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International Trade Commission

# INDUSTRY TRADE AND TECHNOLOGY REVIEW

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# PREFACE

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# Evidence of Trade, Income, and Employment Effects of NAFTA

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*Although U.S.-Mexico trade has tripled in nominal terms since the introduction of the North American Free Trade Agreement (NAFTA) in 1994, only a part of this growth can be attributed directly to the actual provisions of the agreement, such as its tariff reductions. The effects of NAFTA on U.S. gross domestic product (GDP) have likely been small, but positive. For instance, the effect on employment shows that trade policy in general, and NAFTA in particular, tends to move jobs between sectors rather than to create or destroy jobs in the aggregate. The impact on workers in some sectors has been relatively greater than on those in others, but the experience of workers displaced due to NAFTA has likely been similar to that of workers displaced for reasons unrelated to trade. This article examines some factors affecting the increase in U.S.-Mexico trade, provides perspectives on the income and employment effects of NAFTA on the U.S. economy, and summarizes the principal findings of existing evidence regarding the influence of NAFTA on U.S. economic activity.*

On balance and to date, the effects of NAFTA on the U.S. economy have been relatively small.[2] These effects have included increases in overall U.S. income and increases in U.S. trade with Mexico,[3] but little impact on overall levels of unemployment although with some displacement of workers from sector to sector. For particular industries or products with a greater exposure to U.S.-Mexico trade, effects are likely to have been correspondingly greater, including displacement effects on individual workers.

The reason for small effects in the aggregate is not hard to understand. Total U.S. merchandise exports to, and imports from, Mexico amounted to 1.01 percent and 1.35 percent of U.S. GDP, respectively, in 2000. NAFTA removed tariffs on this trade that averaged

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

[2] The full effects of tariff reductions under NAFTA are to be experienced in the future as tariff elimination under the agreement is proceeding on a phased basis. Duties on goods accounting for 54 percent of U.S. imports from Mexico in 1992 were eliminated immediately in 1994, and another 14 percent of U.S. imports from Mexico were already permanently free of duty in 1992, duties on goods accounting for 24 percent of U.S. imports from Mexico are scheduled for elimination effective January 1, 2003, and January 1, 2008.

[3] This article focuses on the effects of increased U.S. trade with Mexico that may be attributed to NAFTA. Since nearly all tariffs on products traded between the United States and Canada were reduced to zero under the U.S.-Canada Free-Trade Agreement by the time of the entry into force of NAFTA, increases in U.S.-Canada trade since 1994 cannot be attributed to NAFTA.

approximately 2.1 percent for U.S. imports from Mexico in 1993[4] and approximately 7 percent on Mexico's imports from the United States.[5] Duties for U.S.-Canada trade had already been scheduled for elimination prior to NAFTA under the Canada-U.S. Free-Trade Agreement of 1987. Even if a percentage-point reduction of 1 percent in the tariff rate leads to an expansion of trade of several percent, the overall increase in exports and imports induced by NAFTA cannot be large, relative to the size of the U.S. economy.[6] Any effects of NAFTA on U.S. incomes or employment are consequences of its effects on exports and imports.

The analytical challenges confronting assessments of NAFTA effects done prior to the 1994 agreement implementation were different from those done after implementation. The most rigorous quantitative analyses of NAFTA effects done prior to 1994 tended to focus solely on tariff changes. Other provisions of NAFTA, such as rules of origin, investment rules, and dispute settlement, are more difficult to quantify. These studies provided estimates of "long-run" effects of these tariff changes, i.e., the cumulative effect of NAFTA having worked its way through the U.S. economy. They were not intended to provide forecasts of changes in the U.S. or Mexican economies arising from other factors, such as currency fluctuations, business cycles, productivity gains, or other policy changes.[7] After NAFTA implementation, and as a result of a Congressional mandate to the President for a comprehensive study of the agreement, the U.S. International Trade Commission (USITC) attempted, in part, to assess NAFTA effects based on statistical analysis of data from pre- and post-NAFTA periods.[8] These analyses are affected by the inherent difficulty in separating the "signal" of NAFTA effects from the "noise" of the other economic factors influencing the U.S. and Mexican economies in the post-NAFTA period.

# Trade Effects

Since 1993 (the last pre-NAFTA year), U.S. trade with Mexico has approximately tripled in nominal terms (not adjusted for inflation). U.S. exports to and imports from Mexico have increased at 14.0 percent and 19.5 percent per year, respectively, substantially exceeding

[4] The reported average tariff on Mexico's exports to the United States is the ratio of calculated duties collected to the customs-value of U.S. imports from Mexico for 1993. This tariff rate was already significantly lower than the then-prevailing most favored nation (MFN) tariff rate of approximately 4.6 percent, because approximately three-quarters of U.S. imports from Mexico received reduced or free duties under the Generalized System of Preferences program or production-sharing provision 9802.00.80 of the Harmonized Tariff Schedule of the United States.

[5] The average rate on U.S. exports to Mexico is from USITC staff calculations for a 1993 investigation into potential NAFTA effects. It is also lower than the comparable MFN rate of 13 percent for Mexican imports due to the Maquiladora and PITEX programs which had already been implemented prior to NAFTA.

[6] For example, if each percentage point cut in the tariff leads to as much as a 3-percent increase in imports, then the total increase in U.S. imports from Mexico induced by NAFTA tariff cuts would be on the order of (3)*(0.021)*(1.35) = approximately 0.09 percent of U.S. GDP.

[7] See USITC, *Economy-Wide Modeling of the Economic Implications of a FTA with Mexico and a NAFTA with Canada and Mexico: Addendum to the Report on Investigation No. 332-217 Under Section 332 of the Tariff Act of 1930*, USITC publication 2508, May 1992. This study was an invited symposium of modelers from a variety of institutions and backgrounds.

[8] USITC, *The Impact of the North American Free Trade Agreement on the U.S. Economy and Industries: A Three-Year Review*, USITC publication 3045, June 1997.

growth in U.S. trade with the world of 7.1 percent for exports and 11.2 percent for imports. Thus, the share of U.S.-Mexico trade in overall U.S. trade has increased from 7.8 percent to 12.2 percent since implementation of NAFTA. Whereas a significant part of this increase in trade is likely attributable to non-NAFTA factors, such as economic growth in the United States and Mexico and the devaluation of the Mexican peso in 1995, some part is also attributable to NAFTA. Prior to NAFTA ratification, economic models of the "pure NAFTA effect" on trade estimated that in the long run, the cumulative increase in U.S. exports to Mexico would be on the order of 1 to 32 percent in real (inflation adjusted) terms, with U.S. imports from Mexico growing between 2 and 17 percent.[9] In 1997, pursuant to a Congressional mandate for a 3-year Presidential review of NAFTA, the USITC estimated that during 1994-96, annual U.S.-Mexico imports and exports were from 1 to 7 percent higher than in the absence of NAFTA, after taking into account changes in incomes, relative prices, and exchange rates.[10] These findings suggest that non-NAFTA factors have contributed to the increase in U.S.-Mexico trade subsequent to the introduction of NAFTA, particularly economic growth in the United States and Mexico.

However, the NAFTA may have contributed to an improved general business climate in North America. Publicity associated with NAFTA may have been an important, though difficult to quantify, factor in expanding U.S.-Mexico trade. Numerous witnesses at the hearings for the USITC 3-year review of NAFTA testified that the NAFTA agreement had resulted in U.S. companies paying more attention to business opportunities within North America; for instance, "New treaty partners and new trade partners tend to go out of their way to do business with each other."[11] An example of the improvement in business climate is the way anticipation of NAFTA led to increased inbound FDI in Mexico.

NAFTA was negotiated as U.S. manufacturers were intensifying efforts to become more globally competitive, especially in response to increased import competition from Asia. To reduce their costs and maintain market share, U.S. producers rationalized their production facilities throughout North America. Reduction in trade barriers in both goods and services was essential to make effective this strategy of improved efficiencies through cross-border integration.[12] Mexico needed to attract foreign direct investment (FDI) and to eliminate protection of inefficient industries in order to modernize its manufacturing sector and promote economic development.

A series of trade and investment reforms undertaken by the de la Madrid and Salinas de Gortari administrations in the 1980's to reassure foreigners that future investments in Mexico

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[9] USITC, *Economy-Wide Modeling of the Economic Implications of a FTA with Mexico and a NAFTA with Canada and Mexico*, chapters 1, 2, 8, 9 and 10.

[10] USITC, *The Impact of the North American Free Trade Agreement on the U.S. Economy and Industries*, pp. xviii and 4-14.

[11] Testimony before the USITC by Richard J. Heckmann, President and CEO of U.S. Filter Corporation, May 15, 1997 as reported in Ibid, p. xviii and Appendix D.

[12] For additional information on the integration of manufacturing industries in North America, see Deborah McNay and Laura Polly, "Mexico's Emergence as a Global Automotive Production Center," *Industry Trade and Technology Review (ITTR)*, USITC publication 3363, Oct. 2000, pp. 19-33; Reuben Mata, "Manufacturing Strategies of the North American Major Household Appliance Industry," *ITTR*, USITC publication 3390, Jan. 2001, pp. 31-45; and Ralph Watkins, "Production-Sharing Update: Developments in 2000," *ITTR*, USITC publication 3443, July 2001, pp. 11-23.

laid the ground work for bilateral negotiations with the United States that would eventually lead to NAFTA.[13] Anticipation that NAFTA would become a reality led companies based in Asia and Europe, as well as in the United States, to establish or expand manufacturing facilities in Mexico. As a result, the pre-NAFTA years exhibited a sharp rise in FDI in Mexico, leading to the rising value of the peso relative to the U.S. dollar and increasing Mexican labor costs.

# Income Effects

Estimates of the effects of NAFTA on aggregate incomes, or GDP, have generally suggested small but positive effects. Modeling exercises prior to NAFTA suggested that the long-run gain in GDP attributable to NAFTA for the United States would be from negligible to 0.5 percent of GDP, with potential gains for Mexico from 0.1 to 11.4 percent of GDP.[14] Since U.S. GDP currently exceeds $10 trillion, this implies that NAFTA income gains may be sizable but are simply small relative to the U.S. economy because of the relative size of U.S.-Mexico trade. Post-NAFTA attempts by the USITC to identify an impact of NAFTA on U.S. GDP through statistical analysis of data through 1996 estimated negligible effects, due in part to the difficulty of sorting out the NAFTA effect from other events occurring in the post-NAFTA years.[15] Given the above-noted difficulties of identifying small NAFTA effects in historical data subject to a variety of shocks, the finding of negligible effects on U.S. GDP in such data is broadly consistent with the pre-NAFTA estimates of relatively small GDP effects.

# Employment Effects -- Economywide Estimates for NAFTA

Several studies have generated estimates of U.S. job "gains" and "losses" due to NAFTA, either for the United States as a whole, by State, or by industry. The most extreme estimates of job gains or losses due to NAFTA are on the order of hundreds of thousands of jobs. One recent report estimates actual and potential job losses due to NAFTA as 766,000 since 1994.[16] A useful benchmark for comparison is the number of new unemployment insurance claims in the United States, which run from 300,000 to 400,000 per week. Thus, the highest available estimates of NAFTA job loss attribute no more than 0.5 percent of U.S. layoffs to NAFTA.[17]

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[13] See USITC, *Review of Trade and Investment Liberalization Measures by Mexico and Prospects for Future United States Mexico Relations–Phase I: Recent Trade and Investment Reforms Undertaken by Mexico and Implications for the United States*, Investigation No. 332-282, USITC publication 2275, Apr. 1990.

[14] USITC, *Economy-Wide Modeling of the Economic Implications of a FTA with Mexico and a NAFTA with Canada and Mexico*, pp. vi and 6-15.

[15] USITC, The Impact of the North American Free Trade Agreement on the U.S. Economy and Industries, p. xxi and app. C.

[16] This estimate will be discussed in more detail in the section on Employment Effects -- Estimates Linked to Trade Deficits.

[17] As of August 30, 2001, NAFTA has been in existence for about 400 weeks, and the estimate of 766,000 jobs lost amounts to 2 weeks' worth of new unemployment insurance claims. Thus, 2/400 = 0.5 percent of layoffs corresponding to the highest available claims regarding NAFTA

(continued...)

On an economywide basis, job "creation" or "destruction" of this magnitude is relatively small compared to the amount of fluctuation in employment levels over the business cycle. The box illustrates this situation in a metaphor by one noted economist.

**An Illustration of the Likely Effect of NAFTA on the Average Level of Employment Over the Next Decade (Krugman)[1]**

"Think of the U.S. economy over the next decade as an automobile driving from Boston to New York. Let the average speed of the automobile over the route represent the average level of employment over the decade. And let the dispute over the direct employment effects of NAFTA be represented as an argument over whether there will be a head wind or a tail wind as the car makes its way along the interstate. Then assessing NAFTA's overall job impact is like predicting how the extra wind will affect the car's speed. Job-counting exercises do this by assuming that nothing else changes--in effect, they assume that the engine in our car will receive exactly the same flow of gas that it would have been given in the absence of any wind."

"Nobody would think that this was a sensible procedure for predicting automobile speed. After all, cars have drivers, and drivers are not passive...A five-mile-per-hour head wind or tail wind will not change (my) average speed; I will simply offset the wind by changing the pressure on my gas pedal."

"The U.S. economy also has a driver: the Federal Reserve..(Its) choice(s) ha(ve) a far more powerful impact on the unemployment rate than any trade policy. The Fed often miscalculates and ends up with more inflation or less employment than it wanted, but right or wrong the Fed's actions are the most powerful determinant of job growth in America."

"Suppose that NAFTA really does..reduce U.S. employment by 500,000 over the next ten years. Will other things actually be the same? Of course not. The Fed, faced with the prospect of a weaker economy, will set interest rates lower than it otherwise would have. Conversely..if NAFTA would add half a million jobs, interest rates would be higher. The Fed will, without doubt, miss the target - but it is as likely to overshoot as to undershoot, and over the course of a decade there is no reason to suppose that the average level of employment will be any different with NAFTA than without."

[1] The views expressed in this illustration summarize those of Paul Krugman, Economist, Princeton University, and are not the views of the U.S. International Trade Commission as a whole or of any individual Commissioner.

Source: Paul Krugman, "The Uncomfortable Truth About NAFTA," *Foreign Affairs*, November/December 1993, pp. 13-19, reprinted in Paul Krugman, *Pop Internationalism* (Cambridge, MA: MIT Press, 1996), pp. 155-165.

USITC statistical analysis of 120 disaggregated industries[18] identified positive or negative NAFTA effects on either employment (as measured by hours worked) or wages for 20 of these industries, accounting for approximately 3 percent of the total labor force and 17 percent of

[17] (...continued)
job loss. This is an upper bound, as it assumes that "actual and potential" job losses are actual, and that all laid-off workers file for unemployment insurance.

[18] USITC, *The Impact of the North American Free Trade Agreement on the U.S. Economy and Industries*, pp. 4-14 to 4-20.

the manufacturing labor force. These effects operated in both positive and negative directions, and were generally on the order of negligible to 15 percent in absolute magnitude.

# Employment Effects of Trade Liberalization -- An Upper Bound

Another USITC study[19] takes into account the fact that unemployed workers eventually are re-employed in other sectors, and accounts for pro-employment effects of cheaper imports. As an example of such effects, lower prices of imported inputs into domestically produced goods increase demand for these goods, as well as for U.S. labor to produce those goods. This study showed that a unilateral repeal of all U.S. import restraints (a more radical policy measure than NAFTA; effectively, free trade) shows approximately 135,000 U.S. workers moving from one sector to another in the long run, primarily out of the textile and apparel sectors and into other manufacturing sectors, wholesale and retail trade, and other services sectors.[20] Since NAFTA represents a smaller trade liberalization than the one modeled above, the implied effects on labor markets would be correspondingly smaller.

The methods used in the above-referenced study did not generate estimates of the time it would take for 135,000 workers displaced by trade liberalization to find new jobs, or of the quality of the jobs they would obtain upon re-employment. A study of longitudinal data collected by the Employment Security Commission of North Carolina found that workers laid off by textile and apparel firms were rehired approximately as quickly as workers in other industries, and were generally paid higher wages in their new jobs.[21] The data used in this study covered the experiences of approximately 35,000 workers, including 7,500 textile and apparel workers, who lost their jobs as a result of mass lay-off or plant closings between the third quarter of 1986 and the fourth quarter of 1991 and, if re-employed, found new jobs by the first quarter of 1992. The average duration of unemployment for apparel workers was 2.3 quarters; for textile workers, 2.1 quarters; for workers in other manufacturing sectors, 1.9 quarters; and for non-manufacturing workers, 2.5 quarters. Apparel workers who were re-employed experienced an average 5-percent wage increase if re-employed by the same industry and 34-percent wage increase if employed by other industries. Whereas the data analyzed were collected just prior to NAFTA and the Uruguay Round, they may provide a useful indicator of post-NAFTA labor transition experiences.[22]

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[19] USITC, *The Economic Effects of Significant U.S. Import Restraints: Second Update*, Investigation No. 332-325, USITC publication 3201, May 1999, table ES-2 (p. xix) and USITC staff calculation of worker movements.

[20] This estimate of labor displacement is equal to about 3 or 4 days' worth of new unemployment insurance claims, or about 0.1 percent of total job displacement since the beginning of NAFTA.

[21] Alfred J. Field and Edward M. Graham, "Is There a Special Case for Import Protection for the Textile and Apparel Sectors Based on Labour Adjustment?," *The World Economy*, Mar. 1997, pp. 137-157.

[22] It should be noted that during the years covered by the study (1986-92), national unemployment rates were 7.0 percent in 1986, fell to 5.3 percent in 1989, and rose to 7.5 percent in 1992 as a consequence of the 1990-91 recession. During the post-NAFTA period, unemployment fell from an average of 6.1 percent in 1994 to 4.5 percent at the time of writing in

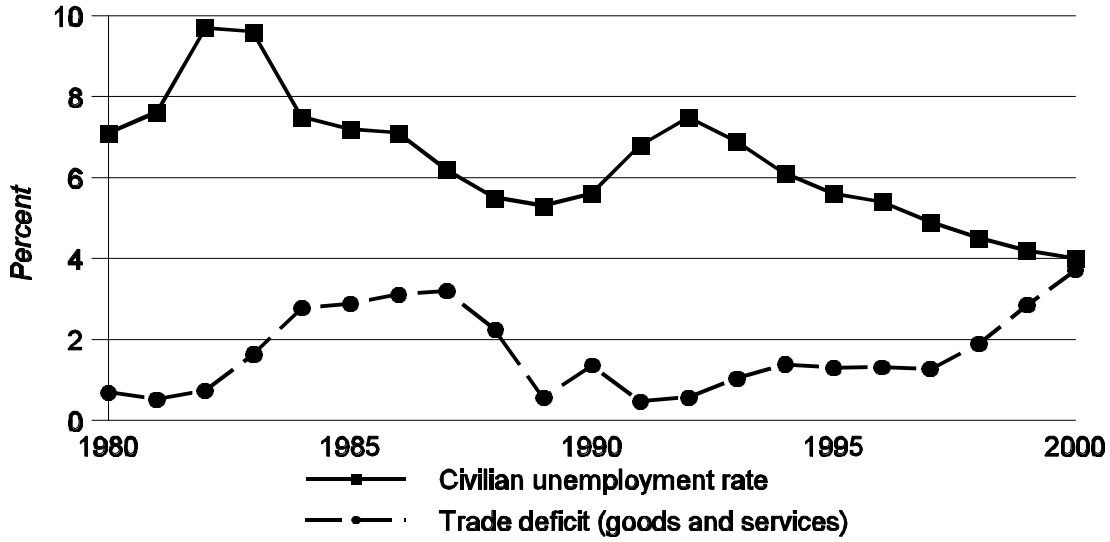
(continued...)

# Employment Effects -- Estimates Linked to the Trade Deficit

The statement that U.S. job creation or destruction is proportional to decreases or increases in the trade balance recurs frequently in the public policy debate. Estimates that $1 billion in exports supports 10,000 to 20,000 jobs, or that an increase in the trade deficit destroys a similar number of jobs, are frequently cited. The above-cited estimate of 766,000 jobs lost due to NAFTA is generated by a more elaborate version of such reasoning, with detailed breakdowns presented by state and industry.[23]

However, such calculations contradict the historical experience of the U.S. economy. In fact, times of high trade deficits have been associated with low unemployment and vice versa (figure 1). The inverse relationship between trade deficits and unemployment is easy to understand. During periods of strong economic growth, the demand for all goods, including imported goods increases, as well as the demand for labor, which reduces unemployment. In contrast, during recessions, such as in 1990-91, import demand falls, the trade deficit declines, and workers are laid off.

**Figure 1**
**U.S. trade deficit (as a percentage of gross domestic product) and civilian unemployment (as a percentage of the civilian labor force)**




Source: Official statistics of the U.S. Department of Commerce, Bureau of Economic Analysis; official statistics of the U.S. Department of Labor, Bureau of Labor Statistics; and USITC staff calculations.

[22] (...continued)
2001. Consequently, spells of unemployment for workers laid off post-NAFTA, regardless of industry, may have been shorter than those found in the above study.

[23] Robert E. Scott, *NAFTA's Hidden Costs,* in Economic Policy Institute, *NAFTA at Seven*, Washington, DC, 2001, p. 3. Scott argues that an increase in the U.S. bilateral trade deficits with Canada and Mexico of $46.2 billion induced 766,030 actual and potential lost jobs, or approximately 18,000 jobs per $1 billion increase in the deficit. USITC staff calculation based on Scott.

In addition, "job-counting" exercises which derive estimates of employment effects from changes in the trade deficit do not take into account potential employment-generating effects of trade liberalization, such as increased consumer demand for all goods (domestic and foreign) due to lower import prices and increased demand for labor by firms which can afford cheaper imported materials, and thus experience greater demand for their product output. These effects are taken into account by many of the above-referenced studies.

# Summary of Findings

- Although U.S.-Mexico trade has tripled in nominal terms since the introduction of NAFTA in 1994, only a part of this growth can be attributed to the actual provisions of the NAFTA, such as tariff reduction. Much of the growth in such trade is due to factors such as growth in the U.S. and Mexican economies. Although hard to quantify, the effect of the NAFTA in promoting U.S.-Mexican business ties may have played a significant role.

- Pre-NAFTA estimates indicated that U.S. GDP gains due to NAFTA would be no more than 0.5 percent. Although these gains represent a significant volume of economic activity, they are small relative to the U.S. economy because U.S.-Mexico trade represents only a small share of U.S. economic activity. The difficulty of finding NAFTA effects in GDP in post-NAFTA data is broadly consistent with the pre-NAFTA estimates.

- The most extreme estimates of job losses due to NAFTA attribute no more than 0.5 percent of U.S. layoffs to NAFTA, and rely on a mechanical and unrealistic linkage between jobs and trade deficits. Trade policy has a relatively smaller impact on overall job gains or losses compared with such factors as monetary and fiscal policy and labor market policies and institutions.

- The effects of trade liberalization in general, and NAFTA in particular, are greater for specific industries and sectors than for the economy as a whole, with changes in employment levels being correspondingly greater. Available evidence indicates that experiences of workers laid off due to trade liberalization may be similar to those of other workers. In the immediate pre-NAFTA period, textile and apparel workers experienced spells of unemployment of approximately equal length as for other workers, as well as wage increases upon re-employment, particularly when re-employment took place in a different industry.**#**

# U.S. Primary Aluminum: Power Costs and Market Conditions Could Cause Long-Term Restructuring

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*U.S. primary aluminum production[2] underwent a sharp decline in the past year, as it was affected by a substantial increase in the cost of electric power in the Pacific Northwest. Although power prices have recently declined, production in the region is unlikely to rebound in the near term given relatively low aluminum prices and declining downstream demand for fabricated aluminum products. Further, the decline in production may portend a longer-term contraction of the U.S. primary aluminum industry. This prospect stems from changes in the contractual agreements between Pacific Northwest aluminum producers and their main electrical provider, the Bonneville Power Administration, and increasing production of foreign primary aluminum, as well as U.S. secondary production. This article examines the current state of the Pacific Northwest aluminum industry, market conditions affecting U.S. production, and the outlook for the U.S. primary aluminum industry.*

U.S. primary aluminum production reached a monthly low of 206,000 metric tons (mt) in September 2001, 37 percent below its 5-year high of 329,000 mt in January 2000 (figure 1), and the lowest level in 33 years. Production of primary aluminum in the United States fell to 2.0 million mt by the third quarter of 2001 compared with 2.8 million mt in the same period of 1999.

Much of the reduction in primary aluminum production has been a result of the cutbacks at smelting facilities in the Pacific Northwest where 10 smelters account for 42 percent of U.S. primary aluminum capacity (table 1). The smelters account for significant employment in the region which, according to one recent study, represents 39,550 jobs or 0.65 percent of regional employment.[3] Although overall employment of these smelters in the Pacific Northwest is small as a percentage of regional employment, smelters are typically located in rural areas and are a significant component of employment.[4] Collectively, these smelters

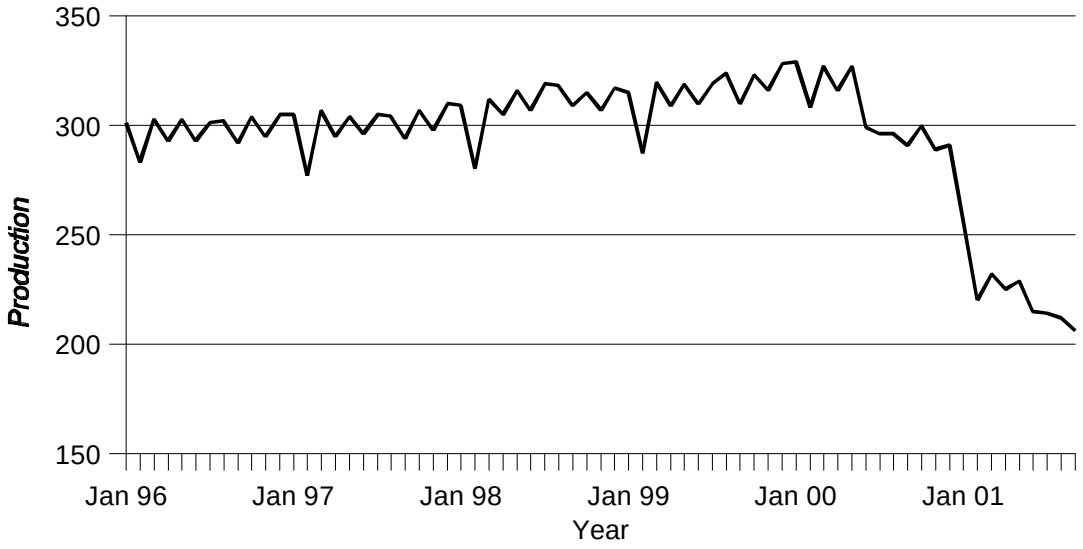
[1] The views expressed in this article are the author's, and are not the views of the U.S. International Trade Commission (USITC) as a whole or of any individual Commissioner.

[2] Primary refers to aluminum smelted from alumina (refined aluminum ore). Secondary refers to aluminum recovered from recycled metal such as aluminum beverage cans, for example.

[3] *Summary of the Aluminum Industry Studies*, Bonneville Power Administration, Feb. 23, 2001, p. 8.

[4] For example, studies estimated that 15 to 20 percent of employment in Klickitat, Washington, is generated by the Goldendale aluminum smelter in the county. Ibid.

**Figure 1**
**Monthly primary aluminum production in the United States**




Source: Official statistics of the U.S. Geological Survey.

**Table 1**
**Structure of U.S. primary aluminum industry**

| Region | Number of smelters | Employment | Capacity | Percentage of capacity |
|---|---|---|---|---|
| | | *1,000* | *1,000 metric tons* | |
| Pacific Northwest[1] | 10 | 7.1 | 1,632 | 42 |
| Rest of United States[2] | 13 | 9.9 | 2,266 | 58 |
| Total | 23 | 17.0 | 3,898 | 100 |

[1] Located in Washington, Oregon, and Montana.
[2] Primarily located in Tennessee, West Virginia, and New York.

Source: Official statistics of the Aluminum Association and the Bonneville Power Administration.

can consume up to 3,145 megawatts (MW) of electricity,[5] enough to power nearly all of the 3.2 million homes in Washington and Oregon.[6] Capacity had been idled in this region as a result of a substantial increase in the cost of electricity, which is a major share of the cost of producing primary aluminum (box 1).

[5] "Northwest Aluminum Smelters Create New Power Ventures to Fight Energy Crunch," *Business Wire*, June 28, 2001.

[6] Marianne Lavelle, "The Power Hungry Get Powered Down," *U.S. New and World Report*, Apr. 30, 2001.

**Box 1**
**Primary Aluminum Production Process**

Primary aluminum is produced at smelters using the Hall-Heroult process to convert alumina (aluminum oxide) into aluminum metal by separating aluminum from oxygen through electrolysis.[1] During electrolysis, an electrical current passes from negatively to positively charged electrodes inside large cells known as "pots." The negative electrode consists of blocks of carbon lining the bottom of the pot; the positive electrode is made up of blocks of carbon lowered down into the pot on long steel rods. Alumina is introduced into the pots, which contain molten cryolyte as an electrolyte. The liquid bath is heated to 1,760 degrees F through 140,000 amperes of electricity delivered to each pot.[2] In this molten state, the oxygen in the alumina reacts with the carbon in the positive electrode to form carbon dioxide, which escapes as bubbles. The heavier aluminum sinks to the bottom of the pot and is siphoned off. According to industry sources, electricity costs comprise approximately 30 percent of the cost of producing primary aluminum.[3]

[1] Most U.S. primary aluminum smelters import alumina, which is processed from bauxite in foreign countries. The primary sources for alumina include Suriname, Jamaica, Australia and Brazil.

[2] Alcoa Primary Metals, *Eastalco Works, Welcome to Alcoa*, Frederick, MD, 2000.

[3] Aluminum company representative, interview by USITC staff, July 26, 2001.

Electricity costs spiked suddenly in 2000 as a result of deregulation of California utilities.[7] Until 1996, investor-owned utilities controlled both power production and distribution. A 1996 law designed to increase competition and to reduce power rates required the utilities (1) to sell their generating and transmission facilities (while retaining rights as distributors), (2) to freeze rates to consumers until they completed the sale of their assets, and (3) to purchase power on the open market.[8] From the period 1996- 2000, demand for power in California grew rapidly, but supply did not meet demand. As a result, open market prices began to rise. The utilities were prohibited from passing those rising costs on to customers because of the rate freeze. However, once the utilities divested the necessary power facilities, the rate freeze was lifted. A heat wave in the summer of 2000 sparked even higher demand so the price skyrocketed.[9] The California power crisis affected the Pacific Northwest because the power grids in these regions are interconnected.

The U.S. aluminum industry has also been affected by a worldwide economic slowdown and the September 11 aftermath, both of which have led to a drop in demand from major end-use sectors. This development has been especially evident in the transportation sector, which historically comprised 33 percent of U.S. aluminum consumption. Prior to September 11, aluminum demand was declining because of reduced vehicle purchases attributable to the economic contraction. Although vehicle purchases have rebounded because of aggressive marketing by automobile manufacturers, the September 11 terrorist attacks have reduced

[7] Electric power prices rose from $30 per megawatt-hour (MWh) to $400 per MWh in less than 7 days during June 2000. Julia Anderson, "Marketplace: Vanalco Closure: 1 Year Later," *The Columbian*, June 24, 2001, p. e1.

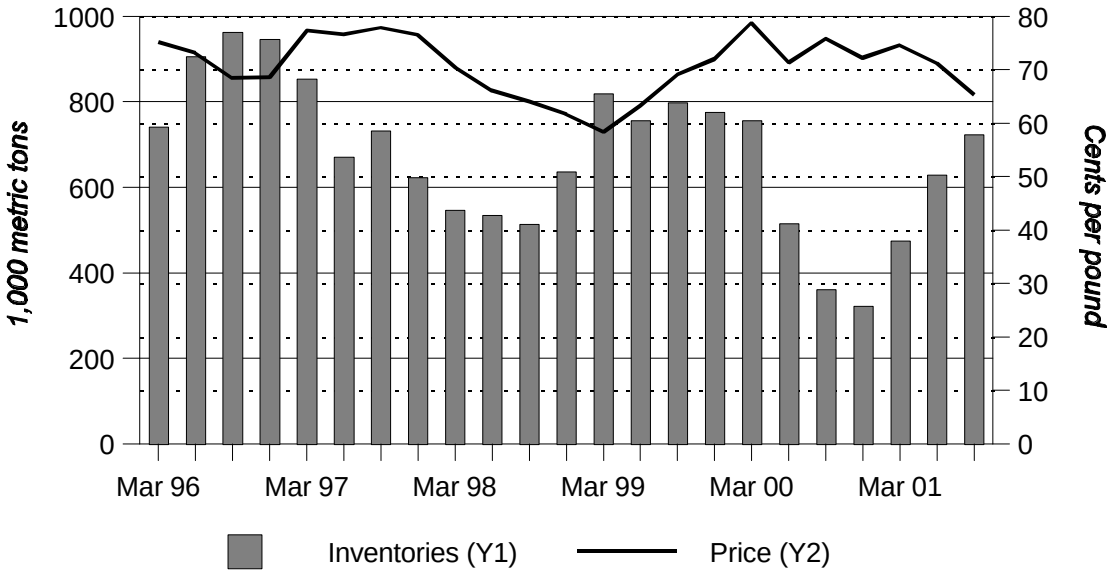
[8] SF Gate, "Energy Crisis Overview: How We Got Here," May 8, 2001, found at Internet address *http://www.sfgate.com/cgi-bin/article.cgi?file=/gate/archive/2001/05/08/lookhow.DTL*, retrieved Dec. 2, 2001.

[9] Ibid.

aluminum demand by airplane manufacturers due to the effect on the airline industry. The aerospace market is one of the most profitable for the aluminum industry due to the prevalent use of such high-value-added products as plate and sheet. Since September 11, airlines have cut expenditures to counter reduced air travel and dwindling profits, leading to a decrease in planned airplane construction. For example, Boeing recently announced a reduction of 30,000 jobs and cut its delivery forecast for 2002 to 350-400 aircraft compared to the 510-520 previously forecast.[10] According to market analysts, civil aerospace build rates are likely to be one-half of build rates in 2001.[11]

As a result of declining demand, and despite U.S. production cutbacks, aluminum prices continued to decline through third quarter 2001 and inventories held in exchange warehouses have grown. The average monthly aluminum price in September had fallen to 64.9 cents per pound, 15 percent off its 5-year high of 80.3 cents per pound in February 2000 (figure 2). Current prices are near 2-year lows. The third quarter 2001 closed with exchange-warehouse inventories reaching 18-month highs (double the inventory levels of September 2000), a reflection of the weakness of the market.

**Figure 2**
**Quarterly average aluminum prices and inventories, March 1996-September 2001**




Source: Official statistics of the U.S. Geological Survey and World Metal Statistics.

[10] Tom Stundza, "Aftermath of September 11: Recovery is Postponed," *Purchasing Magazine*, Nov. 11, 2001, p. 24b17 and Gillian O'Conner, "Putting Makers on Their Mettle," *Financial Times*, Oct. 31, 2001.

[11] "American Metal Market News– Aluminum to Revive Next Year, says Garran," *American Metal Market* (*AMM*), Oct. 22, 2001, found at Internet address *http://www.amm.com/subscrib/2001/oct/inside4/1022al01.htm*, retrieved Oct. 30, 2001.

# The Bonneville Power Administration

Much of the electricity consumed by the Pacific Northwest producers is provided by the Bonneville Power Administration (BPA). BPA sells power in the Pacific Northwest to both industrial and residential consumers (box 2). In 1996, the aluminum companies renegotiated their 5-year contracts with BPA, setting up the current crisis. Under the contract, the aluminum companies agreed to take about 70 percent of their power from BPA at a fixed price of $22.60 per megawatt-hour (MWh).[12] The remaining 30 percent of aluminum smelter power needs would be sought from the wholesale market, at a price that would fluctuate at the market rate.[13] Further, the aluminum companies were given "remarketing rights" that would allow them to resell any excess BPA-contracted power at market rates.

**Box 2**
**Electric Power Generated by Bonneville Power Administration for Aluminum Smelters**

The Bonneville Power Administration (BPA) markets electric power in the Pacific Northwest from 29 federal dams and 1 nuclear power plant.[1] Dam projects were constructed in the Pacific Northwest in order to provide employment during the Depression. Since World War II, BPA has sold power to the aluminum smelters in the Northwest through 5-year fixed-price contracts. The relationship began when access to low-cost hydroelectric power attracted the aluminum companies to the region. BPA was guaranteed a reliable consumer of energy, and the aluminum companies received a reliable source of low-cost power. Until the production cuts in June of 2000, the Northwest aluminum companies consumed about 20 percent of available BPA power.[2]

[1] Gail Kinsey Hill, "Golden Northwest Will Keep Plants Shut," *The Oregonian*, June 26, 2001, p. c1.

[2] Gary Sampson and Christine Cave, "Smelter Shutdown in the Northwest," *Utility Business*, Mar. 2001.

When the power crisis hit the Northwest in June 2000, the market-rate for power skyrocketed, reaching as high as $1,000 per MWh. In response, the aluminum companies cut production to save on high power costs generated from the 30-percent share of power purchased by the companies on the open market. Under their remarketing rights, aluminum companies began to buy contract-priced power from BPA and to sell it back on the open market. Despite their shutdown in production, aluminum companies profited from the situation. For example, as of June 2001, Kaiser had reportedly made $460 million through its resale of electricity.[14]

[12] "BPA Sees 150% Power Rate Increase at Current Load," *Platts Metals Week*, June 11, 2001, p. 9.

[13] Gary Sampson and Christine Cave, "Smelter Shutdown in the Northwest," *Utility Business*, Mar. 2001, pp. 34-37.

[14] These resales helped Kaiser cover its operating losses. However, BPA advocated that Kaiser use the resale-proceeds to focus on alternative energy sources and compensation to employees. Nicholas Geranios, "Lone Aluminum Smelter Holdout Demanding More Money," *The Associated Press*, June 27, 2001; and Bob Regan, "Kaiser Aluminum, BPA Settle on Energy Terms," *AMM*, Oct. 11, 2001, found at Internet address *www.amm.com/subscrib/2001/oct/top/1011tp01.htm*, retrieved Oct. 12, 2001.

The situation deteriorated as contract negotiations for the next 5-year period (2001-06) got underway in second half 2000. According to industry sources, not only was BPA unable to provide the aluminum companies long-term contracts guaranteeing electricity at fixed prices,[15] but the allocation to them was cut from 2,000 MW to 1,500 MW to accommodate other customers with prior legal claim to BPA's power.[16] Even then, BPA was 3,000 MW short of power to meet anticipated demand for the 5-year contract period (beginning October 1, 2001) and began seeking commitments from the aluminum industry to reduce demand.[17] BPA requested that the Northwest aluminum industry shut down its smelters for 2 years until September 2003 so that the agency could sell the saved power on the open market to meet demand from other customers. In exchange, the BPA reportedly agreed to pay the smelters $20 per MWh saved.[18] Most companies complied and BPA reached 95 percent of its load-reduction target for the first 6-month term (October 2001 through March 2002) and 85 percent of its load-reduction goals for the April 2002 through September 2002 period.[19]

As a result of meeting its load reduction goals, largely through the temporary exclusion of aluminum customers, BPA raised prices by only 46 percent (to $34 per MWh) for the initial 6-month term. In late January 2002, BPA will reconsider current power rates and power demand to determine where to set rates for the next 6-month period starting in April 2002.[20] This does not bode well for aluminum companies such as Kaiser that did not agree to keep their smelters shut for 2 years (table 2), in considering the economic feasibility of restarting idled capacity, particularly when aluminum prices are relatively low. Analysts cite a $1,500 per mt price (about 70 cents per pound) for aluminum as the break-even level for the industry in an environment of $30 per MWh power costs. Although wholesale electricity prices that would meet 50 percent of smelter power needs have dropped to less than $20 per MWh as of September 25,[21] BPA prices remain at $34 dollars per MWh, which is still above the break-even levels for many aluminum smelters. Meanwhile, forward electricity prices on the wholesale market are also high,[22] reducing the likelihood that the aluminum smelters will be able to attain power at a cost that will enable them to restart from prices on the wholesale

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[15] Under BPA's pricing structure, prices for power for aluminum companies will be determined every 6 months over the 5-year contract period. The formula, based on a traditional cost-based structure, will vary depending on market prices and aluminum companies' prospective needs. See Sampson and Cave, "Smelter Shutdown in the Northwest."

[16] Aluminum News, "BPA Reallocation Chill Wind for Aluminum," *AMM*, Oct. 17, 2001, found at Internet address *www.amm.com/subscrib/2000/Oct/inside3/1017al03.htm*, retrieved Nov. 9, 2001.

[17] Lynda Mapes, "Rebate? Rates up? Power Picture for Northwest is unclear," *Seattle Times*, June 28, 2001.

[18] Ibid.

[19] "BPA Has Set Contract Rate to Al Smelters at $34/ Mwh," *Platts Metals Week*, July 2, 2001, pp.1 and 11.

[20] "Northwest Smelter Restarts Are Seen Unlikely," The Aluminum Association, found at Internet address *www.aluminum.org/dailya.cfm?docid=643*, Sep 14, 2001, retrieved Oct. 1, 2001.

[21] Ken Olsen, "The Energy Crunch: Utility Loses Bid for a Big Refund on Power Prices," *The Columbian*, Sept. 26, 2001.

[22] According to analysts, forward power prices for Mid-Columbia electricity are $40 per MWh for 2002 and $42 per MWh for 2003. "Early U.S. Smelter Restarts Doubtful," *AMM*, Aug. 22, 2001, found at Internet address *www.amm.com/subscrib/2001/aug/inside4/0822al05.htm*, retrieved Sept. 19, 2001.

market in the longer-term. Because temporary exclusion of the aluminum companies as customers enabled BPA to reduce rates, in-part, due to an increase in available power, demand by aluminum companies to purchase power from BPA will likely increase power prices unless the agency expands capacity. A related concern expressed by the companies such as Kaiser that are considering restarts is that power prices from BPA are not guaranteed outside of the initial six-month term. These variables will likely deter aluminum smelters from reopening, as the longer-term economics of the restart are not guaranteed. Moreover, restart costs estimated at $1 million per potline discourage the aluminum companies from restarts when both future power prices and aluminum prices are uncertain.[23] Finally, BPA is encouraging the aluminum companies to remove themselves from the BPA grid by 2006.

# Implications for the U.S. Aluminum Industry

A majority of the Pacific Northwest smelters agreed to close capacity until September 2003 (table 2). Kaiser, which did not agree to a 2-year load reduction, will keep its smelters closed until at least April 2002, when the company will reportedly reevaluate both the aluminum prices and BPA's next 6-month power prices. Both Alcoa and Vanalco have shutdown smelters permanently. Alcoa announced closure of its Troutdale, Oregon facility because it required extensive capital improvements to keep it operating, even under normal business conditions.[24] Vanalco, which declared bankruptcy because of the power problems, has reportedly filed suit against BPA, claiming that BPA's pricing policy put it out of business.[25]

**Table 2**
**Load reductions at key U.S. Pacific Northwest primary aluminum smelters**

| Company | Smelter location | Capacity | Load reduction |
|---|---|---|---|
| Alcoa | Troutdale, OR | 120,000 | Permanently closed |
| Alcoa | Wenatchee, WA | 220,000 | Closed for 2 years |
| Columbia Falls Aluminum | Columbia Falls, MT | 185,000 | Closed for 2 years |
| Golden Northwest | Goldendale, WA | 160,000 | Closed for 1 year |
| Golden Northwest | The Dalles, OR | 90,000 | Closed for 2 years |
| Intalco | Ferndale, WA | 270,000 | Closed for 2 years |
| Kaiser | Tacoma, WA | 73,000 | Closed until aluminum prices rise |
| Kaiser | Mead, WA | 200,000 | Closed until aluminum prices rise |
| McCook Metals Group | Longview, WA | 204,000 | Closed until April 2002 |
| Vanalco | Vancouver, WA | 110,000 | Permanently closed |

Source: The Spokesman-Review, Economist Intelligence Unit.

[23] "US aluminum restarts less likely in 2002 amid LME drop," *Platts Metals Week*, Oct. 1, 2001, p 1.

[24] "Alcoa to Curtail Production at Troutdale Aluminum Smelter," Alcoa Press Release, found at Internet address *http://www.alcoa.com/site/news/news_release/2000/JUN/17526-2001_03_20.asp*, June 28, 2000, retrieved November 29, 2001.

[25] Lindsay Audin, "Load Curtailment Options: Sparking Savings Without Getting Burned," *Energy User News*, Dec. 8, 2000.

The Pacific Northwest smelters are high-cost producers, as compared with other world producers because they do not have direct access to inexpensive power sources. The ability of Pacific Northwest aluminum smelters to obtain power at reasonable costs in the future, as well as the level of aluminum prices, will determine whether these smelters are economically viable. However, future power costs in the Pacific Northwest are uncertain. Without the aluminum smelters taking power from BPA, electrical energy costs have been set at $34 dollars per MWh. However, according to industry sources, when BPA considered its power rates with the smelters taking power from BPA, prices were anticipated to be 150 percent higher than previous levels (about $55 per MWh). Beyond 2006, the aluminum companies have not negotiated new contracts with BPA that limits their access to less-expensive hydropower. Industry officials indicate that without access to BPA power, the aluminum smelters will be pushed to using higher-priced power, and the smelters "cannot operate" under those conditions.[26]

Because Pacific Northwest smelters comprise a large portion of domestic smelting capacity, these market conditions could have a significant effect on U.S. import dependence for primary aluminum. In the United States, aluminum consumption in the third quarter dropped by 22 percent since the last full quarter of production. In 2001, to date, consumption has fallen by 5 percent; analysts predict an 8-percent decline for the year.[27] As a result of U.S. production declines outstripping declines in U.S. demand, import penetration levels in the United States have increased (table 3).

**Table 3**
**Quarterly U.S. aluminum production, imports, exports, consumption, and import penetration**

| | 1999 | | 2000 | | | | 2001 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Item** | **Q3** | **Q4** | **Q1** | **Q2** | **Q3** | **Q4** | **Q1** | **Q2** | **Q3** |
| | *1,000 metric tons* | | | | | | | | |
| Production[1] | 1,842 | 1,834 | 1,874 | 1,858 | 1,754 | 1,636 | 1,469 | 1,442 | 1,427 |
| Imports[1] | 661 | 612 | 723 | 746 | 686 | 542 | 651 | 616 | 689 |
| Exports[1] | 98 | 129 | 115 | 110 | 108 | 101 | 86 | 84 | 77 |
| Consumption | 2,405 | 2,318 | 2,482 | 2,494 | 2,333 | 2,077 | 2,034 | 1,972 | 2,039 |
| | *Percent* | | | | | | | | |
| Import penetration | 27.5 | 26.4 | 29.1 | 29.9 | 29.4 | 26.1 | 32.0 | 31.2 | 33.8 |

[1] Includes primary and secondary aluminum.

Source: Official statistics of the U.S. Geological Survey and the U.S. Department of Commerce.

[26] Aluminum company representative, interview by USITC staff, Nov. 30, 2001.

[27] "Aluminum demand trends," Economist Intelligence Unit, Oct. 22, 2001, *EIU Viewswire*, retrieved Nov. 7, 2001.

Without production from the Pacific Northwest smelters, the increasing import dependence for primary aluminum may continue as the country recovers from the economic slowdown.[28] Despite the lower consumption in the United States in 2001, imports this year are at their highest level in over a year. As consumption returns to previous levels (above 2.4 million mt), import penetration could rise to more than 50 percent assuming no change in U.S. production. This occurrence becomes more likely because foreign production is growing. According to the International Aluminum Institute, although production in North America fell by 14 percent in the first 3 quarters of 2001, this shift was accompanied by a 22-percent increase in production by Africa. Despite the downturn in U.S. consumption, worldwide production of aluminum was down only 3 percent in the first 3 quarters 2001 (15.3 million mt, as compared with 15.8 million mt over the same period in 2000).

U.S. power problems discourage companies from investing in the United States, while providing producers an incentive to invest in areas (such as Canada, Latin America, and Africa) where energy costs are not as high.[29] Aluminum smelters tend to follow less expensive sources of electricity, either from hydroelectric energy sources or dedicated natural-gas.[30] Canada and Latin America are rich in hydroelectric sources, and countries such as Bahrain, in the Middle East, have ready access to natural gas. Hence, these countries and regions have a substantial competitive advantage as compared with U.S. producers, particularly those in Pacific Northwest, and are increasing production. For example, Alcan's new Canadian smelter, Alma, is expected to produce 270,000 mt in 2001 that is specifically developed to target U.S. markets.[31] Alba, in Bahrain, which currently accounts for 3 percent of world production, is planning an expansion that will add about 250,000 mt of capacity and make it the world's single largest smelter with a capacity of 750,000 mt.[32] In Russia, access to energy from Siberian hydroelectric stations, low capital costs, and low salaries suggest that Russia will likely sustain production, even during periods of low prices. Imports of Russian primary aluminum were at record highs during 1999-2000, and Russia has indicated that it "plans to take advantage of aluminum smelting capacity shutdowns in the United States to gain a foothold in the U.S. market."[33]

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[28] Aluminum company representative, interview by USITC staff, Nov. 30, 2001.

[29] "Aluminum Prices Will Struggle Until Mid-2002," *Economist Intelligence Unit*, Sept. 21, 2001.

[30] Dedicated natural-gas means a smelter with a guaranteed source of natural gas which will be used to run power plants which provide energy to the aluminum smelters or other customers. In many cases, this gas is a byproduct of petroleum production and would otherwise be flared.

[31] "Aluminum Price to be Marginal in 2001 Despite Cuts," *Platts Metals Week*, June 11, 2001, p. 8.

[32] Bahrain, a country from which the United States did not import any unwrought aluminum in 1997, became the ninth-largest supplier in 2000, with 22,049 mt imported. These shifts indicate an increased import reliance in the primary aluminum industry. Richard Moore, "Expansion to make smelter world's biggest producer," *Gulf Daily News*, May 11, 2001.

[33] Aluminum News, "Russian Aluminum Shifts Sights to U.S. Market," *AMM*, July 18, 2001, found at Internet address *www.amm.com/subscrib/2001/jul/inside3/0718ala1.htm*, retrieved July 18, 2001.

In the longer-term, an extensive number of projects are reported to be in operation during 2003-05. BHP Billiton (Mozambique) is adding 250,000 mt per year of capacity in 2003.[34] Also in the planning stages are facilities in Vietnam (73,000 mt capacity), Venezuela, China, Malaysia (500,000 mt),[35] India, and Chile. These anticipated increases in global production by countries having ready access to low cost electricity could prevent aluminum prices from rebounding to levels that would enable economically feasible restarts of idled capacity in the Pacific Northwest. The likelihood of any aluminum price increase would be further reduced if consumption does not recover as anticipated, and the market is affected by additional production.

Another concern for the U.S. aluminum industry is the increase in primary aluminum production in China. China has traditionally produced aluminum only for domestic consumption and has been a net importer of aluminum. However, since China has expanded capacity, it has imported less. For example, U.S. exports of unwrought aluminum to China dropped by 54 percent (to 135 mt) since the power crisis in June 2000 as China replaced imports with domestic production.[36]

A final concern expressed by the primary aluminum industry in the Pacific Northwest is the potential economic effects of the continued shutdown in the region. The Northwest aluminum plants are located in rural, economically challenged areas, and they are a significant part of the local economy (box 3).

**Box 3**
**Implications for the Local Economy**

The Northwest smelters provide economic stimulus to the area, oftentimes as one of the key employers. For example, 2 plants in Spokane employ 2,180 workers and provide $151 million in income. An additional 7,280 Spokane jobs depend on the plants. If aluminum plants in Goldendale, Washington close, the unemployment rate in Goldendale and the surrounding county could soar to 30 percent.[1] Moreover, a typical aluminum-industry job pays $58,710 per year in salaries and benefits. Salaries are regularly augmented by overtime, but during the shutdowns, workers are losing money because they are only paid their base wages.[2] Further, since smelters will not likely restart for 2 or more years, some workers have been laid off and are not receiving supplementary pay from the smelters. For example, Kaiser is currently paying 70 percent of the salaries of 950 employees affected by smelter shutdowns.[3]

[1] John Carlisle, "Energy Crisis Spreads: Aluminum Industry Faces Shutdown, Layoffs Due to Electricity Shortage," *National Policy Analysis*, The National Center for Public Policy Research, found at Internet address *www.nationalcenter.org/NPA338.html*, May 2001,retrieved July 6, 2001.

[2] Nicholas Geranios, "Northwest Aluminum Industry Slumbering, But Will It Return," *Associated Press*, June 15, 2001.

[3] Kelly Barron, "Helter Smelter," *Forbes*, Apr. 2, 2001, pp. 53-54.

[34] "Aluminum prices will struggle until mid-2002," *Economist Intelligence Unit*, Sept. 21, 2001.

[35] Aluminum News, "Malaysian Aluminum Smelter Awaiting OK," *AMM*, Sept. 4, 2001, found at Internet address *www.amm.com/subscrib/2001/sep/0904al01.htm*, retrieved Sept. 19, 2001.

[36] Official statistics of the U.S. International Trade Commission.

The increase in U.S. secondary aluminum production may help to counter primary production decreases.[37] Since January 2001, the height of the power crisis, secondary production has increased by 13 percent overall, peaking at 274,000 mt in August 2001.[38] This trend is expected to continue as more secondary aluminum smelters come online. For example, Hydro Aluminum Metal Products, the largest global supplier of billet, is planning an aluminum remelt plant in Commerce, Texas that will have a capacity of 90,000 mt of primary-quality aluminum from scrap. The plant is expected to serve the Southwestern aluminum market. Hydro's first U.S. remelt plant opened in May of this year in Henderson, Kentucky.[39] Although this increased U.S. secondary production could help lessen overall U.S. dependence on imports, it is unlikely to benefit the Pacific Northwest producers because the additional supply could prevent prices from rising sufficiently to enable economically viable production in the Pacific Northwest.

# Outlook

One option to address the power crisis is to reduce electric-power costs of the aluminum smelting process. Research on new anode technology is expected to reduce average smelter costs by at least one-fifth, and could be introduced into existing smelters within 5 to 10 years. According to industry analysts, the most promising type of new technology, termed "inert anode," would replace carbon anodes in smelters with anodes that are not consumed during the smelting process.[40] Most of the major aluminum smelting firms in the United States are involved in researching these new technologies through the "Industry of the Future" program administered by the U.S. Department of Energy, Office of Industrial Technologies, which has funded a number of studies on new anode technologies.[41]

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[37] In 1999, there were 83 secondary smelters in the United States, primarily in California, Tennessee, and the Great Lakes region. Secondary smelting requires 95 percent less electricity than primary smelting to produce the same amount of metal. "Aluminum Statistical review for 2000," The Aluminum Association, 2001, p. 11.

[38] In the last full quarter of operations since idling of capacity (first quarter 2001) production of secondary smelting accounted for 49 percent of total aluminum production. If Pacific Northwest primary production remains closed, secondary smelting output will likely remain higher than primary output, particularly as more secondary smelters begin operations.

[39] "Hydro Aluminum Plans New Recycling Plant In Texas," Industry News, The Aluminum Association, Sept. 25, 2001, found at *http://www.aluminum.org/dailya.cfm?docid=658,* retrieved Nov. 19, 2001; and "Norsk Hydro to Build Second State of the Art Aluminum Recycling Plant in the United States," *PR Newswire*, Sept. 25, 2001.

[40] Gillian O'Conner, "Promises of More Product for Less Cost," Aluminum Survey, *Financial Times*, Oct. 31, 2001.

[41] For more information on these technologies, see the Office of Industrial Technologies Internet site at *http://www.oit.doe.gov/aluminum/portfolio.shtml*.

Another option is the construction of power plants at the smelter site to take primary aluminum smelters off the public grid. BPA is promoting this option in its efforts to remove aluminum smelters from dependency on BPA-sourced power. Several aluminum companies are studying the economic viability of building power plants to supply their smelters:[42]

- Kaiser is examining the feasibility of two 100 MW power plants at its Mead and Tacoma, Washington smelters.

- McCook is studying a $150 million 280 MW plant at its Longview, Washington smelter.

- Golden Northwest Aluminum is planning natural gas fired power plants at both of its smelters on the Columbia River totaling 720 MW.

- Golden is also planning a 600 MW wind farm project in Klickitat County, Washington.

This strategy could enable aluminum companies to potentially generate more revenue by selling excess energy to the grid, if necessary.

U.S. aluminum companies can also continue to support research and to develop more aluminum consumption. Currently, the best prospect for new uses for aluminum are in automobile production.[43] Ford, Audi, General Motors and DaimlerChrysler are developing aluminum- intensive vehicles. Due to its light weight, aluminum provides a lifetime fuel savings of 500-700 gallons of gasoline per vehicle. Ford's test vehicles provide 46-percent weight savings in the structure, with no loss in crash protection.[44] Uses for aluminum are not limited to frames. Engine blocks, formally of cast-iron have been switched to aluminum, a move that can save 100 pounds or more for larger V8 designs.

The Pacific Northwest primary aluminum industry may undergo long-term restructuring because of uncertain power costs and growing foreign and domestic competition. Restarting idled capacity is problematic when aluminum prices are low, and the future price may not increase to levels that would restore the economic viability of these producers. Without a change in current market conditions and guaranteed sources of power, nearly one-half of U.S. primary smelting capacity could be in jeopardy. Further, there could likely be a substantial increase in U.S. import reliance for this key manufacturing metal and implications for the local economies where smelters have provided significant employment. However, if the Pacific Northwest producers develop power alternatives and aluminum consumption in important sectors increases, smelter restarts could occur in the future.**#**

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[42] These projects are tentative and detailed information, including expenditures, is not available for each facility. "Northwest Aluminum Smelters Create New Power Ventures to Fight Energy Crunch," *Business Wire*, June 28, 2001.

[43] For further information see Vincent DeSapio, "Commericialization of Hybrid Automobile: Prospective Demand for Light Metals," U.S. International Trade Commission, *International Trade and Technology Review*, Mar. 2001, pp. 32 and 33.

[44] "Industry Facts: Metal Markets - Transportation," The Aluminum Association, found at Internet address *http://www.aluminum.org/default3.cfm/17/71/2?CFID=7993967& CFTOKEN=63193861*, retrieved Oct. 4, 2001.

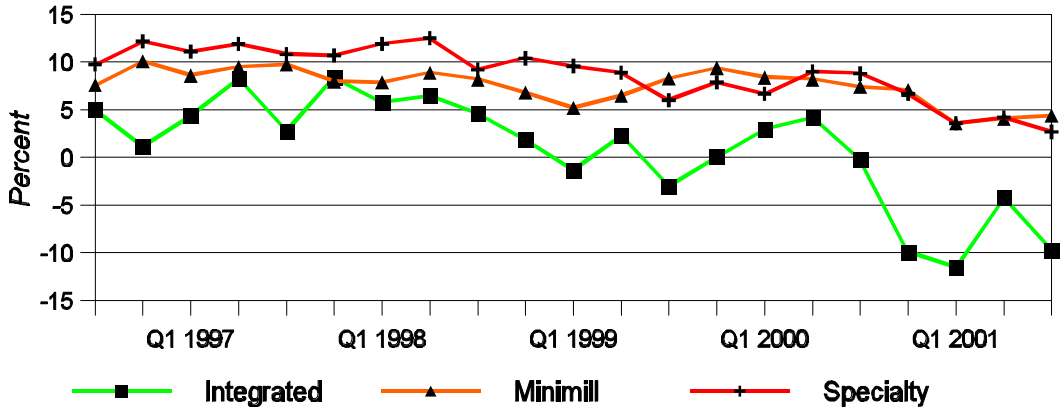
# APPENDIX A
# Key Performance Indicators of Selected Industries and Regions[1]



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

## STEEL

**Figure A-1**
**Minimill profitability improves slightly, but integrated and specialty profitability[1] decline during third quarter 2001**




[1] Operating income as a percent of sales. Integrated group contains 7 firms. Minimill group contains 8 firms. Specialty group contains 4 firms.

Source: Individual company financial statements.

- Based on quarterly financial statements, overall profitability of U.S. integrated and specialty steel producers declined in the third quarter of 2001. As prices declined, in some cases approaching the marginal costs of production, operating income declined sharply. Minimills recorded increased profitability compared to their first quarter 2001 slump, but profitability remained below the levels of preceding years due to depressed prices.
- USX-U.S. Steel Corporation and Bethlehem Steel Corporation (the largest and third largest domestic steel producers) announced on December 4, 2001 that they were considering a merger of the two firms. Five days later, USX-U.S. Steel confirmed that it was considering the purchase of National Steel Corporation (the sixth largest domestic steel producer). The majority owner of National Steel is NKK Corporation of Japan, which immediately announced its support of the proposed acquisition. Also, according to the Wall Street Journal (December 14, 2001) USX-U.S. Steel is considering the acquisition of Wheeling-Pittsburgh Steel Corporation.
- LTV Corporation won bankruptcy court approval on December 7, 2001, for an Asset Protection Plan which includes the immediate shutdown and hot-idling of LTV's integrated steel facilities while continuing normal operations of LTV Copperweld. The Asset Protection Plan was supported by LTV's management, lenders, creditors and the United Steel Workers, which represents LTV's unionized employees.
- Third quarter 2001 imports of finished products decreased slightly from second quarter 2001, but were down more than 25 percent compared with third quarter 2000 (table A-1). Semifinished imports increased significantly from second quarter 2001, but were still down by almost 17 percent compared to third quarter 2000.

**Table A-1**
**Imports decrease significantly in third quarter 2001 compared with third quarter 2000**

| Item | Q3 2001 | Percentage change, Q3 2001 from Q3 2000[1] | YTD 2001 | Percentage change, YTD 2001 from YTD 2000[1] |
|---|---|---|---|---|
| Producers' shipments *(1,000 short tons)* | 24,818 | -6.3 | 75,893 | -9.4 |
| Finished imports *(1,000 short tons)* | 5,903 | -25.4 | 17,484 | -25.2 |
| Ingots, blooms, billets, and slabs *(1,000 short tons)* | 1,873 | -17.2 | 4,613 | -34.9 |
| Exports *(1,000 short tons)* | 1,494 | -7.5 | 4,619 | -6.1 |
| Apparent supply, finished *(1,000 short tons)* | 29,227 | -16.6 | 88,827 | -18.8 |
| Ratio of finished imports to apparent supply *(percent)* | 20.2 | [2]-3.9 | 19.7 | [2]-3.2 |

[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**
**Third quarter 2001 steel service center shipments decrease by almost 13 percent from third quarter 2000**

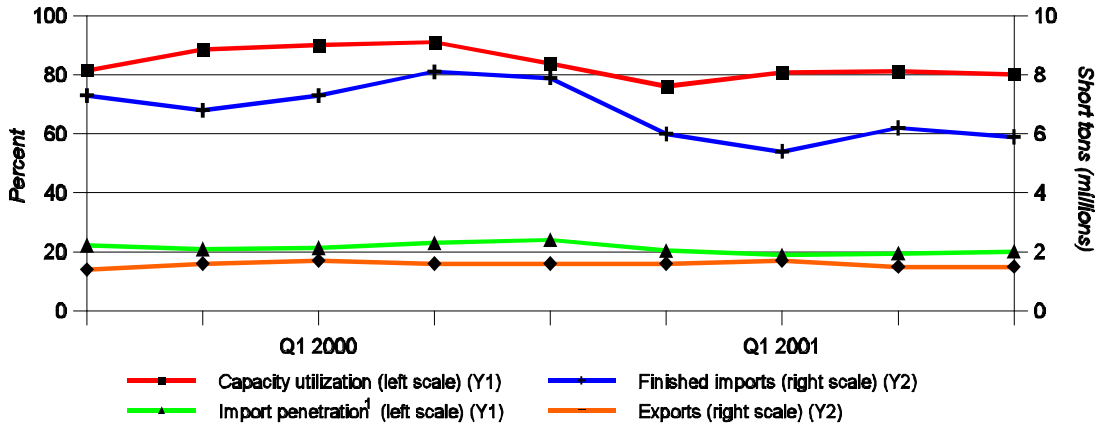
| Item | Jun. 2001 | Sept. 2001 | Percentage change, Sept. 2001 from Jun. 2000[1] | Q3 2000 | Q3 2001 | Percentage change, Q3 2001 from Q3 2000[1] |
|---|---|---|---|---|---|---|
| Shipments *(1,000 short tons)* . . . . . | 2,175 | 1,923 | -11.5 | 7,167 | 6,246 | -12.9 |
| Ending inventories *(1,000 short tons)* . . | 8,163 | 7,677 | -6.0 | 8,954 | 7,677 | -14.3 |
| Inventories on hand *(months)* . . . . . | 3.8 | 3.6 | ([2]) | 3.7 | 3.6 | ([2]) |

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

Source: Steel Service Center Institute.

- Steel service center shipments declined to 6.2 million tons of finished steel products during third quarter 2001, decreasing almost 6 percent from second quarter 2001(6.6 million tons), and almost 13 percent from third quarter 2000. Service center inventories followed a similar pattern- almost 6 percent lower at the end of the third quarter (Sep. 2001) compared with the end of the second quarter (Jun. 2001), and more than 14 percent lower compared to the end of Sep. 2000.
- The majority of member companies responding to the most recent survey (December 5, 2001) by the Steel Service Center Institute (*http://www.ssci.org*) predicted either no change or a decrease in general economic activity, and in their own business prospects, during the next three months.
- The December, 2001 survey by the Steel Buyers Forum of the National Association of Purchasing Management (*http://www.napmsbf.org*) projected either no change or a decrease in dependence on foreign sources of steel. In addition, the majority of respondents (78 percent) reported that foreign mill prices are not significantly different from domestic price levels.
- Respondents to the Steel Import Market Survey (December, 2001) by the American Institute for International Steel (*http://www.aiis.org*) predict steady or decreasing imports of all categories of steel, with the exception of semifinished, during the next two months. Survey respondents unanimously predict an increase in semifinished steel imports.
- Representatives of forty steel producing countries met in Paris on December 17, 2001 under the auspices of the Organization for Economic Cooperation and Development to discuss possible reductions in global steel capacity (estimated at 840 million tons per year), which exceeds present global consumption by five percent. (*http://www.oecd.org/oecd/pages/home/displaygeneral/0,3380,EN-document-0-nodirectorate-no-12-23585-0,FF.html*)

**Figure A-2**
**Steel mill products, all grades: Import penetration increases despite fewer imports during third quarter 2000**




[1] Finished import share of apparent open market supply.

Source: American Iron and Steel Institute.

# AUTOMOBILES

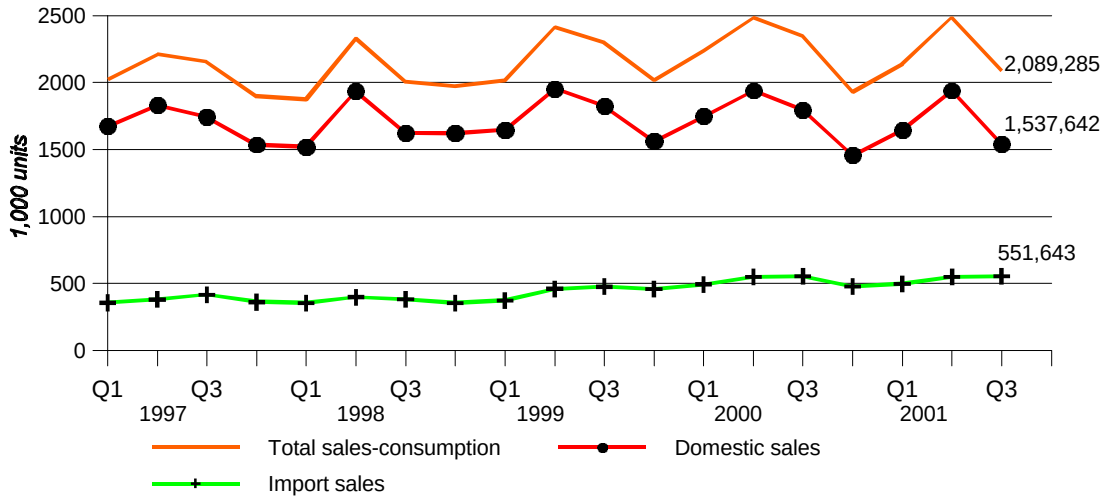
**Table A-3**
**U.S. sales of new automobiles, domestic and imported, and share of U.S. market accounted for by sales of total imports and Japanese imports, by specified periods, January 2000-September 2001**

| Item | Jul.-Sept. 2001 | Jan-Sept. 2001 | Percentage change: Jul.-Sept. 2001 from Apr.-Jun. 2001 | Percentage change: Jan.-Sept. 2001 from Jan.-Sept. 2000 |
|---|---|---|---|---|
| U.S. sales of domestic autos (*1,000 units*)[1] | 1,538 | 4,982 | -14.5 | -9.1 |
| U.S. sales of imported autos (*1,000* units)[2] | 552 | 1,619 | -3.4 | 1.6 |
| Total U.S. sales (*1,000 units*)[1, 2] | 2,089 | 6,602 | -11.9 | -6.7 |
| Ratio of U.S. sales of imported autos to total U.S. sales (*percent*)[1, 2] | 26.4 | 24.5 | 9.6 | 8.9 |
| U.S. sales of Japanese imports as a share of the total U.S. market (*percent*)[1, 2] | 11.0 | 10.4 | 15.2 | 1.2 |

[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 fell in 3rd quarter 2001; 3rd quarter sales of domestic autos registered a larger percentage decrease over 2nd quarter as compared with sales of imports, by 5 percentage-points**

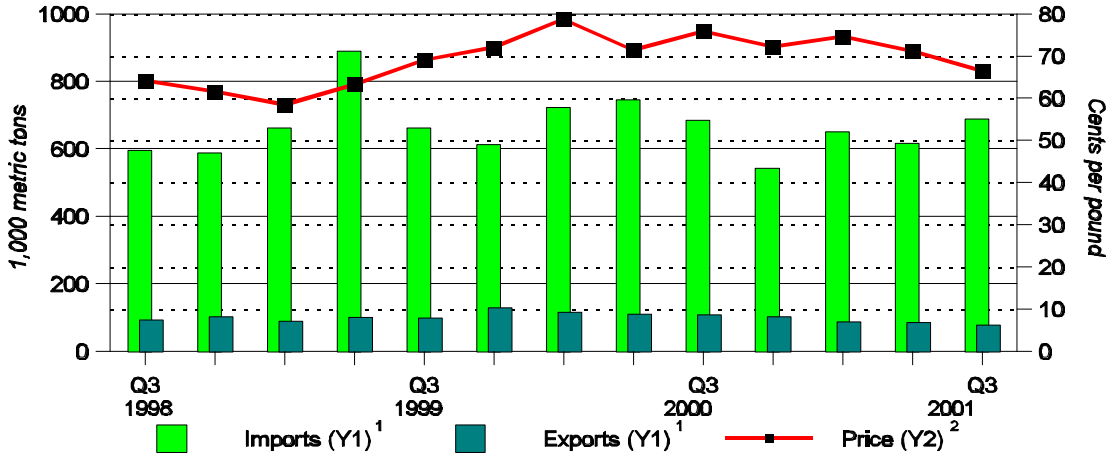



Note.–Domestic automobile sales include U.S.-, Canadian-, and Mexican-built automobiles sold in the United States; these same units are not included in import sales.

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

## UNWROUGHT ALUMINUM[1]

**Figure A-4**
**U.S. production cutbacks and slightly improved U.S. demand led to a 12 percent increase in unwrought aluminum imports, yet prices fell to 28 month lows due to uncertainty over future aluminum demand**




[1] Unwrought aluminum and aluminum alloys.
[2] Quarterly average of the monthly U.S. market price of primary aluminum ingots.

Source: U.S. Geological Survey.

- U.S. imports from Russia have fallen off last year's record-breaking levels, but U.S. import penetration continued to grow as shipments from Canada, Australia, and Venezuela increased during the first three quarters of 2001 as compared with the same period in 2000.
- Increased power costs in the Pacific Northwest have resulted in idled smelters and production cuts in that region (See related article in this issue). The aluminum industry in Brazil is faced with severe droughts that have led the Brazilian government to order cuts of electricity usage by 25 percent in the most stricken areas. These cuts have caused Alcoa's Pocos de Calda smelter in Minas Gerais to reduce production by 50 percent, from 90,000 metric tons per year to 45,000 metric tons per year, and production at the Alumar smelter in Sao Luis to reduce production by 92,500 metric tons, a decline of 25 percent. The power cuts are expected to be maintained until March 2002.

**Table A-4**
**Inventories in LME warehouses reached their highest levels in 18 months despite production cuts in the United States and Brazil**

| | | | | Percentage change | |
|---|---|---|---|---|---|
| Item | Q3 2000 | Q2 2000 | Q3 2001 | Q3 2001 from Q3 2000 | Q3 2001 from Q2 2000 |
| Primary production (*1,000 metric tons*) | 883 | 669 | 632 | -28.4 | -5.5 |
| Secondary recovery (*1,000 metric tons*) | 871r | 770 | 795 | -8.7 | 2.8 |
| Imports (*1,000 metric tons*) | 685 | 616 | 689 | 0.6 | 11.9 |
| Import penetration (*percent*)[1] | 29.4 | 31 | 33.8 | [2]15.0 | [2]8.3 |
| Exports (*1,000 metric tons*) | 108 | 84 | 78 | -27.8 | -7.1 |
| Average nominal price (*¢/lb*) | 75.9 | 71.2 | 65.4 | -12.6 | -6.8 |
| LME inventory level (*1,000 metric tons*) | 361 | 629 | 722 | 100.0 | 14.8 |

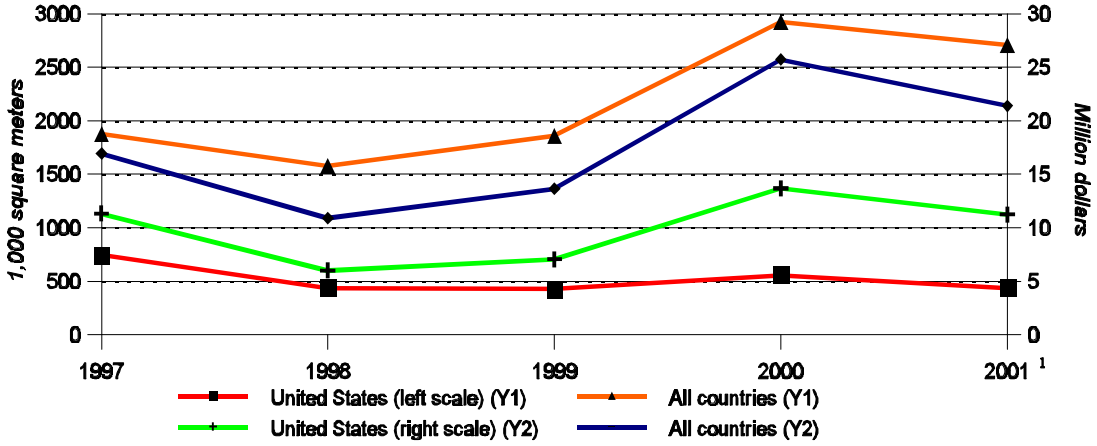
[1] Calculations based on unrounded data
[2] Percentage point change
Note: Revised data indicated by "r."

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

[1] Product coverage is changed from previous issues, and now includes only unwrought aluminum and certain aluminum alloys for improved data comparability.

# FLAT GLASS

**Figure A-5**
**Japanese import decline continues**




[1] Data for 2001 include Jan.-Oct. (latest available data).

Source: Average monthly Japanese imports of flat glass compiled from "World Trade Atlas: Japan" at *http://www.globaltradeatlas.com* on September 24, 2001, which uses official statistics provided by the Government of 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]

- Japanese demand for imported glass improved in 2000. The average monthly quantity of Japanese imports from all countries increased by 57 percent during 2000 to 2.9 million square meters, while the average monthly value of such imports increased by 89 percent to $25.7 million. Imports from the United States increased by 30 percent to 561,000 square meters and by 93 percent to $13.7 million, respectively, but the U.S. share of the market declined.

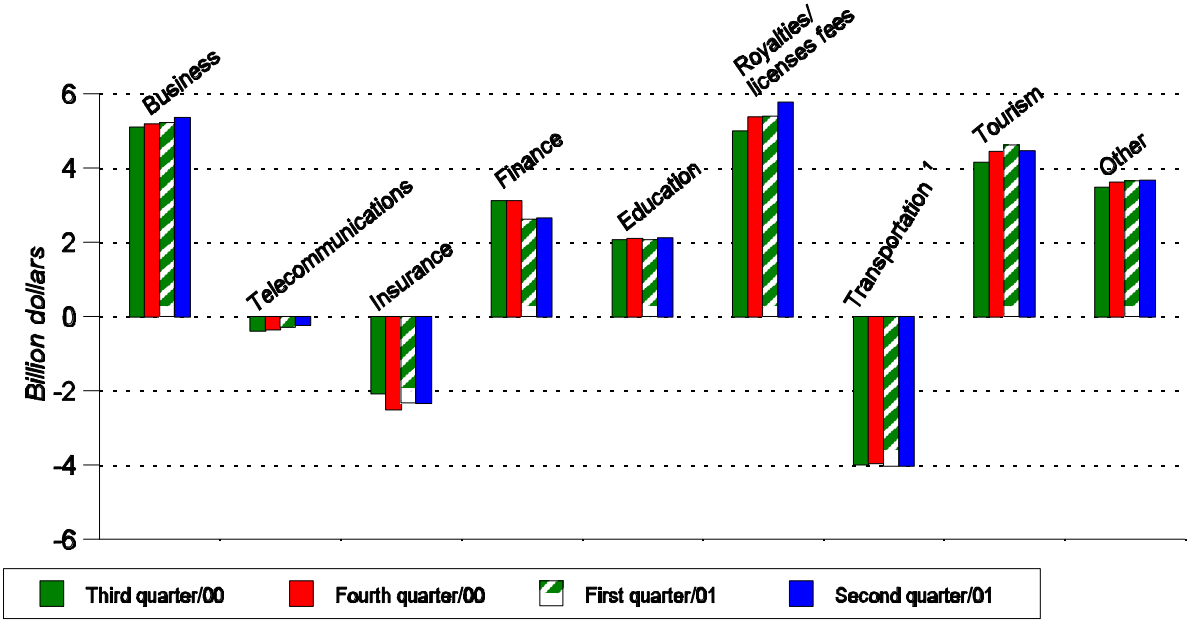
## Current

- The Japanese economy remains sluggish in 2001, and consumption of imported flat glass continued its downward trend. The average monthly quantity of Japanese imports from all countries decreased by 7 percent during the first ten months of 2001 to 2.7 million square meters, whereas the average monthly value of such imports decreased by 16 percent to $21.4 million. However, imports from the United States decreased by 22 percent to 441,000 square meters and by 18 percent to $11.3 million, respectively, and the U.S. share of the market has declined in terms of quantity; imports from the United States lost market share to less expensive imports from Thailand and Korea during this period.

[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.

## SERVICES

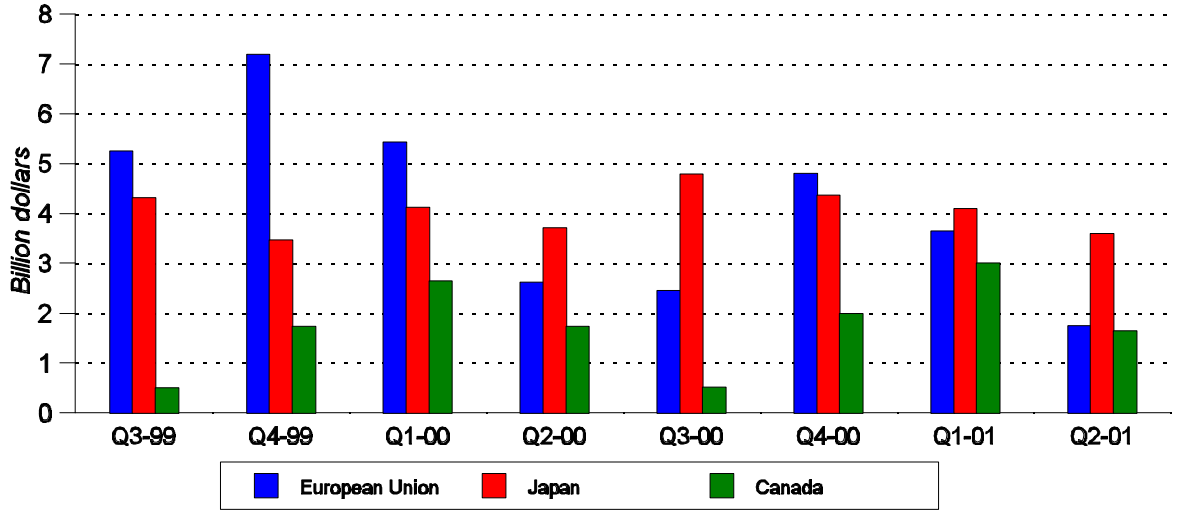
**Figure A-6**
**Balance on U.S. service trade accounts, by selected quarters, 2000-01**




[1] Includes port fees.

Source: Bureau of Economic Analysis, *Survey of Current Business*, Oct. 2001, p. 79.

**Figure A-7**
**Surpluses on cross-border U.S. services transactions with selected trading partners, by quarter, 1999-2001[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*, Oct. 2001, pp. 79-91; July 2001, pp. 74-77; Apr. 2001, pp. 62-67; Jan. 2000, pp. 112-115; and Apr. 2000, pp. 186-189.

## NORTH AMERICAN TRADE

U.S. trade with its North American partners is highlighted in table A-5. The following is a summary of key developments during the third quarter of 2001.

- During January-September 2001, total U.S. trade with its NAFTA partners ($444 billion) decreased by 3.7 percent ($17.3 billion) from the comparable period of 2000. The U.S. merchandise trade deficits with Canada ($-56.4 billion) and Mexico ($-30.2 billion) continued an increasing trend which began in 1998, rising by 6 percent and 17 percent, respectively. A continuing downturn in the U.S. economy, as evidenced by a 0.4 percent decrease in GDP in the third quarter of 2001, should result in a drop in the U.S. trade deficit with both Canada and Mexico as the volume of total trade continues to contract.
- Two-way trade with Canada sustained a declining trend, and fell by 3.5 percent ($10 billion) to $278 billion during the first nine months of 2001. A decrease in Canada's GDP of 0.2 percent between July and September 2001--the first back-to-back quarterly contraction since 1992--led U.S. exports to decline by 6 percent ($6.8 billion) to $111 billion during the third quarter of 2001. U.S. imports from Canada likewise declined by 2 percent ($3.2 billion) to $167 billion from the corresponding period.
    - The fall in U.S. exports was led by transportation equipment and parts, electronics, miscellaneous plastic products, and forestry products.
    - The contraction in U.S. imports from Canada was led by telecommunications equipment and automotive products, and represents the fourth consecutive quarter that imports from Canada decreased, making it the longest string of quarterly declines in more than two decades.
- Canada's economy is highly dependent on the United States, which purchased 65 percent of Canadian manufacturing output in 2000 and 87 percent of Canadian exports. Moreover, the United States annually sells 23 percent of its total exports and purchases 19 percent of its total imports from Canada.
- Mexico's third quarter GDP dropped by 1.6 percent compared with July-September 2000, the steepest contraction in the economy since the fourth quarter of 1995, when the country faced its deepest recession in decades. The economic contraction stems principally from lower U.S. demand for Mexican crude oil and manufactured products as a result of a sharp downturn in the U.S. economy--88percent of Mexico's exports were shipped to the United States in 2000.
    - U.S. exports to Mexico totaled $68.3 billion during January to September 2001, a decrease of 8 percent ($5.8 billion) from the corresponding period in 2000. Exports were led by electrical machinery and electronic equipment, principally computers and telecommunications equipment; motor-vehicles and parts; and plastic products and resins.
    - Capital and intermediate goods accounted for 81 percent of Mexico's imports from the United States during January to September 2001. The bulk of these imports are destined for Mexico's two temporary import programs: the Maquiladora Progam and PITEX. Production and employment under these programs fell by an estimated 10 percent during the third quarter of 2001 compared with the third quarter of 2000. Maquiladora employment fell to 1.1 million in September 2001, a decrease of 14 percent (181,917) from September 2000.
- During January-September 2001, U.S. imports from Mexico decreased by 2 percent ($1.5 billion) over the corresponding 2000 period. Electrical machinery, finished vehicles, auto parts, crude petroleum, and apparel were the leading imports from Mexico. Falling petroleum prices accounted for much of the decline in U.S. imports in 2001. The average per-barrel price for Mexico's crude mix fell by 35 percent to $10.52 in October 2001 compared with $16.15 in October 2000.

# NORTH AMERICAN TRADE

**Table A-5**
**North American trade, 1996-2000, January-September 2000, and January-September 2001**

| Item | 1996 | 1997 | 1998 | 1999 | 2000 | January-September 2000 | January-September 2001 | Percent change 2000/01 |
|---|---|---|---|---|---|---|---|---|
| | Value *(million dollars)* | | | | | | | |
| U.S.-Mexico trade: | | | | | | | | |
| Total imports from Mexico | 74,179 | 85,005 | 93,017 | 109,018 | 134,734 | 100,045 | 98,542 | -2 |
| U.S. imports under NAFTA | | | | | | | | |
| Total value | 55,076 | 62,837 | 68,326 | 71,317 | 83,995 | 62,840 | 61,141 | -3 |
| Percent of total imports | 74 | 74 | 73 | 65 | 62 | 63 | 62 | - |
| Total exports to Mexico | 54,686 | 68,393 | 75,369 | 81,381 | 100,442 | 74,116 | 68,314 | -8 |
| U.S. merchandise trade balance with Mexico[1] | -19,493 | -16,612 | -17,648 | -27,637 | -34,292 | -25,929 | -30,228 | -17 |
| U.S. -Canada trade: | | | | | | | | |
| Total imports from Canada | 156,299 | 167,881 | 174,685 | 198,242 | 229,060 | 170,137 | 166,982 | -2 |
| U.S. imports under NAFTA | | | | | | | | |
| Total value | 84,245 | 88,949 | 111,675 | 115,715 | 123,052 | 92,735 | 86,030 | -7 |
| Percent of total imports | 54 | 53 | 64 | 58 | 54 | 55 | 52 | - |
| Total exports to Canada | 119,123 | 134,794 | 137,768 | 145,731 | 155,601 | 117,397 | 110,595 | -6 |
| U.S. merchandise trade balance with Canada[2] | -37,176 | -33,087 | -36,918 | -52,511 | -73,459 | -52,740 | -56,387 | -7 |

[1] The hyphen (-) symbol indicates a loss or trade deficit, or not applicable. The $34.2 billion deficit in U.S. merchandise trade with Mexico in 2000 was partially offset by a $2.9 billion U.S. surplus in bilateral services trade.

[2] The $56.4 billion deficit in U.S. merchandise trade with Canada in 2000 was partially offset by a $5.3 billion U.S. surplus in bilateral services trade.

Source: Compiled by U.S. International Trade Commission staff from official statistics of the U.S. Department of Commerce. Statistics in footnote 2 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.