# Foreign trade alternatives for employment and occupations, 2005

*BLS examines the impacts on employment of two possible foreign trade alternatives—a high-trade scenario portrays stronger world growth and higher domestic demand; a low-trade scenario illustrates poorer economic performance abroad and weaker domestic economy with respect to trade*

Betty W. Su
and
Carl A. Chentrens

As the world turns increasingly into a global marketplace, the issue of foreign trade becomes more complex. U.S. trade with China has grown rapidly in recent years. New markets in Eastern Europe and in the former Republics of the Soviet Union are emerging. Perhaps the most important element on the trade horizon is the recently negotiated GATT (General Agreement on Tariffs and Trade) and the lately ratified NAFTA (North American Free Trade Agreement) among the United States, Canada, and Mexico.[1] Globalization of trade is an ongoing process that may be hastened or slowed, but chances are that it will not be stopped. The coming decade will likely see some major changes in the way products are produced and delivered to the consuming sector of the world economy.

The BLS projections of the U.S. economy to 2005, described in the November 1993 issue of the *Monthly Labor Review*,[2] offer three alternative views of potential growth to provide a range of future paths for final demand and employment. However, because those alternatives address only a few of the unknowns of the coming 13 years, special scenarios have been prepared which explore other areas of uncertainty in our economy.[3] This article focuses on the area of foreign trade, presenting an evaluation of the potential employment impacts of different levels of demand in this area.

To assess the impact of a U.S. economy which may be more or less competitive in world markets, the analysis of foreign trade presented here focuses primarily on the impacts on employment due to changes in exports and imports. The trade alternatives presented here do not attempt to portray the effects of any particular policy or trade agreement such as NAFTA. Rather, they are prepared to evaluate the sensitivity of the economy to changes in foreign trade. Exports and imports are both important components of our economy and are projected to become even more important between now and 2005. Because exports and imports tend to balance in the long run, their employment impacts at the aggregate level generally balance out except in terms of relative differences in the productivity of the industries affected. However, some industries are sensitive to trade growth. This analysis demonstrates that the shifting structure of the global economy brings prospective employment changes in many industries, some closely associated with foreign trade and others not normally so associated.

Betty W. Su and Carl A. Chentrens are economists in the Office of Employment Projections, Bureau of Labor Statistics.

## Historical perspective

*Trend in exports and imports.* U.S. exports and imports of goods and services are the two components of gross domestic product (GDP) that have gained the most in importance over the past 25 years. Exports (in 1987 dollars) grew at an average annual rate of 7.1 percent between 1970 and 1980, and increased their share of GDP from

## Measuring employment effects of foreign trade

BLS examines various employment alternatives for three particularly uncertain areas of the U.S. economy. The health care spending and infrastructure investment alternatives were presented in the April 1994 issue of the *Monthly Labor Review*. This analysis focuses on the foreign trade area.

In the health care and infrastructure analyses, a straightforward approach was used to assess effects of the alternatives as "employment related to health care spending" or "employment related to infrastructure investment." However, in the foreign trade alternatives, the impacts on employment are not examined from the point of view of "employment related to exports" and "employment related to imports." Subtle interweavings among economies in an increasingly global marketplace make it more difficult to disengage a study of exports from a study of imports. Also, it is especially difficult, if not impossible, in the context of the methodology used by BLS to present a clean estimate of the employment impacts of imports. Rather, the effects of changes in trade-determining factors are assessed in terms of overall GDP and total employment.

One way of looking at the impacts is to consider the overall changes in GDP and in all the components of GDP induced by the assumed changes in the factors affecting foreign trade. This includes not only changes in trade-related employment (direct and indirect), but also changes in employment related to all other categories of demand—consumption, investment, and government. A different way of looking at trade-related employment impacts is to allow only the export and import levels to change and keep all other GDP categories fixed in 2005 at the level from the moderate-growth projection. Although this is a rather artificial approach, it does serve to isolate the direct and indirect impacts of foreign trade changes from the total induced changes discussed above.

**Table 1. Exports and imports of goods and services, selected years**

[Billions of 1987 dollars]

| Item | 1970 | 1975 | 1980 | 1985 | 1990 | 1992 |
|---|---|---|---|---|---|---|
| GDP | $2,868.0 | $3,221.7 | $3,776.4 | $4,279.8 | $4,897.3 | $4,979.3 |
| Total exports | 161.3 | 232.9 | 320.5 | 309.2 | 510.5 | 578.8 |
| Goods | 125.2 | 178.5 | 248.2 | 224.8 | 368.9 | 426.5 |
| Services | 36.1 | 54.4 | 72.3 | 84.4 | 141.6 | 152.3 |
| Total imports | 196.4 | 209.8 | 289.9 | 454.6 | 565.1 | 611.2 |
| Goods | 142.1 | 163.3 | 235.7 | 366.5 | 461.4 | 512.8 |
| Services | 54.3 | 46.5 | 54.2 | 88.1 | 103.7 | 98.4 |
| Net exports | –35.2 | 23.1 | 30.7 | –145.3 | –54.7 | –32.4 |
| Goods | –16.9 | 15.2 | 12.6 | –141.7 | –92.5 | –86.3 |
| Services | –18.3 | 7.9 | 18.1 | –3.6 | 37.9 | 53.9 |
| **Percent distribution** | | | | | | |
| Total exports | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Goods | 77.6 | 76.7 | 77.4 | 72.7 | 72.3 | 73.7 |
| Services | 22.4 | 23.3 | 22.6 | 27.3 | 27.7 | 26.3 |
| Total imports | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Goods | 72.3 | 77.9 | 81.3 | 80.6 | 81.6 | 83.9 |
| Services | 27.7 | 22.1 | 18.7 | 19.4 | 18.4 | 16.1 |
| **Percent of GDP** | | | | | | |
| Total exports | 5.6 | 7.2 | 8.5 | 7.2 | 10.4 | 11.6 |
| Goods | 4.4 | 5.5 | 6.6 | 5.3 | 7.5 | 8.6 |
| Services | 1.2 | 1.7 | 1.9 | 1.9 | 2.9 | 3.0 |
| Total imports | 6.8 | 6.5 | 7.7 | 10.6 | 11.5 | 12.3 |
| Goods | 4.9 | 5.1 | 6.2 | 8.6 | 9.4 | 10.3 |
| Services | 1.9 | 1.4 | 1.5 | 2.0 | 2.1 | 2.0 |
| Net exports | –1.2 | .7 | .8 | –3.4 | –1.1 | –.6 |
| Goods | –.5 | .4 | .4 | –3.3 | –1.9 | –1.7 |
| Services | –.7 | .3 | .4 | –.1 | .8 | 1.1 |

SOURCE: Bureau of Economic Analysis, U.S. Department of Commerce.

5.6 percent to 8.5 percent over the same period. Imports also grew strongly, at 4.0 percent per year over the 1970–80 period, increasing from 6.8 to 7.7 percent of GDP. (See table 1.)

Exchange rate fluctuations of the U.S. dollar relative to other currencies in the first half of the 1980's, combined with much stronger competition in export markets, led to declines in U.S. real exports of 0.7 percent per year between 1980 and 1985. Imports, on the other hand, continued to do well over this period, as the appreciated exchange rate favored foreign producers and many U.S. industries appeared to have difficulties competing with European and Japanese manufacturers. Imports continued to grow strongly, accelerating to 9.4-percent annual growth between 1980 and 1985.

After 1985, the exchange rate of the U.S. dollar relative to other currencies fell quite rapidly. The depreciated exchange rate made exports relatively cheaper than imports, leading to lower prices abroad for U.S. produced goods. At the same time, there seemed to be increasing demand for U.S. products, notably machinery, and exports grew more rapidly. Between 1986 and 1992, exports rose by 9.8 percent annually, while imports slowed to a 3.9-percent rate of growth. By 1992, exports accounted for an 11.6-percent share of GDP, while the import share had risen to 12.3 percent.

In recent years, the United States has enjoyed a large surplus in the trade of services while running a still large but improving deficit in the trade of goods. Goods accounted for about three-fourths of total U.S. exports and imports during the 1970's. Exports of services, however, have become increasingly important during the past two decades: from 22 percent of total exports in 1970, or 1.2 percent of GDP, they rose to 26 percent of total exports, or 3.0 percent of GDP in 1992. The trend in imports of services was in the opposite direction. Services declined sharply as a share of total imports between 1970 and 1992, from 28 percent to 16 percent, while their import share of GDP remained about 2 percent over the same period. The substantial increase in exports of services led to a trade surplus in services of $54 billion in 1992, compared with a deficit of $18 billion in 1970. On the other hand, the merchandise trade deficit rose to $86 billion from $17 billion over the 1970–92 period.

*Industry-level exports.* Other important trends in U.S. foreign trade relationships become apparent only at the industry level of detail. Twenty industries accounted for 47 percent of total exports in 1977. (See table 2.) Of these, 13 were in the goods-producing sector of our economy. Others included wholesale trade, air transportation, water transportation, and trucking and warehousing—those service sectors that facilitate the transfer of goods between producers and purchasers. Only 3 of the top 20 industries were true service-producing industries—depository institutions, real estate, and security and commodity brokers. The aerospace, motor vehicles, agricultural products, and chemical industries accounted for a significant proportion of total exports in 1977, a proportion that increased noticeably between that year and 1990.[4]

By 1990, the top 20 exporting industries accounted for over 50 percent of total exports. Although the United States exports goods and services across a broad range of industries, a significant proportion of those exports are becoming increasingly concentrated in a relatively small handful of industries.

A slightly different approach to understanding exports at the industry level is to examine them from the point of view of the export share of output.[5] This approach allows us to identify those industries most affected by exports, and to analyze how their export share of output compares with the overall average for the economy. Exports accounted for 3.8 percent of output (in 1987 dollars) in 1977, a share that rose to almost 6 percent by 1990.

Table 2. **Real exports of goods and services, top 20 industries, 1977, 1990, and projected to 2005**

| Industry | Percent distribution | | |
|---|---|---|---|
| | 1977 | 1990 | 2005 moderate-growth |
| Total exports | 100.0 | 100.0 | 100.0 |
| Computer equipment | .3 | 6.1 | 12.7 |
| Wholesale trade | 8.0 | 7.0 | 6.7 |
| Air transportation | 2.2 | 4.0 | 4.0 |
| Aircraft | 2.9 | 3.4 | 2.6 |
| Real estate | 3.1 | 2.3 | 2.4 |
| Semiconductors and related devices | .5 | 2.1 | 2.2 |
| Other agricultural products | 4.9 | 3.1 | 2.2 |
| Motor vehicles and car bodies | 5.1 | 2.8 | 2.1 |
| Motor vehicle parts and accessories | 3.9 | 2.4 | 2.0 |
| Aircraft and missile parts and equipment | 1.3 | 1.8 | 1.9 |
| Depository institutions | 1.8 | 1.6 | 1.7 |
| Water transportation | 2.5 | 2.3 | 1.6 |
| Industrial chemicals | 3.1 | 2.6 | 1.6 |
| Miscellaneous electronic components | .7 | 1.3 | 1.4 |
| Measuring and controlling devices; watches | 1.5 | 1.4 | 1.4 |
| Petroleum refining | 1.4 | 1.8 | 1.4 |
| Aircraft and missile engines | .9 | 1.4 | 1.3 |
| Plastics materials and synthetics | 1.2 | 1.6 | 1.3 |
| Security and commodity brokers | .1 | 1.0 | 1.1 |
| Trucking and warehousing | 1.2 | .9 | 1.1 |
| All other industries | 53.4 | 49.1 | 47.3 |

SOURCE: Historical data, Bureau of Economic Analysis, U.S. Department of Commerce; projected data, Bureau of Labor Statistics.

Table 3 presents the 20 industries with the largest share of output going to exports. Clearly, although exports as a whole accounted for only 4 to 6 percent of production over the 1977–90 period, exports of these industries accounted for significant shares of their output historically. With the exception of water transportation, all of these industries are in the manufacturing sector and are generally classified as "high-tech," producing highly complex products with very capital-intensive production methodologies and generally having higher rates of growth in labor productivity. For these 20 industries as a group, about one-fifth of output was accounted for by exports in 1977, rising to almost 30 percent by 1990.

*Industry-level imports.* Turning to imports, it is not surprising to see a somewhat different story. In 1977, 20 industries accounted for 56 percent of imports. (See table 4.) Of these, three—motor vehicles, crude petroleum, and petroleum refining—accounted for one-third of total imports. While motor vehicles rose slightly in share terms between 1977 and 1990, the two petroleum industries—particularly crude petroleum—dropped in share, from 23 percent to 11 percent, over the same period. Unlike exports, which are becoming more concentrated in a handful of industries, imports are becoming broader-based, affecting a wider range of industries.

In 1977, total imports of goods and services accounted for about 4 percent of total supply (domestic output plus imports), rising to 6 percent by 1990. (See table 5.) In 1977, import penetration was highest in household audio and video equipment; fishing, hunting, and trapping; footwear; and crude petroleum—industries with traditionally high shares of demand satisfied by foreign manufacturers. By 1990, these traditional import industries had been joined by another group of sectors with only very low 1977 import penetration ratios—industries such as telephone and telegraph apparatus, computers, electric lighting and wiring, and x-ray and other electromedical apparatus. In short, foreign producers became competitive over the 1980's in many industries not formerly considered to be import-sensitive. This shift has been eased by more rapid international technology transfer.

Table 3. **Real exports of goods and services as a share of output, top 20 industries, 1977, 1990, and projected to 2005**

| Industry | Percent of output[1] | | |
|---|---|---|---|
| | 1977 | 1990 | 2005 moderate-growth |
| Total exports | 3.8 | 5.6 | 9.2 |
| Aircraft | 31.8 | 39.7 | 62.6 |
| Computer equipment | 29.1 | 41.6 | 59.8 |
| Mining and oil field machinery | 25.2 | 41.2 | 58.7 |
| Ammunition and ordnance, except small arms | 28.8 | 23.6 | 56.8 |
| Aircraft and missile parts and equipment | 31.8 | 32.4 | 55.7 |
| Aircraft and missile engines | 20.0 | 27.4 | 45.6 |
| Construction machinery | 27.3 | 24.7 | 42.8 |
| Engines and turbines | 18.7 | 21.0 | 42.5 |
| X-ray and other electromedical apparatus | 12.9 | 24.5 | 41.3 |
| Water transportation | 20.9 | 32.0 | 40.0 |
| Office and accounting machines | 11.0 | 21.8 | 40.0 |
| Household audio and video equipment | 9.6 | 22.0 | 39.6 |
| Special industry machinery | 27.6 | 22.6 | 38.1 |
| Electrical equipment and supplies, n.e.c. | 13.4 | 27.2 | 37.9 |
| Miscellaneous transportation equipment | 16.0 | 16.4 | 37.3 |
| Electric lighting and wiring equipment | 5.6 | 17.8 | 36.4 |
| Semiconductors and related devices | 29.3 | 39.5 | 36.0 |
| Tobacco manufactures | 11.5 | 15.7 | 35.9 |
| Farm and garden machinery | 11.2 | 19.6 | 35.7 |
| Measuring and controlling devices; watches | 18.4 | 22.9 | 34.3 |

[1] Domestic output in real terms. (See footnote 5.)

n.e.c. = not elsewhere classified.

SOURCE: Historical data, Bureau of Economic Analysis, U.S. Department of Commerce; projected data, Bureau of Labor Statistics.

## The moderate-growth projection

Foreign trade determination is interrelated and highly complex. As exports grow more or less rapidly, effects are seen in other categories of domestic spending as domestic incomes increase at varying rates of growth. To the extent that healthy or ailing export growth affects the Federal deficit and inflation in this country ( and thus abroad), the exchange rate of the dollar likely will shift. In combination with domestic income changes, this shift in turn affects imports.

The export and import components used in the moderate-growth alternative developed for the regular set of BLS projections published in the November 1993 issue of the *Review* are based on the assumption that the recent pattern of improvement in the U.S. trade position will continue. Overall, exports of goods and services are projected to increase at an average annual rate of 5.0 percent over the 1992–2005 period, while imports grow by 4.1 percent. Both exports and imports are projected to increase their share of GDP by significant amounts in the next decade. By 2005, the net trade balance on goods and services is expected to attain a net positive level of $51 billion, although there is still a deficit in merchandise trade.[6]

At the industry level, export growth in these projections continues to be concentrated in a relatively small group of industries. Industries in which exports are expected to account for the largest shares of output are also those with higher capital-labor ratios and higher projected rates of

growth in labor productivity. (See tables 2 and 3.) Import demand will also continue recent trends become broader-based over time, as imports become more prominent in many domestic markets. (See tables 4 and 5.)

## Special foreign trade alternatives

In this study, the moderate-growth alternative is used as a baseline, and two alternative projections of foreign trade are developed to examine a high and a low volume of trade. The high-trade alternative illustrates a world with stronger trade growth and higher domestic demand; the low-trade alternative illustrates poorer economic performance abroad and a weaker domestic economy with respect to trade.

*Aggregate assumptions.* Under the high-trade scenario, real exports of goods and services are assumed to be 10 to 15 percent higher in total than in the moderate-growth projection in 2005. This is combined with the assumption that imports are likely to grow in tandem with exports over the long run. Only export and import levels are changed; all other GDP categories are assumed to remain constant, so that GDP is unchanged from the level for the moderate-growth alternative. This approach allows us to isolate the direct and indirect impacts on employment of foreign trade changes from the total induced changes in employment. (See text box.)

In like manner, a low-trade alternative assumes that real exports of goods and services decrease by about 8 to 10 percent from the moderate-growth level of exports, and that imports are lower by an amount equal to the decrease in exports, tending toward trade balance in goods and services over the long run, although there is still a deficit in merchandise trade. Again, no changes in other final demand categories are assumed, and GDP equals that of the moderate-growth projection in 2005:

| | 2005 | | |
|---|---|---|---|
| | *Low-trade* | *Moderate-growth* | *High-trade* |
| GDP (billions of 1987 dollars) | $6,629.1 | $6,629.1 | $6,629.1 |
| Exports of goods and services | 964.4 | 1,088.4 | 1,239.9 |
| Imports of goods and services | 913.4 | 1,037.4 | 1,188.9 |
| Net exports of goods and services | 51.0 | 51.0 | 51.0 |

Table 4. **Real imports of goods and services, top 20 industries, 1977, 1990, and projected to 2005**

| Industry | Percent distribution | | |
|---|---|---|---|
| | 1977 | 1990 | 2005 moderate-growth |
| Total imports | 100.0 | 100.0 | 100.0 |
| Computer equipment | .0 | 4.9 | 13.9 |
| Motor vehicles and car bodies | 10.8 | 11.7 | 7.9 |
| Apparel | 3.0 | 5.1 | 5.9 |
| Crude petroleum, natural gas, and gas liquids | 16.7 | 7.2 | 5.6 |
| Household audio and video equipment | 1.6 | 3.1 | 4.6 |
| Semiconductors and related devices | .5 | 2.3 | 3.1 |
| Petroleum refining | 6.1 | 4.1 | 2.9 |
| Motor vehicle parts and accessories | 3.0 | 2.9 | 2.2 |
| Air transportation | 1.9 | 1.6 | 2.1 |
| Miscellaneous electronic components | .4 | 1.5 | 1.7 |
| Industrial chemicals | 2.0 | 1.7 | 1.3 |
| Pulp, paper, and paperboard mills | 2.1 | 1.7 | 1.3 |
| Footwear, except rubber and plastic | 1.1 | 1.5 | 1.3 |
| Measuring and controlling devices; watches | 1.0 | 1.2 | 1.2 |
| Photographic equipment and supplies | .6 | 1.1 | 1.2 |
| Toys and sporting goods | .6 | 1.4 | 1.2 |
| Blast furnaces and basic steel products | 3.8 | 1.8 | 1.1 |
| General industrial machinery | .7 | 1.0 | 1.1 |
| Telephone and telegraph apparatus | .1 | .9 | 1.0 |
| Electric lighting and wiring equipment | .2 | .8 | 1.0 |
| All other industries | 43.8 | 42.5 | 38.4 |

SOURCE: Historical data, Bureau of Economic Analysis, U.S. Department of Commerce; projected data, Bureau of Labor Statistics.

*Industry assumptions.* Exports and imports of goods and services are widely distributed across many industries. However, alternative foreign trade growth paths will likely have a greater impact on some industries than on others. For instance, the advance of market economies in Third World countries and in former Republics of the Soviet Union and Eastern Bloc countries may significantly increase their demand for capital goods such as computers and communications equipment. In this analysis, export- and import-sensitive industries for the high-trade scenario are defined as those accounting for a larger than proportional share of the assumed changes in trade balances.[7]

Industries for which exports are projected to reach or exceed 35 percent of output in 2005 are deemed export sensitive.[8] (See table 3.) Export-sensitive industries include those generally considered to be "high-tech" in nature, such as those manufacturing computers, electronic components, and aircraft, and those assisting in the development of foreign capital equipment, such as communications equipment. Technological advancement has become a worldwide priority, and the U.S. technological lead in many industries is

acknowledged. However, other industries not usually thought of as high-tech, such as tobacco products and farm and garden machinery, also are considered export sensitive. Industries producing services for business, such as advertising and legal services, are assumed to be sensitive to trade conditions, because they are needed for the emerging global market system.

By the same token, the import-sensitive industries are here defined as those projected to reach an import penetration rate of 30 percent or more by 2005. (See table 5.) Among these industries, some are highly labor-intensive with lower rates of growth in productivity, such as footwear, apparel, and luggage and handbags. Others, such as semiconductors and related devices, often are not considered to be traditional import industries themselves, but are in fact import sensitive because they supply inputs to many export-sensitive industries, such as computers, broadcasting and communications equipment, and telephone and telegraph apparatus. The tourist-related industries are also included, due mainly to the increases in international business and tourism.

In the low-trade scenario, there are no industry-specific assumptions made beyond the aggregate results for both exports and imports. In other words, the low-trade alternative does not explore any particular sensitivity of the individual industries to the low volume trade conditions. All industries are assumed to be affected proportionally by weaker foreign markets and the weaker domestic purchasing power in the low-trade projection.

Table 5. **Real imports of goods and services as a share of output, top 20 industries, 1977, 1990, and projected to 2005**

| Industry | Percent of total supply[1] | | |
|---|---|---|---|
| | 1977 | 1990 | 2005 moderate-growth |
| Total imports | 4.1 | 5.9 | 8.1 |
| Footwear, except rubber and plastic | 34.3 | 68.0 | 86.4 |
| Household audio and video equipment | 43.8 | 63.0 | 77.9 |
| Luggage, handbags, and leather products, n.e.c. | 18.2 | 42.9 | 59.5 |
| Fishing, hunting, and trapping | 42.5 | 54.9 | 57.7 |
| Apparel | 14.9 | 36.2 | 55.4 |
| Jewelry, silverware, and plated ware | 26.5 | 42.4 | 49.6 |
| Crude petroleum, natural gas, and gas liquids | 32.6 | 34.6 | 48.4 |
| Office and accounting machines | 25.5 | 31.2 | 47.5 |
| Toys and sporting goods | 18.5 | 43.9 | 45.2 |
| Ophthalmic goods | 21.2 | 36.8 | 45.1 |
| Telephone and telegraphic apparatus | 1.9 | 24.3 | 39.8 |
| Computer equipment | 4.9 | 27.1 | 38.3 |
| Electric lighting and wiring equipment | 2.6 | 19.5 | 35.4 |
| Photographic equipment and supplies | 10.5 | 23.2 | 32.8 |
| Semiconductors and related devices | 24.4 | 33.0 | 32.3 |
| X-ray and other electromedical apparatus | 9.8 | 23.2 | 30.6 |
| Motor vehicles and car bodies | 20.0 | 32.5 | 30.6 |
| Manufactured products, n.e.c. | 10.6 | 20.4 | 29.9 |
| Electric distribution equipment | 10.0 | 13.6 | 29.3 |
| Special industry machinery | 12.9 | 23.0 | 29.1 |

[1] Total supply is defined as domestic output plus imports.

n.e.c. = not elsewhere classified.

SOURCE: Historical data, Bureau of Economic Analysis, U.S. Department of Commerce; projected data, Bureau of Labor Statistics.

*Results.* To evaluate the impacts of the special alternatives on employment, the alternative demand distribution is translated into direct and indirect employment requirements at the industry and occupational levels, by use of an input-output table expressed in terms of employment requirements and an industry-occupation matrix.[9]

It is clear that a rise in exports will increase employment in the economy as growing demand abroad translates into greater domestic production levels. A rise in imports, on the other hand, implies a decrease in employment (all other things equal) as less is produced domestically and more of a given level of demand is satisfied with foreign-produced products. More than other categories of demand spending examined in the Bureau's analytical system, however, neither imports nor exports are determined in a vacuum. As factors affecting exports change, other factors that come into play which have an impact on imports, and vice versa. Over the long run, the tendency will be for exports and imports to equilibrate, which accounts for the absence of changes assumed in the alternative net trade figures used here.

*Total changes in employment.* Because the trade balance level is assumed to be the same for all three alternatives over the long run, employment effects at the aggregate level are expected to balance out except in the case of relative differences in the productivity of the respective industries that are affected by shifting trade. As indicated in table 6, the changes in employment from the 2005 moderate-growth projection are very small—30,000 fewer jobs in the low-trade scenario, and an increase of 16,000 in the high-trade alternative.

Within major industry sectors, the greatest job impact is felt in manufacturing. Accompanying the expansion of exports and related job opportunities in industries with high productivity growth, however, is an even faster growth of imports in industries that support relatively slower growth in labor productivity. By 2005, the manufacturing sector as a whole is projected to decrease by 382,000 more jobs in the high-trade scenario than in the moderate-growth projection. Employment in the low-trade alternative is expected to be 303,000 less in the manufacturing sector by 2005, compared with that in the moderate-growth projection.

In the wholesale and retail trade sector—those industries that facilitate the process of "getting

Table 6. **Employment by major industry sector, 1977, 1992 and projected to 2005**

[Thousands of jobs]

| Major industry sector | 1977 | 1992 | 2005 | | |
|---|---|---|---|---|---|
| | | | Low-trade | Moderate-growth | High-trade |
| Total employment | 91,955 | 121,092 | 147,452 | 147,482 | 147,498 |
| Agriculture, forestry, fisheries | 3,333 | 3,295 | 3,330 | 3,325 | 3,325 |
| Mining | 834 | 654 | 594 | 575 | 550 |
| Construction | 4,846 | 5,969 | 7,480 | 7,483 | 7,486 |
| Manufacturing | 20,100 | 18,438 | 18,302 | 17,999 | 17,617 |
| Durable manufacturing | 11,873 | 10,485 | 10,066 | 9,963 | 9,828 |
| Nondurable manufacturing | 8,227 | 7,953 | 8,236 | 8,036 | 7,789 |
| Transportation services | 2,841 | 3,812 | 4,598 | 4,667 | 4,737 |
| Communications | 1,187 | 1,279 | 1,131 | 1,135 | 1,142 |
| Public utilities | 751 | 963 | 1,088 | 1,084 | 1,079 |
| Wholesale and retail trade | 20,548 | 27,255 | 32,383 | 32,523 | 32,688 |
| Finance, insurance, real estate | 4,832 | 7,217 | 8,735 | 8,781 | 8,840 |
| Services | 17,556 | 33,557 | 47,794 | 47,890 | 48,009 |
| Government | 15,126 | 18,652 | 22,017 | 22,021 | 22,025 |

SOURCE: Historical and projected data, Bureau of Labor Statistics.

to market"—increases or decreases in foreign trade activity generate greater or lesser indirect demand. This is the case also in the services sector, where job shifts are due only in small part to direct increases or decreases in foreign trade in services. As production levels change in the primary export and import industries, demand begins to change for those industries that supply the primary sector, thus leading to secondary, or indirect, effects on both production and the employment related to that production.

At the detailed industry level, the net impacts on employment vary by industry, and it is here that imports and exports can have their most significant effects on our economy. Table 7 presents the industries with the largest changes in employment from the moderate-growth projection under the low- and high-trade scenarios. The industries most affected by foreign trade are led by wholesale trade and apparel. In the low-trade scenario, wholesale trade exhibits considerably slower job growth—employment is lower by 110,000 jobs than in the moderate-growth alternative—while in the high-trade scenario, wholesale trade is projected to be higher by 127,000 jobs. An increase or a decrease in trade activity means more or less commerce, thus providing greater or lesser indirect demand for wholesalers. Conversely, the apparel industry is expected to decrease by 84,000 *fewer* jobs in the low-trade alternative, and decrease by 111,000 *more* jobs in the high-trade alternative, compared with the moderate-growth scenario. This industry has fewer jobs under the high-trade scenario because import competition rises as demand increases for foreign-produced products. A number of services industries such as colleges and universities and legal services also are included among the industries affected by foreign trade.

In general, the high-trade alternative has a more favorable employment impact on industries that depend greatly on the volume of overall trade activity, such as air transportation, water transportation, and wholesale and retail trade. As discussed earlier, this is primarily due to the indirect effects of increasing demand in the foreign trade area. Also, the "high-tech" industries, such as aircraft and aircraft and missile parts and equipment appear to affect employment positively in the high-trade projection because of the U.S. competitive advantage. Conversely, traditional import-related industries, such as apparel, footwear, and luggage, are affected most because of the increases in import competition.

As can be seen from table 7, the industries with the largest employment impacts in the high-trade alternative are also those most affected in the low-trade alternative. However, the effects are in the opposite direction. Over half of the industries show either no effects or very small employment differences in the special trade alternatives. Not surprisingly, these include many industries not normally associated with foreign trade. It is more important to note that industries with both high exports and high imports also are included in the list of industries with little change. When exports and imports move in tandem, employment effects of export growth often are offset by effects of import growth. Table 8 illustrates this point for a select list of industries.

*Occupational impacts.* Every major occupational group is projected to be affected by trade changes, but only modestly. The differences in projected occupational employment changes among the alternatives are caused only by differences in projected levels of industry employment. In the low-

Table 7. **Employment by selected industry, 1977, 1992 and projected to 2005 with level changes**

[Thousands of jobs]

| Industry | 1977 | 1992 | 2005 | | | Differences from moderate-growth | |
|---|---|---|---|---|---|---|---|
| | | | Low-trade | Moderate-growth | High-trade | Low | High |
| Wholesale trade | 5,004 | 6,404 | 7,500 | 7,610 | 7,737 | −110 | 127 |
| Aircraft and missile parts and equipment | 89 | 170 | 242 | 259 | 284 | −17 | 25 |
| Aircraft | 270 | 332 | 284 | 302 | 326 | −18 | 24 |
| Retail trade, except eating and drinking places | 11,293 | 13,978 | 15,928 | 15,945 | 15,967 | −17 | 22 |
| Depository institutions | 1,699 | 2,106 | 2,184 | 2,204 | 2,226 | −20 | 22 |
| College and universities | 705 | 1,027 | 1,217 | 1,236 | 1,257 | −19 | 21 |
| Trucking and warehousing | 1,399 | 1,839 | 2,239 | 2,256 | 2,274 | −17 | 18 |
| Real estate | 1,065 | 1,670 | 2,075 | 2,086 | 2,102 | −11 | 16 |
| Eating and drinking places | 4,251 | 6,873 | 8,955 | 8,969 | 8,984 | −14 | 15 |
| Water transportation | 199 | 176 | 158 | 171 | 186 | −13 | 15 |
| Other agricultural products | 1,497 | 1,088 | 840 | 846 | 860 | −6 | 14 |
| Air transportation | 390 | 735 | 955 | 973 | 986 | −18 | 13 |
| Management and public relations | 0 | 793 | 1,366 | 1,375 | 1,388 | −9 | 13 |
| Aircraft and missile engines | 130 | 149 | 137 | 146 | 159 | −9 | 13 |
| Computer and data processing services | 192 | 903 | 1,768 | 1,777 | 1,789 | −9 | 12 |
| Legal services | 579 | 1,142 | 1,501 | 1,509 | 1,520 | −8 | 11 |
| Passenger transportation arrangement | 0 | 198 | 309 | 320 | 331 | −11 | 11 |
| Computer equipment | 240 | 355 | 232 | 237 | 246 | −5 | 9 |
| Engineering and architectural services | 472 | 827 | 1,105 | 1,109 | 1,118 | −4 | 9 |
| Hotels and other lodging places | 1,268 | 1,626 | 2,584 | 2,589 | 2,596 | −5 | 7 |
| Miscellaneous transportation services | 0 | 176 | 225 | 231 | 238 | −6 | 7 |
| Communications, except broadcasting | 1,005 | 918 | 728 | 732 | 739 | −4 | 7 |
| Motion pictures | 287 | 426 | 580 | 586 | 593 | −6 | 7 |
| Security and commodity brokers | 209 | 507 | 651 | 656 | 662 | −5 | 6 |
| Insurance carriers | 1,141 | 1,480 | 1,656 | 1,660 | 1,666 | −4 | 6 |
| Apparel | 1,149 | 823 | 653 | 569 | 458 | 84 | −111 |
| Footwear, except rubber and plastic | 168 | 69 | 67 | 39 | (1) | 28 | (2) |
| Household audio and video equipment | 123 | 82 | 89 | 64 | 30 | 25 | −34 |
| Weaving, finishing, yarn, and thread mills | 548 | 363 | 311 | 292 | 268 | 19 | −24 |
| Motor vehicle parts and accessories | 429 | 421 | 438 | 419 | 397 | 19 | −22 |
| Knitting mills | 238 | 203 | 189 | 175 | 156 | 14 | −19 |
| Luggage, handbags, and leather products | 93 | 52 | 45 | 34 | 16 | 11 | −18 |
| Fishing, hunting, and trapping | 54 | 69 | 95 | 83 | 66 | 12 | −17 |
| Crude petroleum, natural gas, and gas liquids | 177 | 198 | 186 | 173 | 156 | 13 | −17 |
| Motor vehicles and car bodies | 443 | 314 | 253 | 241 | 227 | 12 | −14 |
| Miscellaneous plastics products, n.e.c. | 425 | 622 | 856 | 845 | 833 | 11 | −12 |
| Toys and sporting goods | 130 | 119 | 113 | 105 | 93 | 8 | −12 |
| Miscellaneous electronic components | 247 | 309 | 311 | 302 | 292 | 9 | −10 |
| Metalworking machinery | 359 | 307 | 345 | 339 | 329 | 6 | −10 |
| Blast furnaces and basic steel products | 554 | 250 | 234 | 226 | 217 | 8 | −9 |
| Semiconductors and related devices | 148 | 219 | 230 | 226 | 217 | 4 | −9 |
| Miscellaneous fabricated textile products | 185 | 210 | 229 | 221 | 212 | 8 | −9 |
| Jewelry, silverware, and plated ware | 65 | 58 | 63 | 57 | 49 | 6 | −8 |
| Manufactured products, n.e.c. | 278 | 237 | 240 | 232 | 224 | 8 | −8 |
| Rubber products and plastic hose and footwear | 199 | 171 | 166 | 159 | 152 | 7 | −7 |
| Telephone and telegraph apparatus | 149 | 108 | 84 | 81 | 74 | 3 | −7 |
| Miscellaneous fabricated metal products | 249 | 224 | 210 | 205 | 199 | 5 | −6 |
| Electric lighting and wiring equipment | 208 | 175 | 160 | 156 | 150 | 4 | −6 |
| Sawmills and planing mills | 242 | 191 | 179 | 175 | 169 | 4 | −6 |
| General industrial machinery | 278 | 244 | 250 | 248 | 243 | 2 | −5 |

[1] Less than 10,000 jobs.

[2] Not computable.

n.e.c. = not elsewhere classified.

SOURCE: Historical and projected data, Bureau of Labor Statistics.

trade projection, most occupational groups end up with lower employment levels than in the moderate-growth scenario, while the high-trade alternative leads to higher employment levels.

Among detailed occupations, the largest effects are expected among those occupations with very large number of workers, such as general managers and top executives, salespersons, truck-drivers, sewing-machine operators, and blue-collar worker supervisors. However, the majority of occupations show marginal differences among the three alternative projections.

## Summary

The analyses of the effects of foreign trade on employment are complicated by the interrelationships of export and import determination. Results of the two alternative trade models described above differ by only 46,000 jobs in long-term employment growth projected for the economy. The implication seems to be that exports and imports moving in tandem are not important with regard to their effects on aggregate employment. However, the impacts on employment changes vary by industry. □

**Table 8. Industries showing little employment change among alternative trade growth scenarios**

[Thousands of jobs]

| Industry | 2005 | | | Difference from moderate-growth | |
|---|---|---|---|---|---|
| | Low-trade | Moderate-growth | High-trade | Low | High |
| Electrical equipment and supplies, n.e.c. | 49 | 49 | 49 | 0 | 0 |
| Miscellaneous transportation equipment | 58 | 57 | 57 | 1 | 0 |
| X-ray and other electro-medical apparatus | 58 | 58 | 57 | 0 | –1 |
| Office and accounting machines | 27 | 27 | 25 | 0 | –2 |
| Metal mining | 68 | 65 | 62 | 3 | –3 |
| Drugs | 296 | 297 | 298 | –1 | 1 |

n.e.c. = not elsewhere classified.

## Footnotes

[1] Many studies have examined the potential impact on the U.S. economy of the North American Free Trade Agreement. For the most recent work, see "Agriculture in a North American Free Trade Agreement," Foreign Agricultural Economic Report no. 246 (U.S. Department of Agriculture, September 1992); "North American Free Trade Agreement: America's Competitive Future, *Business America* (U.S. Department of Commerce), Oct 19, 1992; "U.S.-Mexico Trade: Pulling Together or Pulling Apart?" (U.S. Congress, Office of Technology Assessment, October 1992); "The Employment Effects of the North American Free Trade Agreement: Recommendations and Background Studies, Special Report no. 33 (National Commission for Employment Policy, October 1992); "Potential Impact on the U.S. Economy and Selected Industries of the North American Free-Trade Agreement," USITC publication no. 2596 (U.S. International Trade Commission, January 1993; the following publications of the U.S. Congress, Congressional Budget Office: "Estimating the Effects of NAFTA: An Assessment of the Economic Models and Other Empirical Studies (June 1993), and "A Budgetary and Economic Analysis of the North American Free Trade Agreement" (July 1993); and William R. White, "The Implications of the FTA and NAFTA for Canada and Mexico," Technical Report no. 70 (Bank of Canada, August 1994).

[2] A series of five articles, entitled "The American work force, 1992–2005," appeared in the *Monthly Labor Review* in November 1993.

[3] See Janet Pfleeger and Brenda Wallace, "Health care alternatives: employment and occupations in 2005," *Monthly Labor Review*, April 1994, pp. 29–37; and Arthur J. Andreassen and Jay M. Berman, "Infrastructure alternatives for 2005: employment and occupations," on pp. 22–28 of the same issue.

[4] In this section, the analysis covers the period from 1990 to 2005, rather than 1992 to 2005, because the industry-level trade analyses presented here have been derived primarily from much more detailed industry data that are not yet available for years after 1990.

[5] Output is defined as gross domestic output or duplicated output. It is a gross or duplicated measure in that it includes not only gross domestic product (GDP), or all final demand purchases of new goods and services, but also all new goods and services produced as intermediate goods for use in further production. For further discussion of industry output, see James C. Franklin, "Industry output and employment," *Monthly Labor Review*, November 1993, pp. 41–57.

[6] For a fully detailed discussion of the Bureau's moderate-growth projections, see Norman C. Saunders, "The U.S. economy: framework for BLS projections," *Monthly Labor Review*, November 1993, pp. 11–30.

[7] In the high-trade alternative, all of the identified export- and import-sensitive industries are assumed to absorb 5 percent more than proportional share of the assumed changes.

[8] For the most recent studies regarding the trade-sensitive industries, see Robert W. Bednarzik, "An analysis of U.S. industries sensitive to foreign trade, 1982–87," *Monthly Labor Review*, February 1993, pp. 15–31; and Robert C. Shelburne and Robert W. Bednarzik, "Geographic concentration of trade-sensitive employment," *Monthly Labor Review*, June 1993, pp. 3–13.

[9] Once a commodity distribution of GDP has been estimated, this "bill-of-goods" is then translated into industry-level employment by multiplying the demand vector by an employment requirements table. The employment requirements table derived from the projected industry total requirements table and industry employment-output ratios from the basic projections estimates, translate a demand bill-of-goods into the employment in all industries necessary to produce a given level and mix of GDP. Finally, a set of industry employments is translated into the set of occupational demands within each of these industries by the use of an occupational staffing pattern matrix, also estimated for 2005 in the basic projections estimation process. This analysis estimates only production-related changes in employment and occupations and does not address the impacts of income multiplier effects on employment. The data underlying the employment requirements table represent annual averages and should be used for marginal analyses—that is, assessing the effect of an additional increase or decrease in the expenditure category—with caution.