases to Canada were in semifabricated copper articles, computers, semiconductors, and telephone equipment.

- U.S. imports from Mexico rose by 24 percent ($25.7 billion) in 2000 whereas imports from Canada were up by 16 percent ($29.8 billion). Leading the growth in imports from Mexico were motor vehicles and parts; petroleum; apparel; and telephone, computer, and radio and television broadcast equipment. Top import increases from Canada were in crude petroleum, petroleum products, natural gas, and electrical energy; telephone equipment; aircraft; furniture; wood pulp; optical goods; computers; and precious metals.

NORTH AMERICAN TRADE

Table A-5
North American trade, 1995-2000

Item	1995	1996	1997	1998	1999	2000	Percent change 1999/00
	--------------------Value *(million dollars)*-----------------------------						
U.S.-Mexico trade:							
Total imports from Mexico	61,721	74,179	85,005	93,017	109,018	134,734	24
U.S. imports under production-sharing provisions (PSP) of HTS Chapter 98:[1]							
Total value	24,962	27,925	28,883	27,162	25,875	19,430	-25
Percent of total imports	40	38	34	29	24	14	-
U.S. components in HTS PSP imports:							
Total value	12,833	14,649	15,483	14,484	13,928	10,271	-26
Percent of HTS PSP imports	51	52	54	53	54	53	-
Percent of total imports	21	20	18	16	13	8	-
U.S. imports under NAFTA:[2]							
Total value	43,927	55,076	62,837	68,326	71,318	83,995	18
Percent of total imports	71	74	74	73	65	62	-
Total exports to Mexico	44,881	54,686	68,393	75,369	81,381	100,442	23
U.S. exports of components[3] to HTS Chapter 98 production-sharing operations as a percent of total U.S. exports	29	27	23	19	17	10	-
U.S. merchandise trade balance with Mexico[4]	-16,840	-19,493	-16,612	-17,648	-27,637	-34,292	-24
U.S.-Canada trade:							
Total imports from Canada	144,882	156,299	167,881	174,685	198,242	228,060	16
Total exports to Canada	113,261	119,123	134,794	137,768	145,731	155,601	7
U.S. merchandise trade balance with Canada[5]	-31,621	-37,176	-33,087	-36,918	-52,511	-73,459	-40

[1]The production-sharing provisions of HTS Chapter 98 are 9802.00.60, 9802.00.80, and 9802.00.90.
[2]Some import entries from Mexico declare eligibility for preferential tariff treatment under both NAFTA and the HTS production-sharing provisions (PSP); such entries are reported in the totals for both imports under HTS PSP (and U.S.-made components in HTS PSP imports) as well as imports under NAFTA.
[3]Represents the total value of U.S. components in HTS production-sharing provision imports.
[4]The hyphen (-) symbol indicates a loss or trade deficit, or not applicable. The $27.6 billion deficit in U.S. merchandise trade with Mexico in 1999 was partially offset by a $2.6 billion U.S. surplus in bilateral services trade. (2000 data for services trade with Mexico will be available by July 15, 2000)
[5]The $52.5 billion deficit in U.S. merchandise trade with Canada in 1999 was partially offset by a $5.8 billion U.S. surplus in bilateral services trade. (2000 data for services trade with Canada will be available April 15, 2000)

Source: Compiled by U.S. International Trade Commission staff from official statistics of the U.S. Department of Commerce. Statistics in footnote 4 on U.S. services trade with Mexico are based on preliminary data provided in U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, July 2000, Vol. 80, No.7.