U.S. TRADE-RELATED EMPLOYMENT

Final Report on Investigation No. 332-154 Under Section 332 of the Tariff Act of 1930

USITC PUBLICATION 1445

OCTOBER 1983

United States International Trade Commission / Washington, D.C. 20436

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This study examines the labor content of U.S. merchandise trade for the years 1978 through 1982. It provides estimates for both the direct and the total labor content of this trade. The direct labor content of a good is the labor required to produce the good in the final industry. The total labor content of a good is the direct labor content plus the labor required to produce all the intermediate inputs used by the final industry. Labor content estimates are given for 79 industry sectors, 62 of which contain merchandise trade. Separate labor content estimates are also given for U.S. trade with selected country groups and individual countries. These are the other members of the Organization for Economic Cooperation and Development (OECD), the European Economic Community (EEC), the group of newly industrializing countries (NIC's), the less developed countries (LDC's), the nonmarket economy countries (NME's), the Organization of Petroleum Exporting Countries (OPEC), Japan, Brazil, Mexico, Hong Kong, the Republic of Korea (Korea), Taiwan, and the People's Republic of China (China).

Estimates of the labor content of trade are often interpreted as the employment effects of trade. Although labor content estimates are an important first step toward estimating such employment effects, actual employment effects depend on a number of additional factors that are difficult to quantify. For example, a tariff that restricts imports or a subsidy that promotes exports simultaneously affects a number of other economic variables, many of which also affect trade, such as the exchange rate. A review of the academic literature indicates that the magnitude and, indeed, the direction of the employment effects of such policy-induced changes in trade has not been definitely determined. Simply stated, an increase in imports does not necessarily cause a reduction in aggregate domestic employment, and an increase in exports does not necessarily cause an increase in aggregate domestic employment. For example, elimination of petroleum imports would cause severe economic dislocations and job losses in a number of sectors that use petroleum as an intermediate input. Similarly, exchange-rate adjustments could eliminate the aggregate trade balance effects of a subsidy that increased U.S. exports. None of these factors are accounted for in simple trade and employment exercises, where domestic producers generally are assumed capable of replacing imports with no increase in their production costs and where the reactions of exchange rates are ignored.

Results for U.S. world trade

The United States ran a deficit in the overall labor content of merchandise trade in 1982 after running surpluses in 1980 and 1981. The total labor content of U.S. imports grew from 6.1 million work-years in 1978 to 6.3 million work-years in 1982. The total labor content of U.S. exports grew from 5.2 million work-years in 1978 to 5.9 million work-years in 1982, but reached a high of 6.9 million work-years in 1980. As a share of total U.S. employment, the total labor content of imports declined slightly, from 7.4

percent in 1978 to 7.3 percent in 1982. The total labor content of exports as a share of total domestic employment increased slightly, from 6.3 percent in 1978 to 6.8 percent in 1982.

Results for individual sectors

The sectors where imports embodied the largest total labor content were Apparel (input-output (I/O) sector 18) and Motor vehicles and equipment (IO 59). The sectors that contributed the largest labor content to imports were Apparel, and Wholesale and retail trade (IO 69). In terms of the simple trade and employment exercise, these latter are the sectors most adversely affected by imports, either because imports occur in the sectors directly or because imports displace domestic output that would have used the sectors' outputs as intermediate inputs.

In some cases, the labor from a sector embodied in imports of all sectors was greater than domestic employment in the sector. Labor from the Iron and ferroalloy ores mining sector (IO 5) embodied in all imports was 116 percent of domestic employment in that sector in 1982. This share was 118 percent for Nonferrous metal ores mining (IO 6), and 112 percent for Leather tanning and finishing (IO 33). Other sectors that contributed importantly to the total labor content of imports relative to their domestic employment were Primary iron and steel manufacturing (IO 38) (59 percent in 1982), Footwear and other leather products (IO 38) (59 percent in 1982), and Miscellaneous manufacturing (IO 64) (68 percent in 1982).

Sectors where the total labor embodied in exports was greatest were Other agricultural products (IO 2), Office computing and accounting machines (IO 51), and Aircraft and parts (IO 60). Sectors that contributed the most labor to all U.S. exports were Other agricultural products, and Wholesale and retail trade. The sectors that contributed the most labor to exports relative to domestic employment were Iron and ferroalloy ores mining (64 percent in 1982) and Nonferrous metal ores mining (60 percent in 1982). Other sectors that contributed importantly to the labor content of U.S. exports relative to domestic employment include Primary nonferrous metals manufacturing (IO 38) (42 percent in 1982) and Engines and turbines (IO 43) (46 percent in 1982).

The labor content of merchandise trade was also calculated for five aggregate sectors: Agriculture, Manufacturing, Mining, Petroleum and Services. In 1982, the U.S. balance in agricultural labor embodied in total merchandise trade (the agricultural labor embodied in all exports minus the agricultural labor embodied in all imports) was a surplus of 275,000 work-years; the balance in manufacturing labor was a deficit of 1,003,000 work-years; the balance in mining labor was a deficit of 56,000 work-years; the balance in petroleum labor was a deficit of 149,000 work-years; and the balance in services labor was a surplus of 483,000 work-years.

Results for selected trading partners

In total labor content of trade, the United States ran deficits with the other members of the OECD as a group, the NIC's as a group, Japan, Hong Kong, Korea, and Taiwan in both 1978 and 1982. In 1982, the total labor content deficit with Japan (573,000 work-years) was less than the total labor content deficit with Hong Kong, Korea, and Taiwan combined (640,000 work-years). This result is somewhat surprising, since the combined U.S. dollar trade deficit with Hong Kong, Korea, and Taiwan was less than 60 percent as large as the trade deficit with Japan. The labor content deficit for U.S. world trade in 1982 was 451,000 work-years. The United States ran surpluses in labor content of trade with the EEC, Mexico, the LDC's, China, and OPEC in both 1978 and 1982. In 1982, the largest labor content surpluses were with the EEC (226,000 work-years) the LDC's (245,000 work-years) and OPEC (354,000 work-years).

U.S. exports were more labor intensive than U.S. imports for U.S. world trade and for U.S. trade with most of the selected trading partners considered in this study. The notable exception was U.S. trade with the NIC's. This is the only group where the labor intensity of U.S. imports significantly exceeded the labor intensity of U.S. exports, largely as a result of the labor intensities of U.S. imports from Hong Kong, Korea, and Taiwan.

For U.S. world trade in manufactured goods, the labor intensity of U.S. exports again exceeded that for U.S. imports, and, again, there were significant differences for U.S. trade with different trading partners. The labor intensity of U.S. manufactured exports was fairly constant across trading partners. In 1982, this labor intensity varied between 31,000 and 35,000 work-years per billion dollar's worth of exports. However, the labor intensity of manufactured imports varied widely across trading partners, being highest (over 40,000 work-years per billion dollar's worth of imports in 1982) for U.S. imports from Hong Kong, Korea, Taiwan, and China, and lowest (less than 30,000 work-years per billion dollar's worth of imports in 1982) for U.S. imports from the other members of the OECD, the EEC, and Japan.

INTRODUCTION

Purpose of the study

The purpose of this study is to provide estimates of the labor content of U.S. merchandise trade for the years 1978 through 1982. Estimates are provided for both the direct labor content and the total labor content of this trade. The direct labor content of a good is the labor required to produce the good in the final industry. The total labor content of a good is the direct labor content plus the labor required to produce all the intermediate inputs used by the final industry. For example, the direct labor content of an auto is the labor required in the auto industry, whereas the total labor content also includes the labor needed to make the glass, rubber, steel and other inputs used by the auto industry. Labor contents are estimated for the industry categories of the Commerce Department's small input-output table for the U.S. economy. This table has 79 industry sectors, of which 62 contain merchandise trade. 1/ Separate estimates are provided of the labor content of U.S. world trade, and of U.S. trade with selected countries and country groups, including other members of the Organization for Economic Cooperation and Development (OECD), the European Economic Community (EEC), the newly industrializing countries (NIC's), the less developed countries (LDC's), the nonmarket economy countries (NME's), the Organization of Petroleum Exporting Countries (OPEC), 2/ Japan, Brazil, Mexico, Hong Kong, the Republic of Korea (Korea), Taiwan, and the People's Republic of China (China).

Labor content estimates are often interpreted as the employment effects of changes in trade. However, actual employment effects depend on a number of additional factors that are difficult to quantify. If these factors are not considered, conclusions about the employment effects of changes in trade from the labor content estimates contained in this report could be misleading. The many problems involved in interpreting labor content estimates are discussed in greater detail in later sections of this report. The following are some of the more important of these problems.

(1) Some imports are needed as inputs to production and are either not produced domestically or can be produced domestically only in limited amounts. These imports include such goods as petroleum, chromium, and tungsten. A restriction on these imports would most likely result in reductions in U.S. employment in user industries, at least until substitutes are found and production technologies adjust. This was clearly demonstrated during the oil embargo in 1973.

(2) Policy actions that restrict imports or encourage exports do not necessarily cause an increase in aggregate U.S. output or employment. For example, the reaction of exchange rates will often offset much of the effect of such policies on the trade balance. Even if such policies do succeed in moving the trade balance toward surplus, their effect may be offset by other changes in aggregate demand. For example, unemployment caused by an increase in the trade deficit may elicit an offsetting response on the part of domestic monetary and fiscal policies.

1/ The 79 sectors are listed in table 3.

2/ The member countries included in each of these groups are given in app. A.

3) The estimated changes in labor content reflect changes in output demand, and the response of actual employment depends on several additional factors. In the short run, employers typically are slow to lay off workers in response to a decline in output in order to avoid turnover costs associated with layoffs and rehiring, until they are more certain of the duration of the output decline. 1/ For the same reasons, firms typically use measures like overtime rather than hiring new workers as a short-run response to an increase in output. Producers may also respond to short-run changes in demand for output by increasing or reducing inventories. For these reasons, employment may not change immediately in response to a change in output demand. Also, depending on how responsive the supply of labor is to wage-rate changes, a given change in the demand for labor may result in a large change in employment at a fairly constant wage, or little change in employment accompanied by a large wage rate change.

The present study makes several important contributions to existing estimates of the labor content of U.S. imports and exports. It provides the first comprehensive set of detailed sector estimates of the labor content of total U.S. merchandise imports since the Bureau of Labor Statistics (BLS) estimates published in 1962, 2/ and the first detailed sector estimates of the labor content of imported manufactured goods since the Bureau of International Labor Affairs (ILAB) study published in 1978. 3/ Since the ILAB study used 1976 data, the present study updates the ILAB estimates by 6 years. Also, it is the first study to provide separate labor content estimates for U.S. trade with individual countries and groups of countries.

Appendix B of the report contains a more detailed examination of the direct labor content of U.S. trade for six disaggregate industries: Fine earthenware food utensils; Photographic cameras, enlargers, and parts; Crude petroleum; Integrated circuits; Soybean oil; and Wood pulp. These industries were singled out for closer inspection to illustrate some of the difficult issues involved in interpreting estimates of the labor content of U.S. trade. In the first case study, the U.S. producers are hard pressed by import competition (Fine earthenware food utensils). Other studies include a case where U.S. producers do not make a product directly comparable with the bulk of imports in the industry (Photographic cameras, enlargers, and parts), a case where imports could not be replaced by domestic output due to resource restraints (Crude petroleum), a case where offshore assembly is an important aspect of the industry's trade (Integrated circuits), a case where the United States is a major exporter (Soybean oil), and a case where imports and exports are more or less in balance and the imported product is a close substitute for domestic output (Wood pulp).

The labor content estimates contained in this study provide information about the effects of changes in trade on demand for labor in individual industry sectors in the United States. Since the role of trade in the U.S.

1/ This phenomenon is known as "labor hoarding."

2/ Eva E. Jacobs and Ronald E. Kutscher, "Employment in Relation to U.S. Imports," Monthly Labor Review (July 1962), pp. 771-773.

3/ Bureau of International Labor Affairs, "The Impact of Changes in Manufacturing Trade on Sectoral Employment Patterns - Progress Report" in Trade and Employment, National Commission for Manpower Policy, Special Report No. 30, November 1978.

economy is expanding rapidly, this information is important for analyzing changes in the structure of employment in the economy and for predicting future changes in this structure. This information is also useful in formulating U.S. policies to deal with adjustment problems that arise when changes in trade cause large and sudden shifts in the pattern of labor demand.

Review of previous studies

Wassily Leontief's study (1954) was the first to measure the total labor content of traded goods. 1/ Leontief's primary objective was to determine whether U.S. imports were more labor intensive and less capital intensive than U.S. exports. He found that the ratio of capital to labor embodied in imports was higher than that for exports. Most economists expected imports to embody relatively more labor and less capital than exports because they believed that the United States was more competitive in goods that required relatively more capital to produce and less competitive in goods that required relatively more labor to produce.

The BLS has used Leontief's method to estimate the labor force involved in producing exports and the U.S. labor force that would have been required to produce imports. They made estimates for each of the 150 industry sectors of the BLS input-output table. For a number of years they made these estimates in an ongoing exercise, but the effort has been terminated. The BLS published their last estimates of employment related to imports in 1962, 2/ and they published their last estimates of employment related to exports in 1973. 3/

More recently, the Bureau of International Labor Affairs (ILAB) used Leontief's method to estimate trade related employment for the years 1965 through 1976. 4/ The ILAB study differs from the earlier BLS studies in that (1) the ILAB study examined only the employment related to U.S. manufacturing trade, whereas the BLS studies examined all merchandise trade, as well as some trade in services; (2) the ILAB study included employment related to noncompetitive imports (imports that have no directly competing domestic substitute), whereas the BLS study included only competitive imports; and (3) the ILAB study used a 367-sector input-output table, whereas the BLS used a 150-sector table. Therefore, the ILAB study provides greater industry detail than the BLS studies.

1/ Wassily Leontief, "Domestic Production and Foreign Trade, the American Capital Position Re-examined," Economia Internazionale, vol. 7 (February 1954) pp. 3-32. Reprinted in Richard E. Caves and Harry G. Johnson, eds. Readings in International Economics (Homewood, Ill.: Richard D. Irwin, 1968), pp. 503-527.

2/ Eva E. Jacobs and Ronald E. Kutscher, "Employment in Relation to U.S. Imports," Monthly Labor Review (July 1962), pp. 771-773.

3/ Donald P. Eldridge and Norman Saunders, "Employment and Exports, 1963-72," Monthly Labor Review (August 1973), pp. 16-27.

4/ Bureau of International Labor Affairs, "The Impact of Changes in Manufacturing Trade on Sectoral Employment Patterns-Progress Report" in Trade and Employment, National Commission for Manpower Policy, Special Report No. 30, November 1978.

The International Trade Administration (ITA) in the Department of Commerce published a study that contains estimates of the labor content of U.S. exports for the years 1970 through 1980. 1/ They obtained their estimates by adjusting the BLS estimates for earlier years to account for changes in labor productivity and for changes in trade volumes. They provided separate labor content estimates for exports in manufacturing, mining, and agriculture. In a later study, the ITA published estimates of the labor content of U.S. exports for the years 1980 and 1982. 2/ The study gives detailed estimates for 1980 for the 200 sectors of the INFORUM input-output model of the U.S. economy. 3/ For 1982, it gives estimates for manufacturing exports and for four categories of nonmanufacturing exports. The 1982 estimates were obtained using 1982 data for U.S. exports and adjusting the 1980 labor-output ratios to account for changes in export prices and productivity.

The Bureau of the Census in the Department of Commerce also publishes estimates of employment related to exports. They published these estimates for 1977, 1980, and 1981. 4/ Estimates for years prior to 1977 were done on an irregular basis. The Census estimates are based on the same methodology as that used for the ITA estimates, but Census uses the 2-digit input-output table constructed by Bureau of Economic Analysis (BEA). Although the Census studies are limited to manufacturing industries, they provide estimates of export-related employment for each of the 50 States.

Some studies used estimates of trade-related employment to examine characteristics of workers most affected by trade. Daniel Mitchell 5/ used the direct labor content of U.S. trade between 1965 and 1970 for several product classes covering all U.S. merchandise trade industries to estimate the demographic characteristics of the export and import labor forces. In a later study, C. Michael Aho and James Orr 6/ used the total labor content of U.S. manufacturing trade to examine skill levels and occupational characteristics of trade-related workers, as well as the demographic characteristics examined by Mitchell. Both studies found that manufacturing workers in import sensitive sectors tend to be less skilled and generally more disadvantaged than manufacturing workers in export sectors, or manufacturing workers in

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1/ Roger T. Pomeroy, Employment Related to Merchandise Exports, Office of Planning and Research, International Trade Administration, U.S. Department of Commerce, August 1981.

2/ Lester A. Davis, Domestic Employment Generated by U.S. Exports, Office of Trade and Investment Analysis, International Trade Administration, U.S. Department of Commerce, April 1983.

3/ INFORUM was developed by the Interindustry Economic Research Fund at the University of Maryland. The technical coefficeints in the model are based on the 1972 BEA input-output table, and are updated to 1976.

4/ Bureau of the Census, "Origins of Exports of Manufactured Products, Annual Survey of Manufactures.

5/ Daniel B. Mitchell, "Recent Changes in the Labor Content of U.S. International Trade," Industrial and Labor Relations Review, April 1975, pp. 355-375.

6/ C. Michael Aho and James A. Orr, "Trade-Sensitive Employment: Who are the Affected Workers?" Monthly Labor Review (February 1981), pp. 29-35.

general. C. Michael Aho and Don Rousslang 1/ examined the demographic and occupational characteristics of workers in manufacturing industries most affected by trade with developing countries. Not surprisingly, they found that the workers in industries that were adversely affected by imports from developing countries are generally less skilled and more disadvantaged than manufacturing workers in sectors sensitive to imports from all sources.

Charles Frank 2/ and Anne Krueger 3/ compared the employment effects of trade with the employment effects of changes in overall demand and of changes in technology. They used a simple accounting identity in which changes in total employment in an industry are attributed to changes in sales, to changes in productivity, and to changes in imports or exports. Their results indicate that trade has been only a minor factor in labor displacement relative to the other causes.

The rapid growth of imports from developing countries has led several authors to examine the employment implications of this trade. The study by Charles Frank and another by Anne Krueger 4/ examine trade with developing countries using the same methodology that these authors used to examine the employment implications of total trade. The studies conclude that trade with developing countries has had a small net positive effect on overall domestic employment.

Errol Grinols and Erik Thorbecke, 5/ and Gene Grossman 6/ developed models to estimate the effects of trade with developing countries on domestic employment using regression equations. They adopted this approach, because the accounting identity calculations used by Frank and by Krueger may give misleading results where changes in imports are significant or where producers can substitute labor for other factors of production. 7/ Grossman also

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1/ C. Michael Aho and Don Rousslang, "The Impact of LDC Trade on U.S. Workers: Demographic and Occupational Characteristics of Workers in Trade-Sensitive Industries," in Science and Technology for Development: Organized Labor's Concerns, proceedings of a workshop by the American Association for the Advancement of Science (Washington, D.C.: Brookings Institution), 1979.

2/ Charles R. Frank, Foreign Trade and Domestic Aid, (Washington, D.C.: Brookings Institution), 1977.

3/ Anne O. Kreuger, "Protectionist Pressures, Imports and Employment in the United States," Scandinavian Journal of Economics, vol. 82, No. 2, 1980.

4/ Anne O. Kreuger, "Restructuring for Import Competition from Developing Countries, I: Labor Displacements and Economic Redeployment in the United States," Journal of Policy Modeling, vol. 2, No. 2, 1980.

5/ Errol Grinols and Erik Thorbecke, "The Effects of Trade Between the U.S. and Developing Countries on U.S. Employment," Cornell University, Working Paper No. 171, 1978.

6/ Gene M. Grossman, "The Employment and Wage Effects of Import Competition in the United States," report prepared for the Bureau of International Labor Affairs, U.S. Department of Labor, September, 1982.

7/ See Grossman, Ibid., and J. P. Martin and J. Evans, "Notes on Measuring the Employment Displacement Effects of Trade by the Accounting Procedure," Oxford Economic Papers, vol. 33, No. 1, 1981.

estimated the effects of imports on wages in the competing domestic industry for a selected group of trade-impacted industries. The results of these studies support the conclusion that trade with developing countries has only a small effect on U.S. employment. Grinols and Thorbecke also found that the net employment effect of this trade was positive.

Methodology and Data

Methodology

The labor content of U.S. exports.--The total labor content of U.S. exports includes the direct labor required in export industries and the indirect labor required to produce all the intermediate inputs used by the export industries. In measuring the labor content of exports, it is assumed that the labor content of a dollar of export-related output in each industry is equal to the industry's total employment divided by the total dollar value of the industry's output. The estimates for the labor content of exports include the labor required for transporting and handling the exports between the production site and the U.S. port of debarkation. However, these estimates do not include any U.S. labor that may have been involved in the international transportation of the exports, such as U.S. airfreight or shipping of the exports from the port of debarkation to the importing country.

Two types of total labor content of exports are estimated for each sector: the total labor content and the total domestic labor content. The total domestic labor content is less than the total labor content, because some imports are used as intermediate inputs in the production of U.S. exports. However, since the final stage in this production is performed domestically, there is only one estimate for the direct labor content of exports for each sector. 1/

Estimates of the labor content of exports are made for the 79 industry sectors of the small U.S. input-output table produced by the Department of Commerce. The "total requirements" version of this table is used to calculate the full direct and indirect labor content of exports for each sector. The elements of this total requirements table are then adjusted to account for imported intermediate inputs, and the domestic indirect labor content of exports is calculated for each sector. (The actual adjustments are described in app. C.)

Five labor content estimates are presented for exports in each sector: (1) The direct labor content of exports in the sector; (2) the total labor content of exports in the sector (the direct labor content plus the total indirect labor content, including the labor content of imported intermediate inputs); (3) the total domestic labor content of exports in the sector (the direct labor content plus the indirect labor content excluding the labor

1/ Although some imports are reexported with no domestic production involved, this trade has been excluded. Recall that the direct labor content of a good is the labor involved only in the final stage of the good's production.

content of imported intermediate inputs); (4) the direct labor content of exports in the sector plus the direct labor content of the sector's sales that would be used as intermediate inputs for the exports of other sectors if none of these intermediate inputs were imported; and (5) the direct labor content of exports in the sector, plus the direct labor content of the sector's sales that are used as intermediate inputs for the exports of other sectors, after allowing for the fact that some of these intermediate inputs required from the sector will be supplied by imports.

Each of these estimates is useful for a different type of exercise. Estimate (1) provides the labor content within a sector that is related to the sector's own exports. Estimates (2) and (3) provide the total and the total domestic labor content within each sector that are related to the sector's own exports. Estimates (4) and (5) provide the total and the total domestic labor content within each sector that are related to all U.S. exports, whether these exports originate within the sector or in other sectors. The total labor content estimates tell us the number of jobs required to produce the exports, given that all the intermediate inputs are also produced domestically. Thus, the total labor content is of interest to those performing the hypothetical exercise of replacing all U.S. imports with domestic output. Although such an exercise is unrealistic (the elimination of imports in any given year would impose tremendous strains on the economy and would have unpredictable employment effects), it may be useful for analyzing the long-run effects of trade on the demand for domestic labor. The total domestic labor content is of interest to those who want to examine the effect on domestic demand for labor of a change in exports when these exports use some imported intermediate inputs. For example, the total domestic labor requirement might be used to determine the domestic jobs required to produce an increase in aircraft exports caused by a reduction in foreign tariffs. Although the domestic labor content estimates account for the fact that part of the resultant increase in intermediate inputs needed by the aircraft industry will be supplied by imports, they do not account for other induced changes in trade. Going back to the example of aircraft exports, these exports would tend to cause an appreciation in the exchange rate that would tend to increase U.S. imports and to reduce U.S. exports. These induced changes in trade are not accounted for in the domestic labor content estimates. This issue is discussed more fully in a later section. 1/

The labor content of U.S. imports—It is difficult to estimate the actual foreign labor content of U.S. imports, because these estimates would require data on labor inputs to foreign production. Therefore, following the approach first adopted by Wassily Leontief, the labor content of U.S. imports of a good are estimated to be the labor inputs that would be required to make the same dollar amount of the domestic substitute. Imports are valued at the U.S. port of entry, gross of trade and transportation margins required to ship them from the foreign port, and gross of U.S. tariff duties. This value of imports is assumed to have the same labor content as an equal value of domestic output at the plant or production site. Labor involved in domestic transportation and handling of imports from the port to the consumer are not imported and are

1/ See page 11.

thus not part of the labor embodied in U.S. imports. If imports were replaced by domestic production, there would be labor involved in transportation and handling of domestic output from the plant to the consumer, and this labor may be greater or less than the labor involved in transporting and handling the imports from the port to the consumer. There are no accurate measures available for the labor involved in transport and distribution of imports after they reach the U.S. port.

There are two major problems with the approach used in this study to measure the labor content of imports. First, some imports, such as chromium and manganese, have no close domestic substitute. Second, even if a close domestic substitute exists, the U.S. labor required to produce the same dollar amount of this substitute may differ significantly from the labor needed to produce the same quantity of domestic output. For example, imports of apparel are apparently much lower priced than the domestic substitute of equal quality. 1/ Thus, the U.S. labor involved in a dollar of apparel output is significantly less than the U.S. labor that would be required to produce the quantity of apparel represented by a dollar of apparel imports. Dr. Rudy Oswald has argued that recent changes in the dollar exchange rate have caused imports over virtually all sectors to be lower priced than the domestic substitute of equal quality, 2/ indicating that in a direct calculation, the labor content of imports might be understated in most sectors.

Despite these problems, it is reasonable to use the dollar-for-dollar assumption where a single methodology must be applied consistently across a number of individual industries. In any event, extensive data and resources would be required to replace it with a better alternative. This assumption is used to derive the estimates of the labor content of imports for all industries. However, appendix C provides an adjustment factor for the direct labor content of apparel imports based on data on the substitution between imports and domestic output for these industries that have been supplied by the International Ladies' Garments Workers' Union. Appendix C also contains adjustment factors for certain other sectors to account for changes in relative prices of imports and domestic output caused by recent appreciations of the dollar. These adjustment factors are not presented for all of the sectors considered in this study due to shortcomings in available data and due to limitations on the resources available for this study.

1/ See the report by the Research Department, International Ladies' Garment Workers' Union, "Estimation of Apparel (Knit and Woven) Imports, Methodological Note," March 1982. Also, see the Economic Consulting Services, Inc., "Fibers, Textiles, Apparel: A Unified Industry Dealing With the Import Problem," January, 1981. An alternative to the dollar-for-dollar assumption for textiles and apparel is presented in Joseph Pelzman and Randolph Martin, "Direct Employment Effects of Increased Imports: A Case Study of the Textile Industry," Southern Economic Journal, October 1981, pp. 412-426

2/ See the statement by Rudy Oswald in the transcript of the hearing, U.S. International Trade Commission, in the matter of: U.S. Trade-Related Employment, investigation No. 332-154, June 30, 1983, p. 77.

Five kinds of labor contents of imports are estimated for each sector, just as was done for exports. These are the direct labor content of imports in the sector, the total labor content of imports in the sector, the total domestic labor content of imports in the sector, the total labor in the sector related to imports in all sectors, and the total domestic labor in the sector related to imports in all sectors. However, as we explain below, care must be exercised in interpreting the two measures of the total domestic labor content of imports.

The calculations and data

The labor content of U.S. imports from each group of supplying countries were calculated for each year as follows. Imports were measured gross of international transportation costs and tariff duties, and classified by input-output sector. They were then deflated to 1972 dollar values using U.S. price deflators. To obtain the direct labor content of imports for each industry, the deflated import value was multiplied by the deflated (1972 constant dollar) labor-output ratio for the appropriate year. To obtain the total labor content of imports, the deflated import values were first multiplied by the total requirements inverse of the 1972 input-output table. The resulting industry outputs were then multiplied by the appropriate deflated labor-output ratios. The total domestic labor content was obtained in the same fashion, except that the input-output table was adjusted so that it included only the domestically produced intermediate inputs used in final output. 1/

The total and total domestic labor content estimates for each sector as calculated above give the labor content in the sector that is related to U.S. imports in all sectors. Calculations were also made for the total and domestic labor in all sectors related to the imports in each sector. To do this, the calculations described above were performed separately for imports from each sector. 2/

Care must be exercised in interpreting the total and total domestic labor content of imports. For example, if one were interested in calculating the effects on demand for labor of replacing all imports with domestic output, the total labor content should be used, because the total domestic requirements input-output table and the total requirements input-output table would be the same in this case. On the other hand, if one were interested in determining the effects of increasing final output by the dollar amount of imports,

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1/ The equations for these calculations are given in app. D.

2/ The total labor content of imports in a given sector was calculated as follows. All elements in the vector of imports were set equal to zero except the chosen sector. This altered vector of imports was multiplied with the total requirements inverse to obtain the total labor requirements in each sector related to the imports in the chosen sector. These total labor requirements were then summed to obtain the total labor content in all sectors related to the imports in the chosen sector. The total domestic labor content of imports in each sector were obtained in the same fashion, except the domestic requirements inverse was used in place of the total requirements inverse.

without restricting imports in any way, the appropriate labor content is the total domestic labor content. Also, the total domestic labor content can be used to estimate the effects of replacing imports in a single sector or from a single country with domestic output, although strictly speaking, a separate domestic requirements input-output table should be constructed for each case. For example, to calculate the effects of replacing steel imports from Japan with domestic output, steel imports from Japan should be excluded from the imports used to derive the domestic requirements input-output table. To calculate the effects of replacing all imports from Japan with domestic output, all imports from Japan should be excluded from the imports used to adjust the total requirements input-output table. For the present study, this would involve the construction of over 800 domestic requirement input-output tables for each year, because the study considers 13 country or country group import suppliers and 62 traded-goods sectors. Since the resources required for such an undertaking could not be justified, a single domestic requirements input-output table is used for each year, the one based on total imports. Thus, estimates of domestic labor content of imports given in this report tend to understate slightly the domestic labor demands created by replacing imports from a given source with domestic output. This tendency is greater the more important the trading partner and the more aggregate the sector being considered. The maximum understatement is the difference between the total and the total domestic labor content. This maximum is reached for the calculated total domestic labor content of aggregate U.S. imports from all countries. However, the understatement for U.S. imports from most trading partners considered in this report is negligible.

The labor content of U.S. exports for each sector was calculated in the same way as the labor content of imports, except that since export data give the value of exports at the U.S. port, these data must be adjusted to get the value of U.S. exports at the domestic producer's plant gates. To make this adjustment, margins compiled by the BEA for the 1972 input-output table were used to allocate part of the port value of exports to transportation, and to warehouse and wholesale expenses incurred in moving the exports from the producer's plant gates to the port of debarkation. 1/ However, in calculating the total and total domestic labor content of merchandise exports from a given sector, the sector was given the labor content of the transportation, warehousing, wholesale and retail trade involved in moving the export from the domestic producer's plant to the port of debarkation.

Data on U.S. imports and U.S. exports are from Commission computer data tapes. Imports are classified by the Tariff Schedule of the United States (TSUS), and exports are classified by Schedule B. These trade data were classified by input-output category using concordances carefully prepared by the Commission's Office of Industries.

Data on ratios of labor to output are from the Office of Economic Growth and Employment Projections in the BLS. Data for domestic output in 1982 are not yet available, so the BLS projected these data using indexes of industrial production in order to obtain ratios of labor to output for 1982.

1/ Thus, the vector of exports that is multiplied with the total requirements inverse and the total domestic requirements inverse to obtain the total and total domestic labor content of merchandise exports contains important components in the services sector. These components are Transportation and warehousing (IO 65), and Wholesale and retail trade (IO 69).

Translating Labor Content Estimates Into Employment Effects

This study presents estimates only of the labor content of imports and exports. Although labor content estimates are commonly interpreted as the employment impact of imports and exports, actual employment effects depend on a number of additional factors that are difficult to quantify. First, a change in imports or exports does not automatically translate into a change in the trade balance or in aggregate employment. Second, there are major technical problems involved in translating estimates of the labor content of exports and imports into employment effects. This section first discusses how changes in trade can affect aggregate employment, and it reviews the academic literature on the aggregate employment effects of policy actions that encourage exports or restrict imports. It then discusses some of the technical problems in translating labor content estimates into employment effects. 1/

Trade and aggregate employment

Changes in the aggregate trade balance can affect domestic employment in the same way that changes in investment, government expenditures, or private consumption expenditures can affect employment. However, under the current system of flexible exchange rates, policy-induced changes in exports or imports do not necessarily translate into corresponding changes in the trade balance. These policies will affect the U.S. trade balance only if they also affect net U.S. borrowing from abroad. 2/ In many cases, the effects on foreign borrowing are either short term or nonexistent. For example, unless the imposition of a tariff on imports causes a net increase in U.S. borrowing that continues from year to year, the net effect on the trade balance will be offset by appreciation of the dollar. The issue of the timing, duration, and extent of the net trade balance and employment effects of import restrictions and export subsidies ("commercial" policies) is still a matter of some debate. Until fairly recently, the conventional wisdom among economists was that, if exchange rates are flexible, exchange-rate adjustments will fairly

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1/ An excellent survey of these problems is contained in the monogram by Walter Salant, "The Effects of Increases in Imports on Domestic Employment: A Clarification of Concepts," A Special Report of the National Commission for Manpower Policy, January, 1978. Our discussion of these problems is based on his work.

2/ This is true because imports must be paid for either by exporting or by borrowing.

quickly and completely eliminate the trade-balance effects of commercial policies. 1/

More recently, Russel Boyer (1977) 2/ showed that the short-run trade-balance effects of commercial policies depend on whether the home country is a net debtor or a net creditor with the rest of the world. Barry Eichengreen 3/ showed that tariffs may have some positive short-run trade-balance effect, but are likely to have a negative trade-balance effect in the longer run. Don Rousslang and Joseph Pelzman 4/ showed that Eximbank loans can have a small, positive short-run trade-balance effect even if exchange rates adjust to immediately offset the trade-balance and employment effects of other commercial policies.

Although commercial policies apparently can have some effect on the short-run trade balance, the effects of other factors such as business cycles, domestic monetary policies, sudden changes in prices of important traded commodities, and the structure of international lending and borrowing appear to be much more significant.

Business cycles cause shifts in the trade balance, because U.S. imports depend largely on U.S. income, whereas U.S. exports depend largely on foreign incomes. When U.S. income and demand are at a cyclical high, imports tend to be high, and when foreign income and demand is at a cyclical high, U.S. exports tend to be high. Thus, for example, when the U.S. economy is experiencing a boom and foreign demand is low, the U.S. trade balance will tend toward deficit. Likewise, when foreign demand is high and the U.S. economy is depressed, the U.S. trade balance will tend toward surplus.

1/ See, for example, Edward. Tower, "Commercial Policy Under Fixed and Flexible Exchange Rates." Quarterly Journal of Economics, 87 (August 1973), pp. 436-454; Egon Sohmen, Flexible Exchange Rates. Chicago: University of Chicago Press, 1969; S. C. Tsiang, "The Role of Money in Trade Balance Stability: A Synthesis of the Elasticity and Absorption Approaches. "American Economic Review, 51 (December 1961), pp. 912-936. Reprinted in Readings in International Economics. Homewood, Ill.: Richard D. Irwin, 1968, pp. 389-412; Harry G. Johnson, "Towards a General Approach to the Balance of Payments." International Trade and Economic Growth. (London: Allen and Unwin, 1958), 6. Reprinted in Richard N. Cooper, ed., International Finance. (Middlesex, England: Penguin Modern Economics), 1969, 11; Svend Laursen and Lloyd A. Metzler, "Flexible Exchange Rates and the Theory of Employment," Review of Economics and Statistics, 32 (November 1950), pp. 281-299; and Arnold C. Harberger, "Currency Depreciation, Income and the Balance of Trade." Journal of Political Economy, 58 (February 1950) pp. 47-50.

2/ Russell S. Boyer, "Commercial Policy Under Alternative Exchange Rate Regimes," Canadian Journal of Economics, 43 (May 1977), pp. 219-232.

3/ Barry Eichengreen, "A Dynamic Model of Tariffs, Output and Employment Under Flexible Exchange Rates," Journal of International Economics II (May, 1981), pp. 341-359.

4/ Don Rousslang and Joseph Pelzman, "Export-Import Bank Loans and the Trade Balance Under Flexible Exchange Rates," Mimeo, Bureau of International Labor Affairs, U.S. Department of Labor, January 1983.

Domestic monetary and fiscal policies can affect the short-run trade balance through their effect on interest rates and capital flows. This effect was demonstrated recently when continued deficit spending, combined with a movement toward noninflationary growth of the money stock, caused U.S. inflation to abate and interest rates to rise, so that the United States experienced a high real rate of interest that attracted substantial short-term capital inflows from abroad. With the current system of flexible exchange rates, these capital inflows caused the dollar to appreciate, U.S. international price competitiveness to decline, and the U.S. trade balance to move toward deficit.

Sudden and large shifts in prices of important exports or imports also tend to cause short-run shifts in the trade balance. For example, most countries financed their increased oil bills following the sudden oil price increase in 1973 by borrowing rather than by increasing their exports. Later, payment in goods was made as oil exporters adjusted to their increased wealth and imported more goods, allowing oil importers to pay for more oil through exports rather than through borrowing. Thus, trade of oil exporters and oil importers both moved toward balance after the initial effects of the oil price increase.

Long-term international lending and borrowing are an important source of surpluses or deficits in the U.S. trade balance. The trade-balance effects of these loans can best be understood in terms of the following identity that relates capital flows and the trade balance within the overall balance of payments:

$$PCF + TB + OCF = 0.$$

Here, PCF is private capital flows (new borrowing, minus new lending, plus receipt of repayments on old loans made to foreigners, minus repayments on old loans to U.S. citizens); TB is the trade balance (exports minus imports); and OCF is official capital flows (net changes in holdings of foreign reserves by the U.S. Treasury and Federal Reserve). This identity shows that a trade surplus (deficit) is the sum of net private capital inflows (outflows) plus net official capital inflows (outflows). Completely floating exchange rates would mean that OCF is equal to zero, because official institutions would no longer buy or sell foreign reserves. Thus, under floating exchange rates, an increase in new private lending to foreigners or repayments to foreigners on old loans would move the trade balance toward deficit, whereas new private borrowing or receipt of interest on old loans to foreigners would move the trade balance toward surplus.

The United States has gone through several stages of borrowing and lending as it progressed from a young agricultural nation to a mature industrialized nation. 1/ In the first stage, as a young growing nation (from the Revolutionary War until after the Civil War) the United States borrowed from Europe. Matching this financial flow, the United States imported more than it exported, and the additional resources allowed it to build up its capital stocks more quickly. In the second stage (from shortly after the

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1/ This paragraph borrows heavily from Paul Samuelson's text, Economics, (10th ed.) New York: McGraw-Hill, 1976, pp. 660 and 661.

Civil War to World War I), the United States was a mature debtor nation. This stage was characterized by little net borrowing or lending. New lending just about canceled new borrowing. However, the U.S. trade balance showed small surpluses, so that it could pay interest and dividends on the debt built up as a young debtor nation. In the third stage (from World War I until the oil price shocks) the United States was a new creditor nation. In this stage, the United States became a net lender to the rest of the world and ran corresponding balance-of-trade surpluses to affect the loans in real terms. These loans were large during and just after World War I, and in the years following World War II when the United States lent billions overseas to help rebuild the industries of Europe and Japan.

More recently (since the oil price shocks), the United States appears to have entered a fourth stage by becoming a mature creditor country. New lending has become much less important than income from U.S. investment stocks abroad. In 1981, net foreign investment income (receipts of this income, which includes fees and royalties, minus payments of this income to foreigners) was $30.6 billion. The book value of the U.S. stock of investment abroad was $227 billion, whereas the stock of foreign direct investment in the United States was only $90 billion. New lending abroad was actually negative that year, with new foreign direct investment in the United States being greater than new U.S. direct investment abroad. With flexible exchange rates, the inflow of investment income tended to cause the dollar to appreciate and to push the trade balance into deficit. This tendency to deficit could only have been eliminated if the United States refused to allow repayment of its prior foreign loans, either by increasing net new lending abroad to offset repayments of these loans, or by turning the loans into gifts. No attempts to improve the competitiveness of U.S. industries can negate this simple fact. Even if the world monetary system were converted to fixed exchange rates, the net inflow of investment income not matched by new net private lending abroad or by a trade deficit would have to be matched by net U.S. Government lending abroad through the accumulation of foreign reserves in U.S. official institutions in order to prevent a negative trade-balance effect.

Trade and employment in disaggregate sectors

General considerations.--The basic macroeconomic assumption used by those who interpret labor content estimates as employment effects is that prices and total expenditures are both fixed. In general, this biases trade and employment exercises toward showing a negative employment effect of trade. This is true, because trade acts much the same as a technological innovation that allows us to increase the total value of output available for consumption with the same or smaller amounts of inputs. Walter Salant and Beatrice Vaccara noted this similarity between the availability of trade and improvements in technology. They state "Both types of changes create the opportunity, when the resources displaced can be absorbed elsewhere, to attain a higher output or more leisure; neither contains any guaranty that the opportunity will be used instead of being dissipated in involuntary unemployment." 1/

1/ Walter S. Salant, and Beatrice N. Vaccara, Import Liberalization and Employment, Washington, D.C.: The Brookings Institution, 1961, p. 96.

Imagine, for example, the inefficiency of growing coffee and bananas domestically, of using substitute domestic energy sources for all oil imports, of Hong Kong and Singapore growing their own wheat, and of less developed countries producing (or attempting to produce) their own computers and aircraft. Since trade allows the world to consume more output from a given input, it is likely that the estimated net employment effect of eliminating trade for all countries would be positive if prices and expenditures were assumed to be the same in the no-trade situation as they were with trade. This result occurs, because elimination of trade would reduce overall productivity, so that more labor would be required to produce the same amount of goods and services. To account for this bias, trade and employment exercises would need to account for the beneficial effects of trade on prices and income. Unfortunately, the data needed to accurately account for these effects are not available.

Labor content, job opportunities, and employment.--The concept of employment related to imports is very different from the concept of employment related to exports, because the domestic jobs that would produce imported goods do not actually exist, whereas those required to produce exports do exist. For example, an increase in imports could occur while the economy is at full employment, in which case it could obviously have no negative employment effect.

An important factor to remember when interpreting trade-related employment estimates is that changes in trade-related employment refer to changes in demand for labor, and do not translate directly into layoffs or new hires. For example, an increase in imports in a growing industry probably would not cause domestic workers to be displaced in the industry, but rather would reduce the number of new hires in the domestic industry. For this reason, the ILAB study refers to trade-related employment as "job opportunities," and is very careful to distinguish between this concept and actual employment changes. Interestingly, changes in actual employment have tended to move opposite to changes in job opportunities related to imports, because imports tend to grow fastest when domestic unemployment is low and there is excess domestic demand. That is, imports tend to vary directly with cyclical output and employment, so that changes in imports have usually reduced the changes in actual domestic employment that accompany domestic business cycles.

Noncompetitive imports.--Another problem in interpreting the labor content of imports as the impact of imports on domestic employment is that some imports are not produced domestically, or are produced under limitations that prevent output from expanding to replace imports. This problem is usually more serious for raw materials and primary products than for manufactured products. For example, reductions in imports of chromium, tungsten, or oil would reduce domestic employment in industries that rely on those materials for inputs to production. Reductions in imports of coffee, tea, or tropical fruits and vegetables would reduce consumption of those products, with unpredictable effects on demand for items that complement or substitute for the imported products. The BLS studies avoided these problems by measuring the labor content for imports of competitive goods only. The ILAB study examined only the manufacturing sector, where the problem of noncompetitive imports is greatly reduced.

Changes in prices and in the input-output structure of the economy.--Some goods are not produced domestically because imports are much more economical. Replacing such imports with domestic output would raise prices substantially. Even where domestic output is undertaken, a restriction on imports would result in significant price increases if additional domestic supply can be produced only at much higher cost. Also, prices of some exports would fall dramatically if U.S. exporters were cut off from foreign markets. The resulting changes in prices would cause producers to substitute between inputs in production and would cause consumers to substitute between goods in consumption. The further one moves from actual trade and production patterns, the greater is the error in using fixed input-output coefficients and fixed prices for intermediate and final output. The ILAB study tried to account for this difficulty by concentrating on the changes in job opportunities related to changes in trade over a short-run period of several years.

Substitution between imports and domestic output.--The assumption that a dollar of imports substitutes for a dollar of domestic output can give misleading results, particularly where labor content estimates are interpreted as employment effects of imports. Previous studies used this assumption, because they lacked a viable alternative, especially where consistent estimates were needed for a wide range of disaggregated industries. The assumption has come under severe criticism from producer and labor organizations in the textile and apparel industries, and their criticism appears to be well justified. 1/ Of course, if domestic textiles and apparel are much more expensive for the same quantity and quality, and if consumers are forced to shift to the higher priced domestic substitutes, they would have less to spend on other goods if aggregate expenditures remain constant, which is commonly assumed in trade and employment studies. This point is generally ignored by those who criticize the dollar-for-dollar assumption.

Average and marginal production and employment effects

The labor content estimates are based on average labor-output ratios in each sector. These averages may give misleading indications of the short-run employment effects of trade changes for two reasons. First, the labor input may change by a percentage that is greater or less than the change in output, because the marginal productivity of labor may differ from average productivity. For example, as the output of an industry contracts, older, less productive facilities usually are closed down first, and the least productive workers dismissed first, so that the marginal productivity of the displaced workers is less than the average. From this, one might expect employment to contract by a greater percentage than output. On the other hand, scale economies may cause employment to contract by a smaller percentage than output.

Second, and more important for the short run, employers tend to "hoard" labor in the face of short-run changes in output due to the costs associated with labor turnover. This effect usually outweights the effects of changes in

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1/ Research Department, International Ladies' Garments Workers' Union, op. cit; and Economic Consulting Services, op. cit. App. C gives adjustment factors for the direct labor content in these industries on the basis of estimates of price differences between domestic output and imports supplied by the International Ladies' Garments Workers' Union.

productivity. For example, labor-output ratios typically increase during recessions. This is contrary to the expected result that labor-output ratios would decrease because less productive facilities are removed from production first.

Estimates of the Labor Content of U.S. Trade

U.S. world trade

Table 1 summarizes the estimates of the labor content and dollar values of U.S. merchandise imports and exports for the years 1978 through 1982. The direct labor content of exports exceeded the direct labor content of imports in each year of this period, although the overall trade balance was in deficit for each of these years. However, the total labor content of imports exceeded the total labor content of exports in 1978, 1979, and 1982. The total labor content of imports increased by only about 3.5 percent from 1978 to 1982, whereas the labor content of exports increased by 12.4 percent over this same period. However, the labor content of exports in 1982 was 14 percent lower than in 1980.

Table 2 shows the labor content per billion dollars of U.S. exports and imports for 1978 through 1982. The decline in labor per dollar of imports and exports over the period reflects inflation and increases in U.S. labor productivity. In these years, the direct labor content per dollar of exports exceeded the direct labor content per dollar of imports by roughly 40 percent, whereas the total labor content per dollar of exports exceeded the total labor content per dollar of imports by roughly 20 percent. These results are consistent with the well-known findings of Leontief that U.S. exports are more labor intensive than U.S. imports. The effects of large petroleum imports help to explain this result, because these imports embody very little labor per dollar. For example, in 1982, petroleum (IO sectors 8 and 31) accounted for about 26 percent of the dollar value of all U.S. merchandise imports, but for about only 6 percent of the total labor embodied in these imports, and for about only 3 percent of the direct labor embodied in these imports.

Also, part of the value of exports at the U.S. port of debarkation was allocated to the transportation and the wholesale trade industries to account for labor required to handle and move exports from the domestic producer to the port, whereas all of the value of imports was allocated directly to the corresponding industry, even though these imports embody labor in transportation and wholesale trade in the foreign country. Since the transportation and wholesale trade industries are very labor intensive compared to overall manufacturing, this procedure tends to cause the estimates of the labor intensity of exports to exceed the estimates of the labor intensity of imports. However, this procedure may also accord with an actual tendency of a balanced expansion of U.S. trade to result in a net increase in demand for labor in the United States. The results for the total domestic labor content of exports for 1980 and 1982 are quite close to those reported in the study by the International Trade Administration. 1/ Their estimates of the labor content were 30,300 jobs per billion dollars of exports in 1980 and 25,200 jobs per billion dollars of exports in 1982.

1/ International Trade Administration, Ibid.

Table 1.--Labor content of aggregate U.S. world trade, and U.S. world trade, 1978-82

Year	Direct	Total	Total domestic
	Labor content of imports (1,000 work-years)		
1978	2,438	6,123	5,222
1979	2,459	6,239	5,617
1980	2,444	6,225	5,566
1981	2,468	6,226	5,574
1982	2,521	6,335	5,638
	Labor content of exports (1,000 work-years)		
1978	2,571	5,236	4,846
1979	2,914	6,054	5,583
1980	3,322	6,852	6,291
1981	3,170	6,536	6,018
1982	2,822	5,884	5,395
	U.S. imports (million dollars)		
1978		189,548	
1979		224,789	
1980		256,994	
1981		278,379	
1982		260,024	
	U.S. exports (million dollars)		
1978		137,489	
1979		176,980	
1980		213,465	
1981		225,329	
1982		201,726	

Source: Labor content, calculated from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics; U.S. imports and exports, compiled from official statistics of the U.S. Bureau of the Census.

Note.--Exports are measured f.a.s. Imports are measured c.i.f. plus tariff duties collected.

Table 2.—Labor content per billion dollars of U.S. world trade, 1978-82

Year	Direct	Total	Total domestic
	Labor content per $ billion of U.S. imports (thousands of work-years)		
1978	12.9	32.3	29.1
1979	10.9	27.8	25.0
1980	9.5	24.2	21.7
1981	8.9	22.4	20.0
1982	9.7	24.4	21.7
	Labor content per $ billion of U.S. exports (thousands of work-years)		
1978	18.7	38.1	35.2
1979	16.5	34.2	31.5
1980	15.6	32.1	29.5
1981	14.0	29.0	26.7
1982	14.0	29.2	26.7

Source: Compiled from official statisitics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statisitics.

Table 3 presents the detailed industry labor content for U.S. merchandise trade with the rest of the world for each of the years from 1978 through 1982. (The detailed trade data for these years are given in app. E.) Although the industry results vary from year to year, there is a fairly consistent pattern. On the import side, the sectors with the largest direct labor content are consistently Apparel (IO 18) and Miscellaneous manufacturing (IO 64). Other sectors with a large direct labor content are Other agricultural products (IO 2), Footwear and other leather products (IO 34), Primary iron and steel manufacturing (IO 37), Radio, TV, and communication equipment (IO 56), Electronic components and accessories (IO 57), and Motor vehicles and equipment (IO 59).

On the export side, the sectors with the largest direct labor content 1/ are Other agricultural products (IO 2), Office, computing, and accounting machines (IO 51), and Aircraft and parts (IO 60). Other sectors with a large direct labor content are Lumber and wood products, except containers (IO 20), Chemicals and selected chemical products (IO 27), Electronic components and accessories (IO 57), and Scientific and controlling instruments (IO 62).

As explained above, the total and total domestic labor content of trade are classified in two different ways. The first classification gives the labor from all sectors embodied in imports (exports) in each sector. For

1/ The entries for transportation and warehousing (IO 65) and Wholesale and retail trade (IO 69) under the column labeled "Direct" are the labor content involved in transporting and handling the finished exports between the domestic plant and the port of debarkation. See app. D for a more detailed account of these entries.

example, in the first classification, the entry for Motor vehicles and equipment under "Total" gives the total labor required to produce the dollar value of imports (exports) in that sector, including the labor embodied in the steel, glass, rubber, and other intermediate inputs needed to produce the final output, and the entry under "Domestic" is the domestic labor content required to produce the dollar value of imports (exports) in that sector, allowing for the fact that some of the intermediate inputs would be imported.

The second classification gives the labor content from the sector embodied in imports (exports) of all sectors. For example, in this second classification, the entry for Primary iron and steel manufacturing under "Total" gives the total labor required in that sector to produce the dollar value of all U.S. merchandise imports (exports), including the steel needed to produce U.S. imports (exports) of autos, aircraft, farm machinery, and other goods that use steel inputs, and the entry under "Domestic" gives the total domestic labor required within each sector to produce the total dollar value of imports (exports), after allowing for the fact that part of the intermediate inputs required from the sector to produce these imports (exports) would be imported. The sum of the entries under "Total" is the same for both classifications, and the sum of the entries under "Domestic" is also the same for both classifications. As explained previously, care must be exercised in interpreting the elements under "Domestic" for U.S. imports for both classifications.

The sectors where imports embodied the largest total and total domestic labor content were Apparel and Motor vehicles and equipment. Other sectors whose imports embodied a large total and total domestic labor content were Food and kindred products (IO 14), Petroleum refining and related industries (IO 31), Footwear and other leather products, Primary iron and steel manufacturing, Radio, TV and communication equipment, and Miscellaneous manufacturing.

The sectors that contributed the largest total and total domestic labor content to imports were Apparel and Wholesale and retail trade (IO 69). Other sectors that contributed importantly to the labor content of imports were Other agricultural products, Primary iron and steel manufacturing, Electronic components and accessories, Motor vehicles and equipment, Miscellaneous manufacturing, Transportation and warehousing (IO 65), and Business services (IO 73).

On the export side, the sectors embodying the largest total and total domestic labor content were Other agricultural products, Office, computing and accounting machines, and Aircraft and parts. Other sectors where exports embodied a large total and total domestic labor content were Food and kindred products, Chemicals and selected chemical products, and Motor vehicles and equipment. The sectors that contributed the largest total and total domestic labor content to all exports were Other agricultural products, and Wholesale and retail trade. Other sectors that contributed importantly to the labor content of exports were Chemicals and selected chemical products, Primary iron and steel manufacturing, Transportation and warehousing, and Business services.

Table 3.--Labor content of U.S. world trade, 1978-82

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1978				
1	Livestock and livestock products	10	34	30	99	90
2	Other agricultural products	210	320	308	314	290
3	Forestry and fishery products	15	23	22	35	30
4	Agricultural, forestry, and fishery services	0	0	0	50	44
5	Iron and ferroalloy ores mining	13	28	26	24	19
6	Nonferrous metal ores mining	24	40	37	62	46
7	Coal mining	0	0	0	24	20
8	Crude petroleum and natural gas	10	19	19	120	107
9	Stone and clay mining and quarrying	33	62	58	42	38
10	Chemical and fertilizer mineral mining	9	16	15	12	11
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	1	1	67	57
13	Ordnance and accessories	2	4	4	2	2
14	Food and kindred products	86	408	361	128	122
15	Tobacco manufactures	0	1	1	1	0
16	Broad and narrow fabrics, yarn and thread mills	38	95	87	158	138
17	Miscellaneous textile goods and floor coverings	7	25	22	21	19
18	Apparel	240	526	467	329	311
19	Miscellaneous fabricated textile products	6	14	13	25	23
20	Lumber and wood products, except containers	79	178	161	169	149
21	Wood containers	2	4	4	7	6
22	Household furniture	21	41	38	27	27
23	Other furniture and fixtures	6	10	10	9	9
24	Paper and allied products, except containers	48	129	118	96	86
25	Paperboard containers and boxes	0	1	1	28	25
26	Printing and publishing	13	23	22	32	29
27	Chemicals and selected chemical products	31	85	78	120	102
28	Plastics and synthetic materials	5	14	13	44	38
29	Drugs, cleaning and toilet preparations	10	33	31	14	13
30	Paints and allied products	1	3	2	7	6
31	Petroleum refining and related industries	84	456	410	101	95
32	Rubber and miscellaneous plastic products	68	134	125	155	140
33	Leather tanning and finishing	3	10	9	13	12
34	Footwear and other leather products	106	178	163	110	109
35	Glass and glass products	11	21	20	35	32
36	Stone and clay products	34	67	63	62	57
37	Primary iron and steel manufacturing	103	253	230	277	241
38	Primary nonferrous metals manufacturing	55	196	162	164	135
39	Metal containers	1	3	2	10	9
40	Heating, plumbing, and structural metal products	9	19	17	18	17

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1978--Continued				
41	Screw machine products and stampings	12	25	23	84	77
42	Other fabricated metal products	49	96	89	120	108
43	Engines and turbines	2	6	5	12	11
44	Farm and garden machinery	8	20	18	11	10
45	Construction and mining machinery	11	27	25	19	17
46	Materials handling machinery and equipment	9	18	17	11	11
47	Metalworking machinery and equipment	38	61	57	63	58
48	Special industry machinery and equipment	27	50	47	35	33
49	General machinery and equipment	24	46	43	54	48
50	Miscellaneous machinery, except electrical	0	0	0	41	37
51	Office, computing, and accounting machines	39	113	101	47	46
52	Service industries machines	1	3	3	7	6
53	Electric industrial equipment and apparatus	17	32	29	49	45
54	Household appliances	21	53	48	23	23
55	Electric lighting and wiring equipment	13	22	21	30	27
56	Radio, TV, and communication equipment	143	340	306	161	156
57	Electronic components and accessories	70	140	129	140	126
58	Misc. electrical machinery and supplies	23	48	43	39	36
59	Motor vehicles and equipment	194	857	731	256	242
60	Aircraft and parts	17	37	34	23	22
61	Other transportation equipment	34	75	68	40	39
62	Scientific and controlling instruments	40	73	69	51	48
63	Optical, ophthalmic, and photographic equipment	32	70	65	36	35
64	Miscellaneous manufacturing	223	438	402	250	240
65	Transportation and warehousing	0	0	0	234	205
66	Communications, except radio and TV	0	0	0	21	18
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	61	51
69	Wholesale and retail trade	0	0	0	475	421
70	Finance and insurance	0	0	0	94	80
71	Real estate and rental	0	0	0	32	28
72	Hotels, personal and repair services exc. auto	0	0	0	78	68
73	Business services	0	0	0	327	286
74	Eating and drinking places	0	0	0	94	82
75	Automobile repair and services	0	0	0	25	21
76	Amusements	0	0	0	9	7
77	Medical, educ. services and nonprofit org.	0	0	0	30	26
78	Federal Government enterprises	0	0	0	25	21
79	State and local government enterprises	0	0	0	4	3
	Total	2,438	6,123	5,522	6,123	5,522

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1978				
1	Livestock and livestock products	4	18	17	77	70
2	Other agricultural products	468	730	704	559	540
3	Forestry and fishery products	2	24	23	16	13
4	Agricultural, forestry, and fishery services	0	0	0	67	62
5	Iron and ferroalloy ores mining	4	13	12	10	7
6	Nonferrous metal ores mining	2	9	8	26	15
7	Coal mining	0	35	34	15	12
8	Crude petroleum and natural gas	1	1	1	19	14
9	Stone and clay mining and quarrying	4	38	36	9	7
10	Chemical and fertilizer mineral mining	3	37	35	7	5
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	0	0	43	37
13	Ordnance and accessories	1	7	7	1	1
14	Food and kindred products	67	330	293	99	94
15	Tobacco manufactures	4	25	23	5	5
16	Broad and narrow fabrics, yarn and thread mills	21	63	58	57	51
17	Miscellaneous textile goods and floor coverings	6	35	33	13	12
18	Apparel	21	54	49	33	30
19	Miscellaneous fabricated textile products	7	29	28	15	15
20	Lumber and wood products, except containers	65	160	146	124	112
21	Wood containers	1	2	1	6	5
22	Household furniture	6	18	17	9	8
23	Other furniture and fixtures	3	19	19	5	4
24	Paper and allied products, except containers	26	83	76	59	52
25	Paperboard containers and boxes	0	9	9	18	17
26	Printing and publishing	16	43	42	34	31
27	Chemicals and selected chemical products	68	198	182	149	136
28	Plastics and synthetic materials	21	68	63	41	38
29	Drugs, cleaning and toilet preparations	17	73	69	20	19
30	Paints and allied products	1	28	28	6	5
31	Petroleum refining and related industries	3	31	29	12	9
32	Rubber and miscellaneous plastic products	28	70	66	87	77
33	Leather tanning and finishing	2	13	12	3	3
34	Footwear and other leather products	5	19	19	6	6
35	Glass and glass products	10	33	31	26	24
36	Stone and clay products	10	36	34	28	24
37	Primary iron and steel manufacturing	24	67	62	152	126
38	Primary nonferrous metals manufacturing	27	103	86	107	86
39	Metal containers	1	9	9	7	6
40	Heating, plumbing, and structural metal products	18	46	43	26	25

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1978--Continued				
41	Screw machine products and stampings	4	14	13	49	44
42	Other fabricated metal products	22	61	57	71	62
43	Engines and turbines	24	72	66	35	34
44	Farm and garden machinery	22	69	64	26	26
45	Construction and mining machinery	57	151	139	63	62
46	Materials handling machinery and equipment	14	39	36	16	15
47	Metalworking machinery and equipment	49	89	84	73	68
48	Special industry machinery and equipment	26	57	53	32	31
49	General machinery and equipment	40	91	85	70	65
50	Miscellaneous machinery, except electrical	26	53	50	65	62
51	Office, computing, and accounting machines	74	225	203	87	85
52	Service industries machines	24	84	77	29	29
53	Electric industrial equipment and apparatus	50	101	94	85	82
54	Household appliances	14	53	50	15	14
55	Electric lighting and wiring equipment	15	44	42	27	25
56	Radio, TV, and communication equipment	60	153	138	75	72
57	Electronic components and accessories	68	143	132	129	117
58	Misc. electrical machinery and supplies	25	74	69	36	34
59	Motor vehicles and equipment	83	376	322	112	105
60	Aircraft and parts	135	298	275	164	163
61	Other transportation equipment	14	39	36	18	17
62	Scientific and controlling instruments	66	137	129	77	75
63	Optical, ophthalmic, and photographic equipment	21	64	61	24	23
64	Miscellaneous manufacturing	81	177	163	93	88
65	Transportation and warehousing	113	0	0	279	259
66	Communications, except radio and TV	0	0	0	19	17
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	43	36
69	Wholesale and retail trade	480	0	0	826	791
70	Finance and insurance	0	0	0	77	68
71	Real estate and rental	0	0	0	25	22
72	Hotels, personal and repair services exc. auto	0	0	0	67	60
73	Business services	0	0	0	266	240
74	Eating and drinking places	0	0	0	90	83
75	Automobile repair and services	0	0	0	22	20
76	Amusements	0	0	0	7	6
77	Medical, educ. services and nonprofit org.	0	0	0	23	21
78	Federal Government enterprises	0	0	0	20	17
79	State and local government enterprises	0	0	0	3	3
	Total	2,571	5,236	4,846	5,236	4,846

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1979				
1	Livestock and livestock products	8	28	25	90	82
2	Other agricultural products	178	279	269	277	255
3	Forestry and fishery products	15	23	22	38	32
4	Agricultural, forestry, and fishery services	0	0	0	52	45
5	Iron and ferroalloy ores mining	11	24	22	23	18
6	Nonferrous metal ores mining	22	36	34	63	46
7	Coal mining	0	0	0	26	21
8	Crude petroleum and natural gas	13	25	24	138	122
9	Stone and clay mining and quarrying	30	57	54	39	36
10	Chemical and fertilizer mineral mining	9	17	16	13	11
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	1	1	69	59
13	Ordnance and accessories	2	4	4	2	2
14	Food and kindred products	97	440	390	141	135
15	Tobacco manufactures	0	1	1	1	0
16	Broad and narrow fabrics, yarn and thread mills	32	81	74	148	130
17	Miscellaneous textile goods and floor coverings	8	29	26	21	19
18	Apparel	237	514	457	325	307
19	Miscellaneous fabricated textile products	6	15	14	27	25
20	Lumber and wood products, except containers	82	183	166	177	156
21	Wood containers	2	4	4	8	7
22	Household furniture	24	47	44	30	30
23	Other furniture and fixtures	5	10	9	9	8
24	Paper and allied products, except containers	51	139	126	99	89
25	Paperboard containers and boxes	0	1	1	30	27
26	Printing and publishing	13	23	22	33	30
27	Chemicals and selected chemical products	30	82	76	118	100
28	Plastics and synthetic materials	4	12	11	40	35
29	Drugs, cleaning and toilet preparations	10	33	31	14	14
30	Paints and allied products	1	3	2	7	6
31	Petroleum refining and related industries	83	482	432	99	93
32	Rubber and miscellaneous plastic products	72	139	130	166	150
33	Leather tanning and finishing	3	9	8	16	13
34	Footwear and other leather products	108	181	165	113	111
35	Glass and glass products	12	22	21	39	36
36	Stone and clay products	31	61	57	60	55
37	Primary iron and steel manufacturing	95	234	213	270	235
38	Primary nonferrous metals manufacturing	61	215	177	180	146
39	Metal containers	0	2	2	10	9
40	Heating, plumbing, and structural metal products	9	18	16	18	17

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector: Total	Labor content from all sectors in imports of sector: Domestic	Labor content of sector in imports of all sectors: Total	Labor content of sector in imports of all sectors: Domestic
			Imports, 1979--Continued			
41	Screw machine products and stampings	12	27	24	87	79
42	Other fabricated metal products	50	98	90	123	110
43	Engines and turbines	3	8	7	14	12
44	Farm and garden machinery	10	25	22	12	12
45	Construction and mining machinery	11	25	23	18	17
46	Materials handling machinery and equipment	10	20	19	12	12
47	Metalworking machinery and equipment	48	77	73	75	69
48	Special industry machinery and equipment	28	51	48	36	34
49	General machinery and equipment	29	57	53	60	54
50	Miscellaneous machinery, except electrical	0	0	0	45	40
51	Office, computing, and accounting machines	39	120	108	47	46
52	Service industries machines	1	3	3	7	6
53	Electric industrial equipment and apparatus	20	37	35	54	49
54	Household appliances	19	49	44	20	20
55	Electric lighting and wiring equipment	14	24	23	30	27
56	Radio, TV, and communication equipment	129	319	287	146	142
57	Electronic components and accessories	84	177	162	152	138
58	Misc. electrical machinery and supplies	26	54	49	43	40
59	Motor vehicles and equipment	207	874	744	273	257
60	Aircraft and parts	22	49	45	29	28
61	Other transportation equipment	37	84	76	43	42
62	Scientific and controlling instruments	44	79	74	55	53
63	Optical, ophthalmic, and photographic equipment	31	68	63	34	33
64	Miscellaneous manufacturing	221	437	400	247	236
65	Transportation and warehousing	0	0	0	234	205
66	Communications, except radio and TV	0	0	0	21	18
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	62	52
69	Wholesale and retail trade	0	0	0	483	427
70	Finance and insurance	0	0	0	98	83
71	Real estate and rental	0	0	0	34	29
72	Hotels, personal and repair services exc. auto	0	0	0	83	73
73	Business services	0	0	0	337	295
74	Eating and drinking places	0	0	0	102	89
75	Automobile repair and services	0	0	0	26	22
76	Amusements	0	0	0	9	7
77	Medical, educ. services and nonprofit org.	0	0	0	30	27
78	Federal Government enterprises	0	0	0	25	21
79	State and local government enterprises	0	0	0	4	3
	Total	2,459	6,239	5,617	6,239	5,617

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1979				
1	Livestock and livestock products	3	17	16	71	64
2	Other agricultural products	457	736	710	547	529
3	Forestry and fishery products	2	27	26	22	17
4	Agricultural, forestry, and fishery services	0	0	0	75	70
5	Iron and ferroalloy ores mining	6	19	17	14	10
6	Nonferrous metal ores mining	3	12	12	42	26
7	Coal mining	0	41	40	19	16
8	Crude petroleum and natural gas	1	1	1	24	17
9	Stone and clay mining and quarrying	5	45	43	11	8
10	Chemical and fertilizer mineral mining	3	43	41	8	6
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	0	0	51	43
13	Ordnance and accessories	1	8	8	1	1
14	Food and kindred products	72	344	306	108	103
15	Tobacco manufactures	4	28	26	5	5
16	Broad and narrow fabrics, yarn and thread mills	28	84	77	74	66
17	Miscellaneous textile goods and floor coverings	7	43	39	15	14
18	Apparel	29	73	65	45	41
19	Miscellaneous fabricated textile products	9	34	32	19	18
20	Lumber and wood products, except containers	93	223	203	170	154
21	Wood containers	1	2	2	7	6
22	Household furniture	6	20	19	9	9
23	Other furniture and fixtures	3	21	21	5	5
24	Paper and allied products, except containers	29	96	88	68	60
25	Paperboard containers and boxes	0	11	10	22	20
26	Printing and publishing	18	48	46	38	35
27	Chemicals and selected chemical products	86	250	230	182	166
28	Plastics and synthetic materials	29	96	88	52	49
29	Drugs, cleaning and toilet preparations	18	80	76	22	21
30	Paints and allied products	1	32	31	6	6
31	Petroleum refining and related industries	3	33	31	13	9
32	Rubber and miscellaneous plastic products	33	80	76	104	92
33	Leather tanning and finishing	3	13	12	4	4
34	Footwear and other leather products	6	23	22	7	7
35	Glass and glass products	12	37	36	32	29
36	Stone and clay products	11	40	38	32	28
37	Primary iron and steel manufacturing	32	88	81	176	148
38	Primary nonferrous metals manufacturing	62	224	185	176	145
39	Metal containers	1	11	10	8	7
40	Heating, plumbing, and structural metal products	19	50	46	29	28

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector: Total	Labor content from all sectors in exports of sector: Domestic	Labor content of sector in exports of all sectors: Total	Labor content of sector in exports of all sectors: Domestic
			Exports, 1979--Continued			
41	Screw machine products and stampings	4	15	14	55	50
42	Other fabricated metal products	23	65	61	80	70
43	Engines and turbines	30	87	80	43	42
44	Farm and garden machinery	23	75	70	27	26
45	Construction and mining machinery	64	167	154	71	70
46	Materials handling machinery and equipment	14	41	38	16	16
47	Metalworking machinery and equipment	51	94	90	80	74
48	Special industry machinery and equipment	35	73	68	43	41
49	General machinery and equipment	41	97	91	76	70
50	Miscellaneous machinery, except electrical	27	56	54	74	71
51	Office, computing, and accounting machines	85	277	249	101	99
52	Service industries machines	25	89	82	31	30
53	Electric industrial equipment and apparatus	54	110	103	94	90
54	Household appliances	15	60	56	16	15
55	Electric lighting and wiring equipment	14	45	43	27	25
56	Radio, TV, and communication equipment	61	161	146	78	74
57	Electronic components and accessories	81	178	163	148	134
58	Misc. electrical machinery and supplies	29	85	79	42	39
59	Motor vehicles and equipment	94	409	350	128	119
60	Aircraft and parts	162	368	339	197	195
61	Other transportation equipment	14	41	38	19	18
62	Scientific and controlling instruments	80	161	152	94	91
63	Optical, ophthalmic, and photographic equipment	22	71	67	25	24
64	Miscellaneous manufacturing	91	200	185	104	99
65	Transportation and warehousing	132	0	0	324	301
66	Communications, except radio and TV	0	0	0	22	20
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	52	44
69	Wholesale and retail trade	550	0	0	956	913
70	Finance and insurance	0	0	0	92	81
71	Real estate and rental	0	0	0	29	26
72	Hotels, personal and repair services exc. auto	0	0	0	81	73
73	Business services	0	0	0	315	283
74	Eating and drinking places	0	0	0	113	103
75	Automobile repair and services	0	0	0	26	23
76	Amusements	0	0	0	9	7
77	Medical, educ. services and nonprofit org.	0	0	0	27	24
78	Federal Government enterprises	0	0	0	24	20
79	State and local government enterprises	0	0	0	4	3
	Total	2,914	6,054	5,583	6,054	5,583

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1980				
1	Livestock and livestock products	8	29	26	86	78
2	Other agricultural products	184	286	276	289	266
3	Forestry and fishery products	14	21	20	35	30
4	Agricultural, forestry, and fishery services	0	0	0	57	49
5	Iron and ferroalloy ores mining	10	21	20	21	16
6	Nonferrous metal ores mining	26	40	38	80	55
7	Coal mining	0	0	0	21	17
8	Crude petroleum and natural gas	12	24	23	127	113
9	Stone and clay mining and quarrying	22	41	38	30	28
10	Chemical and fertilizer mineral mining	10	18	17	14	12
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	1	0	78	65
13	Ordnance and accessories	2	4	3	2	2
14	Food and kindred products	93	439	387	135	129
15	Tobacco manufactures	0	2	2	1	1
16	Broad and narrow fabrics, yarn and thread mills	33	84	76	153	134
17	Miscellaneous textile goods and floor coverings	7	28	25	19	18
18	Apparel	231	516	456	316	299
19	Miscellaneous fabricated textile products	7	17	16	27	25
20	Lumber and wood products, except containers	73	160	145	167	146
21	Wood containers	3	6	5	9	7
22	Household furniture	24	45	42	30	29
23	Other furniture and fixtures	6	11	10	9	9
24	Paper and allied products, except containers	48	135	122	94	84
25	Paperboard containers and boxes	0	1	1	29	26
26	Printing and publishing	13	24	23	33	30
27	Chemicals and selected chemical products	29	80	73	113	96
28	Plastics and synthetic materials	4	11	10	41	36
29	Drugs, cleaning and toilet preparations	10	32	30	14	13
30	Paints and allied products	1	2	2	6	5
31	Petroleum refining and related industries	71	425	382	85	80
32	Rubber and miscellaneous plastic products	65	127	119	156	140
33	Leather tanning and finishing	2	6	5	13	11
34	Footwear and other leather products	90	155	142	94	92
35	Glass and glass products	12	22	21	37	34
36	Stone and clay products	29	57	53	57	52
37	Primary iron and steel manufacturing	90	217	197	275	236
38	Primary nonferrous metals manufacturing	77	268	214	215	168
39	Metal containers	0	1	1	10	9
40	Heating, plumbing, and structural metal products	7	15	14	17	16

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1980--Continued				
41	Screw machine products and stampings	13	29	26	86	78
42	Other fabricated metal products	52	101	93	125	111
43	Engines and turbines	2	6	5	13	12
44	Farm and garden machinery	21	53	48	24	23
45	Construction and mining machinery	10	23	21	17	15
46	Materials handling machinery and equipment	9	19	18	12	11
47	Metalworking machinery and equipment	50	81	76	78	71
48	Special industry machinery and equipment	30	55	51	38	36
49	General machinery and equipment	28	55	51	59	53
50	Miscellaneous machinery, except electrical	0	0	0	47	42
51	Office, computing, and accounting machines	48	147	130	57	56
52	Service industries machines	1	3	3	6	5
53	Electric industrial equipment and apparatus	23	43	40	58	52
54	Household appliances	19	50	45	20	20
55	Electric lighting and wiring equipment	13	24	22	28	25
56	Radio, TV, and communication equipment	126	315	281	143	139
57	Electronic components and accessories	97	205	186	170	154
58	Misc. electrical machinery and supplies	27	57	51	43	39
59	Motor vehicles and equipment	206	844	707	271	252
60	Aircraft and parts	40	92	84	51	50
61	Other transportation equipment	37	85	77	42	41
62	Scientific and controlling instruments	44	79	74	56	54
63	Optical, ophthalmic, and photographic equipment	26	58	54	30	29
64	Miscellaneous manufacturing	209	427	388	233	223
65	Transportation and warehousing	0	0	0	235	204
66	Communications, except radio and TV	0	0	0	20	17
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	61	51
69	Wholesale and retail trade	0	0	0	480	422
70	Finance and insurance	0	0	0	90	76
71	Real estate and rental	0	0	0	31	27
72	Hotels, personal and repair services exc. auto	0	0	0	84	74
73	Business services	0	0	0	328	285
74	Eating and drinking places	0	0	0	104	91
75	Automobile repair and services	0	0	0	25	21
76	Amusements	0	0	0	8	7
77	Medical, educ. services and nonprofit org.	0	0	0	29	25
78	Federal Government enterprises	0	0	0	24	19
79	State and local government enterprises	0	0	0	4	3
	Total	2,444	6,225	5,566	6,225	5,566

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1980				
1	Livestock and livestock products	3	18	17	74	67
2	Other agricultural products	582	927	893	687	666
3	Forestry and fishery products	2	30	30	25	20
4	Agricultural, forestry, and fishery services	0	0	0	97	90
5	Iron and ferroalloy ores mining	6	20	18	15	11
6	Nonferrous metal ores mining	6	17	16	59	34
7	Coal mining	0	45	43	18	14
8	Crude petroleum and natural gas	1	1	1	27	19
9	Stone and clay mining and quarrying	4	47	45	11	9
10	Chemical and fertilizer mineral mining	4	47	45	10	8
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	0	0	68	57
13	Ordnance and accessories	1	9	9	1	1
14	Food and kindred products	74	365	323	110	105
15	Tobacco manufactures	4	29	27	5	5
16	Broad and narrow fabrics, yarn and thread mills	29	87	80	79	70
17	Miscellaneous textile goods and floor coverings	9	52	48	17	15
18	Apparel	33	85	76	51	47
19	Miscellaneous fabricated textile products	7	32	31	17	15
20	Lumber and wood products, except containers	109	257	235	202	182
21	Wood containers	1	2	2	8	7
22	Household furniture	7	23	22	11	10
23	Other furniture and fixtures	4	25	25	6	6
24	Paper and allied products, except containers	37	121	110	79	70
25	Paperboard containers and boxes	0	12	12	24	21
26	Printing and publishing	19	51	49	40	38
27	Chemicals and selected chemical products	88	260	239	194	176
28	Plastics and synthetic materials	33	106	98	59	55
29	Drugs, cleaning and toilet preparations	19	86	82	23	23
30	Paints and allied products	1	36	35	6	6
31	Petroleum refining and related industries	2	35	33	14	10
32	Rubber and miscellaneous plastic products	36	88	84	112	99
33	Leather tanning and finishing	2	13	12	4	3
34	Footwear and other leather products	7	26	25	8	8
35	Glass and glass products	13	41	40	33	30
36	Stone and clay products	12	43	41	35	31
37	Primary iron and steel manufacturing	37	100	92	207	172
38	Primary nonferrous metals manufacturing	76	268	215	215	168
39	Metal containers	1	12	11	8	8
40	Heating, plumbing, and structural metal products	24	61	57	35	34

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1980--Continued				
41	Screw machine products and stampings	4	16	15	57	51
42	Other fabricated metal products	26	74	70	90	78
43	Engines and turbines	36	101	92	50	49
44	Farm and garden machinery	25	83	77	30	29
45	Construction and mining machinery	79	202	186	87	86
46	Materials handling machinery and equipment	16	46	43	18	18
47	Metalworking machinery and equipment	58	108	102	90	83
48	Special industry machinery and equipment	40	85	79	49	47
49	General machinery and equipment	45	107	100	83	76
50	Miscellaneous machinery, except electrical	33	66	63	87	83
51	Office, computing, and accounting machines	120	385	343	141	138
52	Service industries machines	23	92	84	28	28
53	Electric industrial equipment and apparatus	62	127	118	109	103
54	Household appliances	16	66	62	17	17
55	Electric lighting and wiring equipment	13	46	44	25	23
56	Radio, TV, and communication equipment	64	173	155	82	79
57	Electronic components and accessories	92	203	185	173	155
58	Misc. electrical machinery and supplies	31	93	86	43	40
59	Motor vehicles and equipment	88	374	315	121	111
60	Aircraft and parts	187	430	392	228	224
61	Other transportation equipment	19	55	51	24	23
62	Scientific and controlling instruments	80	164	154	96	93
63	Optical, ophthalmic, and photographic equipment	21	71	67	24	24
64	Miscellaneous manufacturing	90	206	189	104	98
65	Transportation and warehousing	144	0	0	363	336
66	Communications, except radio and TV	0	0	0	23	21
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	58	49
69	Wholesale and retail trade	617	0	0	1,068	1,018
70	Finance and insurance	0	0	0	97	84
71	Real estate and rental	0	0	0	32	28
72	Hotels, personal and repair services exc. auto	0	0	0	92	83
73	Business services	0	0	0	345	308
74	Eating and drinking places	0	0	0	129	117
75	Automobile repair and services	0	0	0	28	25
76	Amusements	0	0	0	9	8
77	Medical, educ. services and nonprofit org.	0	0	0	29	26
78	Federal Government enterprises	0	0	0	26	21
79	State and local government enterprises	0	0	0	4	3
	Total	3,322	6,852	6,291	6,852	6,291

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1981				
1	Livestock and livestock products	7	25	23	77	70
2	Other agricultural products	140	225	217	236	217
3	Forestry and fishery products	12	18	18	31	27
4	Agricultural, forestry, and fishery services	0	0	0	53	46
5	Iron and ferroalloy ores mining	9	21	20	21	16
6	Nonferrous metal ores mining	22	36	33	68	49
7	Coal mining	0	0	0	20	16
8	Crude petroleum and natural gas	10	19	18	117	104
9	Stone and clay mining and quarrying	11	21	20	19	17
10	Chemical and fertilizer mineral mining	10	18	17	14	13
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	0	0	70	59
13	Ordnance and accessories	2	4	4	2	2
14	Food and kindred products	92	429	381	134	128
15	Tobacco manufactures	1	4	3	1	1
16	Broad and narrow fabrics, yarn and thread mills	39	99	90	165	142
17	Miscellaneous textile goods and floor coverings	8	27	24	21	19
18	Apparel	266	576	507	364	342
19	Miscellaneous fabricated textile products	8	20	18	26	24
20	Lumber and wood products, except containers	70	156	142	163	143
21	Wood containers	3	5	5	8	7
22	Household furniture	24	47	44	31	30
23	Other furniture and fixtures	6	11	10	9	9
24	Paper and allied products, except containers	45	127	115	91	81
25	Paperboard containers and boxes	0	1	1	29	26
26	Printing and publishing	12	22	21	32	29
27	Chemicals and selected chemical products	28	77	71	112	94
28	Plastics and synthetic materials	4	14	12	39	34
29	Drugs, cleaning and toilet preparations	9	32	30	13	13
30	Paints and allied products	0	1	1	6	5
31	Petroleum refining and related industries	69	373	340	84	79
32	Rubber and miscellaneous plastic products	57	112	105	144	130
33	Leather tanning and finishing	4	9	8	18	15
34	Footwear and other leather products	113	192	175	118	116
35	Glass and glass products	12	22	20	37	33
36	Stone and clay products	28	55	52	56	51
37	Primary iron and steel manufacturing	107	268	242	280	240
38	Primary nonferrous metals manufacturing	67	237	193	196	156
39	Metal containers	0	2	1	9	8
40	Heating, plumbing, and structural metal products	8	16	15	18	16

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1981--Continued				
41	Screw machine products and stampings	12	26	23	83	74
42	Other fabricated metal products	49	96	88	120	106
43	Engines and turbines	2	4	4	12	11
44	Farm and garden machinery	16	41	37	19	18
45	Construction and mining machinery	13	29	27	20	19
46	Materials handling machinery and equipment	10	21	19	12	12
47	Metalworking machinery and equipment	49	80	75	78	71
48	Special industry machinery and equipment	27	51	47	36	34
49	General machinery and equipment	32	64	59	64	57
50	Miscellaneous machinery, except electrical	0	0	0	46	41
51	Office, computing, and accounting machines	55	174	154	66	64
52	Service industries machines	1	3	3	5	5
53	Electric industrial equipment and apparatus	24	45	41	59	54
54	Household appliances	20	53	48	22	21
55	Electric lighting and wiring equipment	13	25	23	28	25
56	Radio, TV, and communication equipment	146	369	329	165	161
57	Electronic components and accessories	98	206	188	180	162
58	Misc. electrical machinery and supplies	25	56	50	40	36
59	Motor vehicles and equipment	190	782	650	251	231
60	Aircraft and parts	47	106	97	59	58
61	Other transportation equipment	38	81	73	44	43
62	Scientific and controlling instruments	52	91	85	65	62
63	Optical, ophthalmic, and photographic equipment	30	65	60	34	33
64	Miscellaneous manufacturing	214	441	401	239	228
65	Transportation and warehousing	0	0	0	242	209
66	Communications, except radio and TV	0	0	0	19	17
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	63	52
69	Wholesale and retail trade	0	0	0	477	419
70	Finance and insurance	0	0	0	93	78
71	Real estate and rental	0	0	0	29	25
72	Hotels, personal and repair services exc. auto	0	0	0	89	79
73	Business services	0	0	0	336	293
74	Eating and drinking places	0	0	0	109	96
75	Automobile repair and services	0	0	0	25	21
76	Amusements	0	0	0	8	7
77	Medical, educ. services and nonprofit org.	0	0	0	30	26
78	Federal Government enterprises	0	0	0	23	19
79	State and local government enterprises	0	0	0	4	3
	Total	2,468	6,226	5,574	6,226	5,574

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1981				
1	Livestock and livestock products	3	20	18	66	60
2	Other agricultural products	533	878	846	626	609
3	Forestry and fishery products	2	29	29	20	16
4	Agricultural, forestry, and fishery services	0	0	0	95	89
5	Iron and ferroalloy ores mining	3	14	13	11	8
6	Nonferrous metal ores mining	5	15	14	44	27
7	Coal mining	0	42	41	16	13
8	Crude petroleum and natural gas	1	1	1	29	21
9	Stone and clay mining and quarrying	4	45	43	10	9
10	Chemical and fertilizer mineral mining	3	43	41	9	7
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	0	0	61	52
13	Ordnance and accessories	1	9	8	1	1
14	Food and kindred products	70	342	305	105	100
15	Tobacco manufactures	4	29	27	5	5
16	Broad and narrow fabrics, yarn and thread mills	23	72	67	68	59
17	Miscellaneous textile goods and floor coverings	8	48	44	17	15
18	Apparel	33	82	73	51	46
19	Miscellaneous fabricated textile products	6	30	28	15	14
20	Lumber and wood products, except containers	84	203	186	164	147
21	Wood containers	1	2	1	8	7
22	Household furniture	8	25	24	12	11
23	Other furniture and fixtures	5	27	26	7	7
24	Paper and allied products, except containers	33	110	101	73	65
25	Paperboard containers and boxes	0	11	11	22	20
26	Printing and publishing	20	53	51	41	39
27	Chemicals and selected chemical products	84	247	228	186	170
28	Plastics and synthetic materials	27	95	87	50	46
29	Drugs, cleaning and toilet preparations	19	85	81	22	22
30	Paints and allied products	2	36	35	6	6
31	Petroleum refining and related industries	3	36	34	15	11
32	Rubber and miscellaneous plastic products	35	87	83	107	95
33	Leather tanning and finishing	2	12	12	4	4
34	Footwear and other leather products	7	26	25	9	8
35	Glass and glass products	12	40	39	32	29
36	Stone and clay products	12	42	41	34	30
37	Primary iron and steel manufacturing	24	71	65	176	142
38	Primary nonferrous metals manufacturing	51	183	151	168	132
39	Metal containers	1	12	11	8	7
40	Heating, plumbing, and structural metal products	26	64	59	38	36

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1981--Continued				
41	Screw machine products and stampings	4	16	15	56	49
42	Other fabricated metal products	25	71	67	85	74
43	Engines and turbines	37	101	92	52	51
44	Farm and garden machinery	25	84	77	30	29
45	Construction and mining machinery	85	208	192	93	92
46	Materials handling machinery and equipment	15	45	42	17	17
47	Metalworking machinery and equipment	61	111	105	92	85
48	Special industry machinery and equipment	36	78	73	45	43
49	General machinery and equipment	45	105	98	82	75
50	Miscellaneous machinery, except electrical	33	65	62	85	81
51	Office, computing, and accounting machines	129	422	375	152	148
52	Service industries machines	22	93	85	27	26
53	Electric industrial equipment and apparatus	64	129	120	111	105
54	Household appliances	15	63	59	16	16
55	Electric lighting and wiring equipment	14	48	45	26	24
56	Radio, TV, and communication equipment	65	176	158	83	79
57	Electronic components and accessories	89	195	178	172	154
58	Misc. electrical machinery and supplies	30	93	86	41	39
59	Motor vehicles and equipment	84	357	299	116	105
60	Aircraft and parts	179	406	370	218	214
61	Other transportation equipment	26	66	61	32	31
62	Scientific and controlling instruments	93	183	172	109	106
63	Optical, ophthalmic, and photographic equipment	21	70	66	25	24
64	Miscellaneous manufacturing	81	190	175	94	89
65	Transportation and warehousing	136	0	0	353	327
66	Communications, except radio and TV	0	0	0	22	20
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	57	48
69	Wholesale and retail trade	601	0	0	1,031	985
70	Finance and insurance	0	0	0	98	85
71	Real estate and rental	0	0	0	30	27
72	Hotels, personal and repair services exc. auto	0	0	0	93	84
73	Business services	0	0	0	342	307
74	Eating and drinking places	0	0	0	130	119
75	Automobile repair and services	0	0	0	28	25
76	Amusements	0	0	0	9	8
77	Medical, educ. services and nonprofit org.	0	0	0	28	25
78	Federal Government enterprises	0	0	0	24	20
79	State and local government enterprises	0	0	0	4	3
	Total	3,170	6,536	6,018	6,536	6,018

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1982				
1	Livestock and livestock products	8	30	27	70	64
2	Other agricultural products	138	232	223	226	208
3	Forestry and fishery products	8	13	13	27	23
4	Agricultural, forestry, and fishery services	0	0	0	60	52
5	Iron and ferroalloy ores mining	5	11	10	16	11
6	Nonferrous metal ores mining	26	44	40	69	48
7	Coal mining	0	0	0	20	15
8	Crude petroleum and natural gas	14	24	23	128	114
9	Stone and clay mining and quarrying	8	16	15	16	14
10	Chemical and fertilizer mineral mining	9	15	15	13	11
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	0	0	64	53
13	Ordnance and accessories	2	4	4	2	2
14	Food and kindred products	82	387	343	121	115
15	Tobacco manufactures	1	4	4	1	1
16	Broad and narrow fabrics, yarn and thread mills	35	90	81	162	139
17	Miscellaneous textile goods and floor coverings	7	25	22	19	17
18	Apparel	284	614	536	389	363
19	Miscellaneous fabricated textile products	8	18	17	27	25
20	Lumber and wood products, except containers	60	136	124	144	125
21	Wood containers	2	4	4	8	6
22	Household furniture	24	49	45	31	30
23	Other furniture and fixtures	6	11	11	9	9
24	Paper and allied products, except containers	39	113	103	82	73
25	Paperboard containers and boxes	0	1	1	28	26
26	Printing and publishing	12	22	21	32	28
27	Chemicals and selected chemical products	31	82	75	121	101
28	Plastics and synthetic materials	4	13	12	41	35
29	Drugs, cleaning and toilet preparations	9	31	29	13	12
30	Paints and allied products	0	1	1	6	5
31	Petroleum refining and related industries	59	337	306	73	68
32	Rubber and miscellaneous plastic products	48	95	89	138	123
33	Leather tanning and finishing	3	8	7	20	17
34	Footwear and other leather products	147	250	228	153	151
35	Glass and glass products	12	22	21	36	32
36	Stone and clay products	26	50	47	53	48
37	Primary iron and steel manufacturing	111	254	228	320	263
38	Primary nonferrous metals manufacturing	68	227	182	208	161
39	Metal containers	0	2	2	9	8
40	Heating, plumbing, and structural metal products	11	21	19	20	19

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in imports of sector		Labor content of sector in imports of all sectors	
			Total	Domestic	Total	Domestic
		Imports, 1982--Continued				
41	Screw machine products and stampings	12	26	23	91	81
42	Other fabricated metal products	50	97	88	125	110
43	Engines and turbines	2	4	3	12	11
44	Farm and garden machinery	13	32	29	16	15
45	Construction and mining machinery	10	21	19	16	15
46	Materials handling machinery and equipment	11	23	21	13	13
47	Metalworking machinery and equipment	40	67	62	68	61
48	Special industry machinery and equipment	29	52	48	38	35
49	General machinery and equipment	34	67	61	65	57
50	Miscellaneous machinery, except electrical	0	0	0	52	46
51	Office, computing, and accounting machines	75	229	200	90	87
52	Service industries machines	1	3	3	5	4
53	Electric industrial equipment and apparatus	26	47	43	66	59
54	Household appliances	23	62	55	24	24
55	Electric lighting and wiring equipment	12	25	22	27	24
56	Radio, TV, and communication equipment	143	369	326	161	157
57	Electronic components and accessories	106	226	204	193	173
58	Misc. electrical machinery and supplies	27	60	54	42	38
59	Motor vehicles and equipment	194	839	694	255	237
60	Aircraft and parts	42	96	87	53	52
61	Other transportation equipment	31	66	60	37	36
62	Scientific and controlling instruments	44	79	73	56	54
63	Optical, ophthalmic, and photographic equipment	32	68	63	35	35
64	Miscellaneous manufacturing	259	523	474	288	275
65	Transportation and warehousing	0	0	0	236	203
66	Communications, except radio and TV	0	0	0	19	16
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	63	51
69	Wholesale and retail trade	0	0	0	475	415
70	Finance and insurance	0	0	0	91	76
71	Real estate and rental	0	0	0	27	23
72	Hotels, personal and repair services exc. auto	0	0	0	89	78
73	Business services	0	0	0	335	291
74	Eating and drinking places	0	0	0	108	95
75	Automobile repair and services	0	0	0	25	21
76	Amusements	0	0	0	8	7
77	Medical, educ. services and nonprofit org.	0	0	0	30	26
78	Federal Government enterprises	0	0	0	22	18
79	State and local government enterprises	0	0	0	3	3
	Total	2,521	6,335	5,638	6,335	5,638

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1982				
1	Livestock and livestock products	4	20	19	55	50
2	Other agricultural products	445	763	734	522	509
3	Forestry and fishery products	1	25	25	19	16
4	Agricultural, forestry, and fishery services	0	0	0	98	92
5	Iron and ferroalloy ores mining	2	10	9	9	6
6	Nonferrous metal ores mining	6	15	14	36	20
7	Coal mining	0	36	35	15	11
8	Crude petroleum and natural gas	1	2	2	35	26
9	Stone and clay mining and quarrying	4	39	38	10	9
10	Chemical and fertilizer mineral mining	3	37	36	8	6
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	0	0	53	45
13	Ordnance and accessories	1	8	7	1	1
14	Food and kindred products	59	294	262	89	85
15	Tobacco manufactures	4	29	27	5	5
16	Broad and narrow fabrics, yarn and thread mills	17	55	50	52	45
17	Miscellaneous textile goods and floor coverings	7	40	37	13	12
18	Apparel	25	63	56	39	35
19	Miscellaneous fabricated textile products	5	25	24	12	11
20	Lumber and wood products, except containers	81	200	183	152	137
21	Wood containers	1	1	1	7	6
22	Household furniture	7	22	20	10	10
23	Other furniture and fixtures	4	24	23	6	6
24	Paper and allied products, except containers	27	92	85	61	54
25	Paperboard containers and boxes	0	10	10	20	18
26	Printing and publishing	19	50	48	38	36
27	Chemicals and selected chemical products	90	254	233	191	174
28	Plastics and synthetic materials	25	86	79	46	43
29	Drugs, cleaning and toilet preparations	18	80	75	21	21
30	Paints and allied products	2	32	31	6	5
31	Petroleum refining and related industries	5	45	42	16	13
32	Rubber and miscellaneous plastic products	30	76	72	94	84
33	Leather tanning and finishing	2	12	11	4	3
34	Footwear and other leather products	6	23	22	8	7
35	Glass and glass products	10	35	34	28	25
36	Stone and clay products	10	36	35	30	26
37	Primary iron and steel manufacturing	24	64	58	186	143
38	Primary nonferrous metals manufacturing	38	133	108	146	111
39	Metal containers	1	10	9	7	7
40	Heating, plumbing, and structural metal products	23	57	52	35	33

Table 3.--Labor content of U.S. world trade, 1978-82--Continued

(In thousands of work-years)

Input-output sector	Description	Direct labor content	Labor content from all sectors in exports of sector		Labor content of sector in exports of all sectors	
			Total	Domestic	Total	Domestic
		Exports, 1982--Continued				
41	Screw machine products and stampings	4	14	13	52	46
42	Other fabricated metal products	23	63	59	79	68
43	Engines and turbines	39	102	93	53	52
44	Farm and garden machinery	18	61	56	22	21
45	Construction and mining machinery	79	191	175	87	86
46	Materials handling machinery and equipment	14	40	37	16	15
47	Metalworking machinery and equipment	46	87	82	73	67
48	Special industry machinery and equipment	36	74	69	44	42
49	General machinery and equipment	44	101	94	78	71
50	Miscellaneous machinery, except electrical	33	62	60	84	79
51	Office, computing, and accounting machines	151	473	416	178	172
52	Service industries machines	17	78	71	21	20
53	Electric industrial equipment and apparatus	64	126	117	113	106
54	Household appliances	12	53	49	13	13
55	Electric lighting and wiring equipment	12	42	40	22	21
56	Radio, TV, and communication equipment	62	169	150	76	72
57	Electronic components and accessories	90	198	180	173	153
58	Misc. electrical machinery and supplies	28	85	78	37	35
59	Motor vehicles and equipment	65	293	245	90	82
60	Aircraft and parts	128	296	269	157	154
61	Other transportation equipment	26	65	60	32	31
62	Scientific and controlling instruments	91	180	168	105	103
63	Optical, ophthalmic, and photographic equipment	21	66	62	24	23
64	Miscellaneous manufacturing	71	164	150	84	78
65	Transportation and warehousing	116	0	0	311	287
66	Communications, except radio and TV	0	0	0	19	17
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	52	44
69	Wholesale and retail trade	526	0	0	906	865
70	Finance and insurance	0	0	0	87	76
71	Real estate and rental	0	0	0	27	24
72	Hotels, personal and repair services exc. auto	0	0	0	83	75
73	Business services	0	0	0	308	275
74	Eating and drinking places	0	0	0	115	105
75	Automobile repair and services	0	0	0	24	22
76	Amusements	0	0	0	8	7
77	Medical, educ. services and nonprofit org.	0	0	0	25	22
78	Federal Government enterprises	0	0	0	20	17
79	State and local government enterprises	0	0	0	3	3
	Total	2,822	5,884	5,395	5,884	5,395

Relative labor content of imports and exports

Table 4 shows the direct, total, and total domestic labor content of imports and exports as percentages of domestic employment in 1978 and in 1982, where the total and total domestic labor content of each sector refer to the total and total domestic labor in the sector embodied in imports or exports of all sectors.

On the import side, the ratio for direct labor content was greatest for Iron and ferroalloy ores mining (IO 5), Nonferrous metal ores mining (IO 6), Chemical and fertilizer mineral mining (IO 10), Petroleum-refining and related industries (IO 31), Footwear and other leather products (IO 34), and Miscellaneous manufacturing (IO 64). The ratios for the total and total domestic labor content were also greatest for these industries, for Crude petroleum and natural gas (IO 8), and for Leather tanning and finishing. In 1982, the total labor content of imports exceeded domestic employment in three sectors, Iron and ferroalloy ores mining, Nonferrous metal ores mining, and Leather tanning and finishing.

On the export side, the ratio for direct labor content was greatest for Other agricultural products (IO 2), Engines and turbines (IO 43), Construction and mining machinery (IO 45), Office computing and accounting machines (IO 51), Aircraft and parts (IO 60), and Scientific and controlling instruments (IO 62). The total and total domestic ratios were greatest in Iron and feroalloy ores mining and Nonferrous metal ores mining. In 1978, the third and fourth greatest ratios were in Wood containers (IO 21) and Chemicals and selected chemical products (IO 27). In 1982, the third and fourth places were taken by Primary nonferrous metals manufacturing (IO 38), and Engines and turbines (IO 43).

In aggregate, the direct labor content of imports remained unchanged at 2.9 percent of domestic employment from 1978 to 1982. The total labor content of imports declined slightly, from 7.4 percent of domestic employment in 1978 to 7.3 percent in 1982. On the export side, the direct labor content of exports increased slightly, from 3.1 percent of domestic employment in 1978 to 3.3 percent in 1982, and the total labor content of exports increased from 6.3 percent of domestic employment in 1978 to 6.8 percent in 1982.

Table 5 shows the labor content of U.S. merchandise trade for five aggregate industry sectors (Agriculture, Manufacturing, Mining, Petroleum, and Services) for 1978 and 1982. Agriculture is the only aggregate sector where U.S. exports embodied more total labor than U.S. imports in both 1978 and 1982. However, the labor from both Services and Agriculture embodied in all U.S. merchandise exports exceeded the labor from these sectors embodied in all U.S. merchandise imports. U.S.-manufactured imports embodied more labor than U.S. manufactured exports in both 1978 and 1982. Also, labor from manufacturing embodied in all U.S. merchandise imports exceeded labor from manufacturing embodied in all U.S. merchandise exports in both years. In 1982, the deficit in manufacturing labor imported and exported in all merchandise trade was 1,003,000 work-years. The balance for agricultural labor embodied in all U.S. merchandise trade in 1982 was a surplus of 275,000 work-years, the balance for labor in services was a surplus of 483,000 work-years, the balance for labor in mining was a deficit of 56,000 work-years, and the balance for labor in petroleum was a deficit of 149,000 work-years.

U.S. trade with selected trading partners

Tables 6 through 18 summarize the labor content estimates for U.S. merchandise trade with selected individual countries and country groups for the years 1978 and 1982. 1/ For both years, the labor content of imports exceeded the labor content of exports for U.S. trade with the OECD countries as a group, the NIC's as a group, Japan, Brazil, Hong Kong, Korea, and Taiwan. In 1982, the total labor content deficit for U.S. trade with Japan was 573,000 work-years, and this deficit for U.S. trade with the NIC's amounted to 626,000 work-years. (U.S. trade with Taiwan and Hong Kong contributed importantly to the deficit with the NIC's. The deficit for U.S. trade with Taiwan was 301,000 work-years, and the deficit for U.S. trade with Hong Kong was 221,000 work-years.) The aggregate U.S. deficit in total labor content of trade in 1982 was 451,000 work-years.

The total labor content of exports exceeded the total labor content of imports in both 1978 and 1982 for U.S. trade with the EEC countries, the LDC's, the NME's, OPEC, Mexico, and China. In 1982, the largest surpluses in total labor content of trade were with the EEC countries (226,000 work-years) the LDC's (245,000 work-years), and OPEC (354,000 work-years).

Table 19 shows the total and total domestic labor content per billion dollars of U.S. imports and exports in 1978 and 1982 for total U.S. trade and for U.S. trade with selected trading partners. U.S. exports were more labor intensive than U.S. imports for trade with most of the selected country groups, and the difference generally was significant. In 1982, the labor intensity of U.S. exports exceeded the labor intensity of imports by the greatest margins for U.S. trade with Mexico and with OPEC. Somewhat surprisingly, the labor intensity of U.S. exports exceeded that for U.S. imports significantly for U.S. trade with the LDC's, and the labor intensities of U.S. exports and imports were roughly the same for U.S. trade with Japan and with China.

The notable exception to this pattern of labor intensities occurs for U.S. trade with the NIC's. This is the only country group where the labor intensity of U.S. imports significantly exceeded the labor intensity of U.S. exports, and this difference was chiefly due to the labor intensities of U.S. imports from Hong Kong, Korea, and Taiwan.

Table 20 shows total and total domestic labor contents for each billion dollars of U.S. exports and imports of manufactured goods in 1978 and in 1982. Again, the data show that U.S. exports were more labor intensive than U.S. imports, although the difference was smaller than for aggregate U.S. trade. The labor intensity of U.S.-manufactured exports exceeded that for U.S.-manufactured imports by a significant margin for U.S. trade with the other members of the OECD as a group, the EEC and Japan. The reverse held true for U.S. manufacturing trade with the NIC's as a group, Hong Kong, Korea, Taiwan, the LDC's, the NME's, China, and OPEC.

1/ The corresponding trade data are given in app. E. Detailed results like those in table 3 were calculated and are available from the author on request.

Table 4.--Ratios of labor content of U.S. imports and exports to U.S. employment, 1978 and 1982

(In percent)

Input-output sector	Description	Direct labor content	Labor content of sector in imports of all sectors	
			Total	Domestic
		Imports, 1978		
1	Livestock and livestock products	1.0	9.0	8.2
2	Other agricultural products	11.0	16.5	15.3
3	Forestry and fishery products	16.5	39.2	33.5
4	Agricultural, forestry, and fishery services	0	11.2	9.8
5	Iron and ferroalloy ores mining	43.5	84.2	66.4
6	Nonferrous metal ores mining	36.1	94.4	69.1
7	Coal mining	0	11.5	9.3
8	Crude petroleum and natural gas	4.8	59.9	53.3
9	Stone and clay mining and quarrying	32.9	42.0	38.9
10	Chemical and fertilizer mineral mining	35.8	50.2	44.2
11	New construction	0	0	0
12	Maintenance and repair construction	0	5.7	4.8
13	Ordnance and accessories	1.3	1.5	1.5
14	Food and kindred products	4.9	7.3	6.9
15	Tobacco manufactures	.4	.7	.7
16	Broad and narrow fabrics, yarn and thread mills	7.0	29.5	25.8
17	Miscellaneous textile goods and floor coverings	5.4	15.7	14.3
18	Apparel	17.3	23.7	22.4
19	Miscellaneous fabricated textile products	2.9	12.6	11.7
20	Lumber and wood products, except containers	10.4	22.2	19.7
21	Wood containers	12.3	37.3	32.2
22	Household furniture	6.4	8.2	8.0
23	Other furniture and fixtures	3.2	5.1	4.9
24	Paper and allied products, except containers	9.8	19.7	17.6
25	Paperboard containers and boxes	.1	13.0	11.8
26	Printing and publishing	1.0	2.6	2.3
27	Chemicals and selected chemical products	6.4	24.5	20.8
28	Plastics and synthetic materials	2.3	20.5	17.8
29	Drugs, cleaning and toilet preparations	3.0	4.3	4.1
30	Paints and allied products	1.2	10.4	9.2
31	Petroleum refining and related industries	40.6	48.4	45.5
32	Rubber and miscellaneous plastic products	9.0	20.4	18.5
33	Leather tanning and finishing	15.3	61.0	53.0
34	Footwear and other leather products	43.7	45.6	44.9
35	Glass and glass products	5.4	17.1	15.5
36	Stone and clay products	6.8	12.3	11.3
37	Primary iron and steel manufacturing	11.8	31.7	27.6
38	Primary nonferrous metals manufacturing	13.5	40.7	33.4
39	Metal containers	.9	12.4	11.2
40	Heating, plumbing, and structural metal products	1.6	3.2	2.9

Table 4.--Ratios of labor content of U.S. imports and exports to U.S. employment, 1978 and 1982--Continued

(In percent)

Input-output sector	Description	Direct labor content	Labor content of sector in imports of all sectors	
			Total	Domestic
	Imports, 1978--Continued			
41	Screw machine products and stampings	3.2	23.5	21.4
42	Other fabricated metal products	9.1	22.1	19.8
43	Engines and turbines	1.6	8.5	7.7
44	Farm and garden machinery	4.9	6.5	6.3
45	Construction and mining machinery	4.2	6.9	6.3
46	Materials handling machinery and equipment	8.7	11.6	11.0
47	Metalworking machinery and equipment	10.7	18.0	16.4
48	Special industry machinery and equipment	13.8	18.0	16.9
49	General machinery and equipment	7.5	17.3	15.4
50	Miscellaneous machinery, except electrical	.1	14.7	13.1
51	Office, computing, and accounting machines	11.2	13.4	13.1
52	Service industries machines	.6	3.8	3.4
53	Electric industrial equipment and apparatus	3.7	10.9	9.9
54	Household appliances	11.6	12.4	12.3
55	Electric lighting and wiring equipment	5.9	13.7	12.5
56	Radio, TV, and communication equipment	23.2	26.1	25.4
57	Electronic components and accessories	15.2	30.6	27.6
58	Misc. electrical machinery and supplies	13.3	22.7	20.8
59	Motor vehicles and equipment	19.3	25.4	24.0
60	Aircraft and parts	3.1	4.2	4.1
61	Other transportation equipment	7.8	9.2	8.9
62	Scientific and controlling instruments	10.9	13.8	13.2
63	Optical, ophthalmic, and photographic equipment	15.7	17.5	17.1
64	Miscellaneous manufacturing	45.0	50.3	48.2
65	Transportation and warehousing	0	7.4	6.5
66	Communications, except radio and TV	0	2.0	1.7
67	Radio and TV broadcasting	0	0	0
68	Electric, gas, water, and sanitary services	0	7.6	6.3
69	Wholesale and retail trade	0	2.8	2.5
70	Finance and insurance	0	2.4	2.0
71	Real estate and rental	0	2.6	2.2
72	Hotels, personal and repair services except auto	0	2.4	2.1
73	Business services	0	6.9	6.0
74	Eating and drinking places	0	2.0	1.8
75	Automobile repair and services	0	3.1	2.7
76	Amusements	0	.8	.7
77	Medical, educ. services and nonprofit org.	0	.3	.3
78	Federal Government enterprises	0	3.1	2.5
79	State and local government enterprises	0	.6	.5
	Total	2.9	7.4	6.7

Table 4.--Ratios of labor content of U.S. imports and exports to U.S. employment, 1978 and 1982--Continued

(In percent)

Input-output sector	Description	Direct labor content	Labor content of sector in exports of all sectors	
			Total	Domestic
		Exports, 1978		
1	Livestock and livestock products	0.3	7.0	6.4
2	Other agricultural products	24.7	29.4	28.4
3	Forestry and fishery products	1.7	18.2	14.2
4	Agricultural, forestry, and fishery services	0	14.9	13.8
5	Iron and ferroalloy ores mining	13.1	36.0	25.4
6	Nonferrous metal ores mining	2.9	39.7	23.0
7	Coal mining	0	7.3	5.8
8	Crude petroleum and natural gas	.3	9.7	6.8
9	Stone and clay mining and quarrying	3.7	8.7	6.9
10	Chemical and fertilizer mineral mining	12.5	27.9	22.2
11	New construction	0	0	0
12	Maintenance and repair construction	0	3.6	3.1
13	Ordnance and accessories	.6	.8	.8
14	Food and kindred products	3.8	5.6	5.4
15	Tobacco manufactures	5.0	6.6	6.6
16	Broad and narrow fabrics, yarn and thread mills	3.8	10.7	9.5
17	Miscellaneous textile goods and floor coverings	4.5	9.8	9.0
18	Apparel	1.5	2.4	2.2
19	Miscellaneous fabricated textile products	3.7	7.9	7.4
20	Lumber and wood products, except containers	8.6	16.4	14.7
21	Wood containers	4.4	30.5	25.9
22	Household furniture	1.7	2.6	2.5
23	Other furniture and fixtures	1.6	2.6	2.5
24	Paper and allied products, except containers	5.3	12.2	10.8
25	Paperboard containers and boxes	0	8.6	7.8
26	Printing and publishing	1.3	2.7	2.5
27	Chemicals and selected chemical products	14.0	30.5	27.7
28	Plastics and synthetic materials	9.7	19.3	17.9
29	Drugs, cleaning and toilet preparations	5.2	6.1	6.0
30	Paints and allied products	2.0	8.2	7.4
31	Petroleum refining and related industries	1.4	5.9	4.2
32	Rubber and miscellaneous plastic products	3.7	11.4	10.1
33	Leather tanning and finishing	11.3	15.8	14.8
34	Footwear and other leather products	1.9	2.5	2.3
35	Glass and glass products	4.9	12.8	11.8
36	Stone and clay products	2.0	5.4	4.8
37	Primary iron and steel manufacturing	2.8	17.4	14.5
38	Primary nonferrous metals manufacturing	6.8	26.6	21.4
39	Metal containers	.9	8.5	7.7
40	Heating, plumbing, and structural metal products	3.1	4.5	4.3

Table 4.--Ratios of labor content of U.S. imports and exports to U.S. employment, 1978 and 1982--Continued

(In percent)

Input-output sector	Description	Direct labor content	Labor content of sector in exports of all sectors	
			Total	Domestic
	Exports, 1978--Continued			
41	Screw machine products and stampings	1.0	13.6	12.3
42	Other fabricated metal products	4.0	12.9	11.4
43	Engines and turbines	17.6	25.3	24.7
44	Farm and garden machinery	13.3	15.8	15.5
45	Construction and mining machinery	20.8	23.0	22.6
46	Materials handling machinery and equipment	14.2	16.0	15.6
47	Metalworking machinery and equipment	13.8	20.7	19.4
48	Special industry machinery and equipment	13.3	16.4	15.7
49	General machinery and equipment	12.7	22.3	20.7
50	Miscellaneous machinery, except electrical	9.2	23.0	22.0
51	Office, computing, and accounting machines	21.0	24.9	24.3
52	Service industries machines	13.2	15.9	15.7
53	Electric industrial equipment and apparatus	11.0	18.9	18.1
54	Household appliances	7.4	7.9	7.8
55	Electric lighting and wiring equipment	7.0	12.4	11.6
56	Radio, TV, and communication equipment	9.8	12.3	11.7
57	Electronic components and accessories	14.9	28.2	25.5
58	Misc. electrical machinery and supplies	14.7	20.9	19.7
59	Motor vehicles and equipment	8.2	11.1	10.4
60	Aircraft and parts	24.7	30.1	29.8
61	Other transportation equipment	3.1	4.2	4.0
62	Scientific and controlling instruments	17.9	21.0	20.5
63	Optical, ophthalmic, and photographic equipment	10.0	11.5	11.2
64	Miscellaneous manufacturing	16.3	18.7	17.7
65	Transportation and warehousing	3.6	8.8	8.2
66	Communications, except radio and TV	0	1.8	1.6
67	Radio and TV broadcasting	0	0	0
68	Electric, gas, water, and sanitary services	0	5.3	4.5
69	Wholesale and retail trade	2.8	4.8	4.6
70	Finance and insurance	0	2.0	1.7
71	Real estate and rental	0	2.0	1.7
72	Hotels, personal and repair services except auto	0	2.0	1.8
73	Business services	0	5.6	5.1
74	Eating and drinking places	0	2.0	1.8
75	Automobile repair and services	0	2.8	2.5
76	Amusements	0	.7	.6
77	Medical, educ. services and nonprofit org.	0	.3	.2
78	Federal Government enterprises	0	2.5	2.2
79	State and local government enterprises	0	.4	.4
	Total	3.1	6.3	5.8

Table 4.--Ratios of labor content of U.S. imports and exports to U.S. employment, 1978 and 1982--Continued

(In percent)

Input-output sector	Description	Direct labor content	Labor content of sector in imports of all sectors	
			Total	Domestic
		Imports, 1982		
1	Livestock and livestock products	0.8	7.4	6.7
2	Other agricultural products	7.4	12.1	11.2
3	Forestry and fishery products	9.8	31.8	27.0
4	Agricultural, forestry, and fishery services	0	10.3	9.0
5	Iron and ferroalloy ores mining	35.3	115.9	80.8
6	Nonferrous metal ores mining	44.7	117.6	80.7
7	Coal mining	0	8.4	6.6
8	Crude petroleum and natural gas	4.5	40.1	35.5
9	Stone and clay mining and quarrying	9.2	17.8	15.8
10	Chemical and fertilizer mineral mining	36.4	52.0	45.3
11	New construction	0	0	0
12	Maintenance and repair construction	0	4.5	3.7
13	Ordnance and accessories	1.1	1.3	1.3
14	Food and kindred products	4.9	7.3	6.9
15	Tobacco manufactures	1.3	1.9	1.8
16	Broad and narrow fabrics, yarn and thread mills	8.0	36.9	31.7
17	Miscellaneous textile goods and floor coverings	6.0	17.6	15.8
18	Apparel	23.6	32.2	30.0
19	Miscellaneous fabricated textile products	4.5	15.7	14.3
20	Lumber and wood products, except containers	9.5	22.8	19.9
21	Wood containers	13.1	44.4	37.5
22	Household furniture	8.9	11.2	10.9
23	Other furniture and fixtures	3.2	4.9	4.7
24	Paper and allied products, except containers	8.2	17.4	15.6
25	Paperboard containers and boxes	.2	15.0	13.5
26	Printing and publishing	.9	2.3	2.1
27	Chemicals and selected chemical products	6.3	24.7	20.6
28	Plastics and synthetic materials	2.3	22.6	19.3
29	Drugs, cleaning and toilet preparations	2.6	3.8	3.6
30	Paints and allied products	.4	9.7	8.4
31	Petroleum refining and related industries	28.3	35.1	32.9
32	Rubber and miscellaneous plastic products	6.8	19.6	17.6
33	Leather tanning and finishing	16.6	111.7	93.4
34	Footwear and other leather products	75.6	78.6	77.2
35	Glass and glass products	6.7	21.0	18.8
36	Stone and clay products	6.2	12.8	11.5
37	Primary iron and steel manufacturing	18.3	52.5	43.3
38	Primary nonferrous metals manufacturing	19.2	59.0	45.8
39	Metal containers	.7	13.1	11.8
40	Heating, plumbing, and structural metal products	2.0	3.7	3.5

Table 4.--Ratios of labor content of U.S. imports and exports to U.S. employment, 1978 and 1982--Continued

(In percent)

Input-output sector	Description	Direct labor content	Labor content of sector in imports of all sectors	
			Total	Domestic
	Imports, 1982--Continued			
41	Screw machine products and stampings	4.2	32.6	29.1
42	Other fabricated metal products	10.7	26.9	23.7
43	Engines and turbines	1.3	10.7	9.6
44	Farm and garden machinery	9.6	11.6	11.2
45	Construction and mining machinery	3.9	6.4	5.8
46	Materials handling machinery and equipment	12.0	15.0	14.1
47	Metalworking machinery and equipment	12.5	21.0	19.0
48	Special industry machinery and equipment	15.9	21.0	19.6
49	General machinery and equipment	11.9	23.1	20.3
50	Miscellaneous machinery, except electrical	.1	17.4	15.4
51	Office, computing, and accounting machines	15.4	18.3	17.7
52	Service industries machines	.6	3.0	2.7
53	Electric industrial equipment and apparatus	6.0	15.4	13.8
54	Household appliances	16.1	17.1	16.9
55	Electric lighting and wiring equipment	6.7	14.2	13.0
56	Radio, TV, and communication equipment	21.9	24.7	24.1
57	Electronic components and accessories	18.6	34.0	30.4
58	Misc. electrical machinery and supplies	18.1	28.0	25.5
59	Motor vehicles and equipment	28.0	36.8	34.2
60	Aircraft and parts	6.6	8.3	8.1
61	Other transportation equipment	9.1	10.8	10.4
62	Scientific and controlling instruments	11.1	14.3	13.6
63	Optical, ophthalmic, and photographic equipment	15.0	16.8	16.4
64	Miscellaneous manufacturing	60.8	67.6	64.5
65	Transportation and warehousing	0	7.6	6.5
66	Communications, except radio and TV	0	1.6	1.4
67	Radio and TV broadcasting	0	0	0
68	Electric, gas, water, and sanitary services	0	6.8	5.6
69	Wholesale and retail trade	0	2.7	2.4
70	Finance and insurance	0	2.0	1.7
71	Real estate and rental	0	2.0	1.7
72	Hotels, personal and repair services except auto	0	2.5	2.2
73	Business services	0	5.5	4.8
74	Eating and drinking places	0	2.1	1.9
75	Automobile repair and services	0	2.7	2.3
76	Amusements	0	.7	.6
77	Medical, educ. services and nonprofit org.	0	.3	.3
78	Federal Government enterprises	0	2.7	2.2
79	State and local government enterprises	0	.4	.4
	Total	2.9	7.3	6.5

Table 4.--Ratios of labor content of U.S. imports and exports to U.S. employment, 1978 and 1982--Continued

(In percent)

Input-output sector	Description	Direct labor content	Labor content of sector in exports of all sectors	
			Total	Domestic
		Exports, 1982		
1	Livestock and livestock products	0.4	5.8	5.3
2	Other agricultural products	23.9	28.0	27.3
3	Forestry and fishery products	1.7	22.9	18.8
4	Agricultural, forestry, and fishery services	0	16.8	15.8
5	Iron and ferroalloy ores mining	15.2	63.9	41.0
6	Nonferrous metal ores mining	9.4	60.4	33.8
7	Coal mining	0	6.2	4.8
8	Crude petroleum and natural gas	.3	11.0	8.3
9	Stone and clay mining and quarrying	4.7	11.2	9.8
10	Chemical and fertilizer mineral mining	12.7	33.7	25.8
11	New construction	0	0	0
12	Maintenance and repair construction	0	3.7	3.2
13	Ordnance and accessories	.6	.8	.8
14	Food and kindred products	3.5	5.3	5.1
15	Tobacco manufactures	6.2	8.1	8.0
16	Broad and narrow fabrics, yarn and thread mills	3.8	11.8	10.2
17	Miscellaneous textile goods and floor coverings	6.0	12.1	11.1
18	Apparel	2.1	3.3	2.9
19	Miscellaneous fabricated textile products	3.0	7.2	6.6
20	Lumber and wood products, except containers	13.0	24.1	21.8
21	Wood containers	4.4	39.9	33.3
22	Household furniture	2.4	3.6	3.5
23	Other furniture and fixtures	2.4	3.2	3.1
24	Paper and allied products, except containers	5.7	13.0	11.6
25	Paperboard containers and boxes	0	10.3	9.3
26	Printing and publishing	1.4	2.8	2.6
27	Chemicals and selected chemical products	18.5	39.1	35.7
28	Plastics and synthetic materials	13.6	25.0	23.3
29	Drugs, cleaning and toilet preparations	5.2	6.1	6.0
30	Paints and allied products	2.5	9.6	8.7
31	Petroleum refining and related industries	2.4	7.9	6.1
32	Rubber and miscellaneous plastic products	4.3	13.4	12.0
33	Leather tanning and finishing	12.8	20.2	18.4
34	Footwear and other leather products	3.1	3.9	3.5
35	Glass and glass products	6.0	15.9	14.4
36	Stone and clay products	2.4	7.2	6.3
37	Primary iron and steel manufacturing	4.0	30.5	23.5
38	Primary nonferrous metals manufacturing	10.9	41.6	31.5
39	Metal containers	1.0	10.7	9.7
40	Heating, plumbing, and structural metal products	4.3	6.5	6.3

Table 4.--Ratios of labor content of U.S. imports and exports to U.S. employment, 1978 and 1982--Continued

(In percent)

Input-output sector	Description	Direct labor content	Labor content of sector in exports of all sectors	
			Total	Domestic
	Exports, 1982--Continued			
41	Screw machine products and stampings	1.3	18.8	16.6
42	Other fabricated metal products	4.8	17.0	14.6
43	Engines and turbines	33.6	45.9	45.0
44	Farm and garden machinery	13.1	16.4	15.9
45	Construction and mining machinery	31.2	34.4	33.9
46	Materials handling machinery and equipment	15.5	17.7	17.1
47	Metalworking machinery and equipment	14.3	22.6	20.7
48	Special industry machinery and equipment	19.9	24.4	23.2
49	General machinery and equipment	15.6	27.6	25.0
50	Miscellaneous machinery, except electrical	11.2	28.3	26.9
51	Office, computing, and accounting machines	30.8	36.2	35.1
52	Service industries machines	10.6	12.9	12.7
53	Electric industrial equipment and apparatus	15.1	26.5	24.9
54	Household appliances	8.3	9.0	8.8
55	Electric lighting and wiring equipment	6.3	12.0	11.0
56	Radio, TV, and communication equipment	9.5	11.6	11.1
57	Electronic components and accessories	15.8	30.4	27.0
58	Misc. electrical machinery and supplies	18.4	24.6	23.0
59	Motor vehicles and equipment	9.4	13.0	11.9
60	Aircraft and parts	20.1	24.6	24.1
61	Other transportation equipment	7.7	9.4	9.1
62	Scientific and controlling instruments	23.0	26.6	26.0
63	Optical, ophthalmic, and photographic equipment	9.8	11.4	11.0
64	Miscellaneous manufacturing	16.8	19.6	18.3
65	Transportation and warehousing	3.7	10.0	9.2
66	Communications, except radio and TV	0	1.6	1.5
67	Radio and TV broadcasting	0	0	0
68	Electric, gas, water, and sanitary services	0	5.7	4.8
69	Wholesale and retail trade	3.0	5.2	4.9
70	Finance and insurance	0	1.9	1.7
71	Real estate and rental	0	2.0	1.8
72	Hotels, personal and repair services except auto	0	2.3	2.1
73	Business services	0	5.1	4.5
74	Eating and drinking places	0	2.2	2.0
75	Automobile repair and services	0	2.7	2.4
76	Amusements	0	.7	.6
77	Medical, educ. services and nonprofit org.	0	.2	.2
78	Federal Government enterprises	0	2.4	2.1
79	State and local government enterprises	0	.4	.3
	Total	3.3	6.8	6.2

Source: Computed from official statistics of the U.S. Bureau of Labor Statistics and the U.S. Bureau of the Census.

Table 5.--Labor content of U.S. trade with the world (summary), 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	235	377	361	449	410
Manufacturing	2,031	5,126	4,596	3,664	3,358
Mining	78	146	136	164	133
Petroleum	94	475	429	220	201
Services	0	1	1	1,626	1,419
Total	2,438	6,123	5,522	6,123	5,522
Exports, 1978					
Agriculture	474	771	744	652	623
Manufacturing	1,488	4,301	3,945	2,607	2,413
Mining	12	132	127	67	47
Petroleum	3	32	30	32	22
Services	594	0	0	1,879	1,741
Total	2,571	5,236	4,846	5,236	4,846
Imports, 1982					
Agriculture	154	275	262	322	295
Manufacturing	2,245	5,613	4,966	4,021	3,633
Mining	49	86	80	134	100
Petroleum	73	361	329	201	182
Services	0	0	0	1,656	1,428
Total	2,521	6,335	5,638	6,335	5,638
Exports, 1982					
Agriculture	450	809	778	597	575
Manufacturing	1,708	4,891	4,442	3,018	2,754
Mining	15	137	131	78	52
Petroleum	6	47	44	52	39
Services	642	0	0	2,139	1,974
Total	2,822	5,884	5,395	5,884	5,395

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 6.--Labor content of U.S. trade with the Organization for Economic Cooperation and Development (OECD), 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	29	54	51	127	108
Manufacturing	1,300	3,401	3,046	2,360	2,165
Mining	37	71	66	94	74
Petroleum	17	62	56	42	35
Services	0	1	1	966	839
Total	1,383	3,588	3,221	3,588	3,221
Exports, 1978					
Agriculture	254	417	403	356	339
Manufacturing	890	2,607	2,387	1,576	1,456
Mining	9	84	81	44	31
Petroleum	2	21	20	20	14
Services	356	0	0	1,134	1,050
Total	1,513	3,129	2,890	3,129	2,890
Imports, 1982					
Agriculture	25	52	49	104	90
Manufacturing	1,333	3,506	3,093	2,445	2,204
Mining	20	36	33	75	53
Petroleum	23	86	80	62	53
Services	0	0	0	994	854
Total	1,401	3,680	3,255	3,680	3,255
Exports, 1982					
Agriculture	228	414	398	312	299
Manufacturing	987	2,872	2,602	1,760	1,602
Mining	11	84	81	50	34
Petroleum	4	26	25	30	23
Services	368	0	0	1,246	1,148
Total	1,599	3,397	3,106	3,397	3,106

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 7.--Labor content of U.S. trade with the European Economic Community (EEC), 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	15	25	24	55	48
Manufacturing	458	1,130	1,020	782	724
Mining	14	27	25	33	26
Petroleum	3	15	13	11	9
Services	0	1	1	316	276
Total	490	1,197	1,082	1,197	1,082
Exports, 1978					
Agriculture	122	198	191	165	158
Manufacturing	343	980	900	590	547
Mining	4	34	32	18	13
Petroleum	1	7	7	8	5
Services	135	0	0	438	407
Total	606	1,219	1,130	1,219	1,130
Imports, 1982					
Agriculture	10	19	18	43	37
Manufacturing	443	1,079	964	752	687
Mining	2	4	4	19	12
Petroleum	7	39	35	24	21
Services	0	0	0	303	263
Total	462	1,141	1,021	1,141	1,021
Exports, 1982					
Agriculture	93	170	163	129	124
Manufacturing	400	1,153	1,047	702	641
Mining	4	33	31	19	13
Petroleum	1	11	10	12	9
Services	146	0	0	504	465
Total	644	1,367	1,252	1,367	1,252

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 8.--Labor content of U.S. trade with Japan, 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	0	1	0	11	8
Manufacturing	394	1,033	924	728	666
Mining	1	1	1	16	10
Petroleum	0	0	0	4	2
Services	0	0	0	277	240
Total	395	1,035	926	1,035	926
Exports, 1978					
Agriculture	80	127	123	110	106
Manufacturing	126	383	352	221	204
Mining	2	18	17	7	5
Petroleum	1	4	3	4	3
Services	63	0	0	191	178
Total	272	532	495	532	495
Imports, 1982					
Agriculture	0	1	1	9	6
Manufacturing	451	1,209	1,061	853	765
Mining	0	0	0	17	10
Petroleum	0	0	0	6	3
Services	0	0	0	326	278
Total	451	1,211	1,062	1,211	1,062
Exports, 1982					
Agriculture	74	129	124	100	96
Manufacturing	163	481	439	286	262
Mining	4	22	21	11	8
Petroleum	1	6	5	7	5
Services	70	0	0	235	218
Total	312	638	590	638	590

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 9.--Labor content of U.S. trade with the newly industrializing countries (NICs), 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	59	95	91	105	96
Manufacturing	523	1,152	1,041	864	799
Mining	4	8	7	14	10
Petroleum	3	18	17	12	9
Services	0	0	0	280	242
Total	590	1,273	1,156	1,273	1,156
Exports, 1978					
Agriculture	83	135	130	103	100
Manufacturing	224	612	564	381	354
Mining	2	19	18	10	7
Petroleum	1	5	5	5	3
Services	86	0	0	271	252
Total	395	771	717	771	717
Imports, 1982					
Agriculture	40	69	66	79	71
Manufacturing	646	1,427	1,274	1,074	979
Mining	4	8	7	17	12
Petroleum	10	52	48	31	27
Services	0	0	0	356	306
Total	701	1,557	1,395	1,557	1,395
Exports, 1982					
Agriculture	76	137	132	95	92
Manufacturing	277	762	695	479	438
Mining	2	21	20	11	7
Petroleum	2	11	10	10	8
Services	104	0	0	337	312
Total	460	931	857	931	857

Source: computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 10.--Labor content of U.S. trade with Brazil, 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	30	46	44	41	40
Manufacturing	29	79	71	52	48
Mining	1	3	3	2	2
Petroleum	0	0	0	1	0
Services	0	0	0	31	27
Total	61	128	118	128	118
Exports, 1978					
Agriculture	12	20	19	14	14
Manufacturing	28	79	73	48	44
Mining	0	4	4	2	1
Petroleum	0	1	1	1	1
Services	13	0	0	39	36
Total	54	103	96	103	96
Imports, 1982					
Agriculture	17	28	27	27	26
Manufacturing	37	98	87	65	59
Mining	1	2	1	2	2
Petroleum	1	4	3	3	2
Services	0	0	0	35	31
Total	56	132	119	132	119
Exports, 1982					
Agriculture	9	16	15	10	10
Manufacturing	27	75	68	47	43
Mining	0	2	2	1	1
Petroleum	0	1	1	1	1
Services	11	0	0	35	32
Total	47	94	87	94	87

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 11.--Labor content of U.S. trade with Mexico, 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	26	43	41	37	35
Manufacturing	67	159	143	116	107
Mining	2	3	3	4	3
Petroleum	3	17	15	8	7
Services	0	0	0	56	50
Total	97	222	202	222	202
Exports, 1978					
Agriculture	16	26	25	21	20
Manufacturing	77	213	195	133	123
Mining	0	6	5	3	2
Petroleum	0	2	2	2	1
Services	28	0	0	88	81
Total	121	247	228	247	228
Imports, 1982					
Agriculture	20	37	35	29	28
Manufacturing	75	184	163	136	123
Mining	3	5	4	6	5
Petroleum	9	46	42	23	21
Services	0	0	0	76	67
Total	107	271	244	271	244
Exports, 1982					
Agriculture	13	25	24	18	18
Manufacturing	94	262	238	165	150
Mining	1	7	7	4	3
Petroleum	1	6	6	4	3
Services	36	0	0	110	101
Total	144	301	275	301	275

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 12.--Labor content of U.S. trade with Hong Kong, 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	0	0	0	4	3
Manufacturing	114	243	219	189	174
Mining	0	0	0	1	1
Petroleum	0	0	0	1	0
Services	0	0	0	48	40
Total	114	243	219	243	219
Exports, 1978					
Agriculture	6	10	9	8	8
Manufacturing	20	54	50	33	30
Mining	0	1	1	1	0
Petroleum	0	0	0	0	0
Services	7	0	0	23	21
Total	33	65	60	65	60
Imports, 1982					
Agriculture	0	0	0	4	3
Manufacturing	136	293	260	227	206
Mining	0	0	0	2	1
Petroleum	0	0	0	1	1
Services	0	0	0	59	50
Total	136	293	260	293	260
Exports, 1982					
Agriculture	4	7	7	6	6
Manufacturing	23	64	58	39	35
Mining	0	1	1	1	0
Petroleum	0	0	0	0	0
Services	7	0	0	26	24
Total	34	72	66	72	66

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 13.--Labor content of U.S. trade with Korea, 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	1	1	1	6	5
Manufacturing	110	233	210	178	165
Mining	0	0	0	2	1
Petroleum	0	0	0	1	0
Services	0	0	0	47	41
Total	111	234	211	234	211
Exports, 1978					
Agriculture	22	35	34	27	26
Manufacturing	27	79	73	48	44
Mining	0	4	4	1	1
Petroleum	0	0	0	1	0
Services	13	0	0	41	38
Total	63	118	110	118	110
Imports, 1982					
Agriculture	0	0	0	4	3
Manufacturing	131	276	247	213	195
Mining	0	0	0	2	1
Petroleum	0	0	0	1	1
Services	0	0	0	56	47
Total	131	277	247	277	247
Exports, 1982					
Agriculture	24	41	39	28	27
Manufacturing	40	111	102	70	64
Mining	0	4	4	2	1
Petroleum	0	2	2	2	1
Services	17	0	0	57	54
Total	81	159	147	159	147

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 14.--Labor content of U.S. trade with Taiwan, 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	0	0	0	7	5
Manufacturing	145	309	280	235	218
Mining	0	0	0	2	1
Petroleum	0	0	0	1	1
Services	0	0	0	65	56
Total	146	310	281	310	281
Exports, 1978					
Agriculture	18	28	27	20	20
Manufacturing	21	58	54	36	34
Mining	0	2	2	1	1
Petroleum	0	0	0	1	0
Services	10	0	0	30	29
Total	49	89	83	89	83
Imports, 1982					
Agriculture	0	1	0	8	6
Manufacturing	201	421	378	323	296
Mining	0	0	0	3	1
Petroleum	0	0	0	2	1
Services	0	0	0	88	74
Total	201	422	378	422	378
Exports, 1982					
Agriculture	18	31	30	20	20
Manufacturing	32	87	80	55	51
Mining	0	3	2	1	1
Petroleum	0	1	1	1	1
Services	12	0	0	43	40
Total	63	121	112	121	112

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 15.--Labor content of U.S. trade with the less developed countries (LDCs), 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	129	198	191	171	165
Manufacturing	142	370	330	276	250
Mining	18	32	30	29	25
Petroleum	22	116	105	51	47
Services	0	0	0	191	169
Total	310	717	655	717	655
Exports, 1978					
Agriculture	62	101	98	93	88
Manufacturing	208	600	551	359	334
Mining	1	16	15	8	5
Petroleum	0	4	3	4	3
Services	81	0	0	257	238
Total	352	720	667	720	667
Imports, 1982					
Agriculture	79	132	127	108	104
Manufacturing	173	432	381	319	286
Mining	12	21	19	22	18
Petroleum	15	87	79	44	41
Services	0	0	0	179	158
Total	279	672	607	672	607
Exports, 1982					
Agriculture	79	141	136	106	102
Manufacturing	269	752	685	467	428
Mining	1	18	18	10	6
Petroleum	1	6	5	7	5
Services	98	0	0	327	302
Total	448	917	844	917	844

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p.65 for notes.

Table 16.--Labor content of U.S. trade with the nonmarket economies (NMEs), 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	2	4	3	7	6
Manufacturing	31	78	70	54	49
Mining	1	1	1	3	2
Petroleum	0	2	1	1	1
Services	0	0	0	20	17
Total	34	85	76	85	76
Exports, 1978					
Agriculture	66	103	99	76	75
Manufacturing	19	72	67	39	36
Mining	1	7	7	2	1
Petroleum	0	1	1	1	1
Services	23	0	0	65	61
Total	109	183	174	183	174
Imports, 1982					
Agriculture	2	4	4	7	6
Manufacturing	52	118	105	89	81
Mining	1	2	2	2	2
Petroleum	1	4	4	2	2
Services	0	0	0	28	24
Total	55	127	114	127	114
Exports, 1982					
Agriculture	65	111	107	73	72
Manufacturing	25	88	82	52	47
Mining	1	7	7	2	2
Petroleum	0	1	1	2	2
Services	24	0	0	78	74
Total	116	208	197	208	197

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 17.--Labor content of U.S. trade with the People's Republic of China, 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	0	1	1	1	1
Manufacturing	8	19	17	14	13
Mining	0	0	0	0	0
Petroleum	0	0	0	0	0
Services	0	0	0	4	4
Total	9	20	18	20	18
Exports, 1978					
Agriculture	13	20	19	14	14
Manufacturing	3	12	11	6	6
Mining	0	1	1	0	0
Petroleum	0	0	0	0	0
Services	4	0	0	12	11
Total	20	33	31	33	31
Imports, 1982					
Agriculture	1	2	2	4	3
Manufacturing	37	84	74	64	58
Mining	1	1	1	1	1
Petroleum	1	3	3	2	2
Services	0	0	0	19	16
Total	39	90	80	90	80
Exports, 1982					
Agriculture	24	46	44	37	36
Manufacturing	186	520	473	326	298
Mining	1	9	9	6	4
Petroleum	0	3	3	4	2
Services	65	0	0	205	189
Total	275	578	528	578	528

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Table 18.--Labor Contents of U.S. Trade with the Organization of Petroleum Exporting Countries (OPEC), 1978 and 1982

(In thousands of work-years)

Industry sector	Direct labor content	Labor content from all sectors in trade of sector		Labor content of sector in trade of all sectors	
		Total	Domestic	Total	Domestic
Imports, 1978					
Agriculture	30	46	44	37	35
Manufacturing	9	25	22	67	55
Mining	2	4	4	6	5
Petroleum	63	336	303	138	131
Services	0	0	0	163	147
Total	103	411	373	411	373
Exports, 1978					
Agriculture	24	42	41	44	41
Manufacturing	179	504	463	309	288
Mining	0	9	9	6	4
Petroleum	0	2	2	3	2
Services	62	0	0	197	182
Total	266	558	515	558	515
Imports, 1982					
Agriculture	15	26	25	20	19
Manufacturing	12	31	28	44	37
Mining	1	1	1	3	2
Petroleum	30	166	151	78	74
Services	0	0	0	80	72
Total	58	224	204	224	204
Exports, 1982					
Agriculture	24	46	44	37	36
Manufacturing	186	520	473	326	298
Mining	1	9	9	6	4
Petroleum	0	3	3	4	2
Services	65	0	0	205	189
Total	275	578	528	578	528

Source: Computed from official statistics of the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

See p. 65 for notes.

Note.--Agriculture = IO sectors 1 through 3.
Manufacturing = IO sectors 13 through 64, except IO sector 31.
Mining = IO sectors 5, 6, 7, 9, and 10.
Petroleum = IO sectors 8 and 31.
Services = IO sectors 4, 11, 12, and 65 through 79.
Because of rounding, figures may not add to the totals shown.

Table 19.--Labor intensities of U.S. trade with selected trading partners, 1978 and 1982

(In thousands of work-years per billion dollars)

Item	1978	1982
U.S. total world trade:		
Imports:		
Total	32.3	24.4
Total domestic	29.1	21.7
Exports:		
Total	38.1	29.2
Total domestic	35.3	26.7
U.S.-OECD trade:		
Imports:		
Total	34.6	25.5
Total domestic	31.1	22.6
Exports:		
Total	37.8	29.3
Total domestic	34.9	26.8
U.S.-EEC trade:		
Imports:		
Total	36.1	24.9
Total domestic	32.6	22.3
Exports:		
Total	38.5	29.8
Total domestic	35.7	27.3
U.S.-Japanese trade:		
Imports:		
Total	37.1	29.1
Total domestic	33.2	25.5
Exports:		
Total	38.3	29.5
Total domestic	35.7	27.3
U.S. trade will all NIC's:		
Imports:		
Total	46.1	31.7
Total domestic	41.9	28.5
Exports:		
Total	38.5	28.6
Total domestic	35.8	26.3
U.S.-Brazilian trade:		
Imports:		
Total	41.3	27.8
Total domestic	38.1	25.1
Exports:		
Total	35.0	28.0
Total domestic	32.6	25.9
U.S.-Mexican trade:		
Imports:		
Total	34.9	17.4
Total domestic	31.7	15.7
Exports:		
Total	37.8	27.4
Total domestic	34.9	25.0

Table 19.--Labor intensities of U.S. trade with selected trading partners, 1978 and 1982--Continued

(In thousands of work-years per billion dollars)

Item	1978	1982
U.S.-Hong Kong trade:		
Imports:		
Total	57.2	44.9
Total domestic	51.5	39.8
Exports:		
Total	41.7	31.4
Total domestic	38.5	28.8
U.S.-Korean trade:		
Imports:		
Total	51.7	41.7
Total domestic	46.6	37.2
Exports:		
Total	39.8	29.4
Total domestic	37.1	27.2
U.S.-Taiwan trade:		
Imports:		
Total	49.7	40.5
Total domestic	45.0	36.3
Exports:		
Total	39.7	29.6
Total domestic	37.0	27.4
U.S. Trade with all LDC's:		
Imports:		
Total	28.4	20.4
Total domestic	25.9	18.4
Exports:		
Total	38.3	29.3
Total domestic	35.4	26.9
U.S. trade with all NME's:		
Imports:		
Total	39.8	32.5
Total domestic	35.6	29.2
Exports:		
Total	40.8	31.2
Total domestic	38.8	29.5
U.S.-Chinese trade:		
Imports:		
Total	47.6	33.7
Total domestic	42.9	29.9
Exports:		
Total	40.3	31.4
Total domestic	37.9	29.5
U.S. trade with OPEC:		
Imports:		
Total	12.3	6.9
Total domestic	11.2	6.2
Exports:		
Total	37.8	28.5
Total domestic	34.9	26.0

Source: Calculated from official statistics of the Bureau of the Census and the Bureau of Labor Statistics.

Table 20.--Labor intensity of U.S. manufacturing trade with selected trading partners, 1978 and 1982

(In thousands of work-years per billion dollars)

Item	1978	1982
U.S. total world trade:		
Imports:		
Total	39.3	31.3
Total domestic	35.2	27.7
Exports:		
Total	42.1	32.6
Total domestic	38.6	29.6
U.S.-OECD trade:		
Imports:		
Total	36.4	28.4
Total Domestic	32.6	25.0
Exports:		
Total	41.9	32.8
Total domestic	38.4	29.7
U.S.-EEC trade:		
Imports:		
Total	37.0	28.5
Total domestic	33.4	25.4
Exports:		
Total	42.8	33.6
Total domestic	39.3	30.5
U.S.-Japanese trade:		
Imports:		
Total	37.2	29.1
Total domestic	33.2	25.6
Exports:		
Total	43.0	33.4
Total domestic	39.6	30.5
U.S. trade with all NIC's:		
Imports:		
Total	49.4	38.8
Total domestic	44.7	34.6
Exports:		
Total	42.5	32.6
Total domestic	39.2	29.7
U.S.-Brazilian trade:		
Imports:		
Total	41.8	30.9
Total domestic	37.6	27.4
Exports:		
Total	38.7	30.7
Total domestic	35.8	27.9
U.S.-Mexican trade:		
Imports:		
Total	43.0	32.2
Total domestic	38.6	28.5
Exports:		
Total	42.2	32.5
Total domestic	38.6	29.5

Table 20.--Labor intensities of U.S. manufacturing trade with selected trading partners, 1978 and 1982--Continued

(In thousands of work-years per billion dollars)

Item	1978	1982
U.S.-Hong Kong trade:		
Imports		
Total	57.3	44.9
Total domestic	51.7	39.9
Exports:		
Total	47.0	35.2
Total domestic	43.5	31.9
U.S.-Korean trade:		
Imports:		
Total	51.9	41.8
Total domestic	46.8	37.4
Exports:		
Total	44.0	33.4
Total domestic	41.0	30.7
U.S.-Taiwan trade:		
Imports:		
Total	49.6	40.4
Total domestic	44.9	36.3
Exports:		
Total	43.9	32.0
Total domestic	40.9	29.4
U.S. trade with all LDC's:		
Imports:		
Total	44.5	36.9
Total domestic	39.7	32.5
Exports:		
Total	42.0	32.2
Total domestic	38.6	29.4
U.S. trade with all NME's:		
Imports:		
Total	41.9	39.9
Total domestic	37.6	35.5
Exports:		
Total	51.1	35.2
Total domestic	47.5	32.8
U.S.-Chinese trade:		
Imports:		
Total	48.7	44.0
Total domestic	43.6	38.7
Exports:		
Total	48.0	34.2
Total domestic	44.0	31.5
U.S. trade with OPEC:		
Imports:		
Total	41.7	34.4
Total domestic	36.7	31.1
Exports:		
Total	42.3	31.1
Total domestic	38.0	28.3

Source: Calculated from official statistics of the Bureau of the Census and he Bureau of Labor Statistics.

The labor intensity of U.S.-manufactured exports was fairly constant across trading partners, varying between 30,700 and 35,200 work-years per billion dollars of exports in 1982. However, the labor intensity of manufactured imports varied widely across trading partners, being highest (over 40,000 work-years per billion dollars of imports in 1982) for U.S. imports from Hong Kong, Korea, Taiwan, and China, and lowest (less than 30,000 work-years per billion dollars of imports in 1982) for U.S. imports from other OECD members, including members of the EEC and Japan.

Conclusions

This study examined the labor content of U.S. imports and exports for the 5 year period 1978 through 1982. The major findings are as follows. The labor content of U.S. imports did not change significantly over the period. It increased only slightly, from about 6.1 million work-years in 1978 to 6.3 million work-years in 1982. The labor content of imports as a share of total domestic employment fell slightly, from 7.4 percent in 1978 to 7.3 percent in 1982. The labor content of U.S. exports rose from 5.2 million work-years in 1978 to 6.9 million work-years in 1980, and then declined to 5.9 million work-years in 1982. The labor content of exports as a share of total domestic employment rose from 6.3 percent in 1978 to 6.8 percent in 1982.

Among the industry sectors examined in this study, imports contained the most labor from the Apparel and the Wholesale and retail trade sectors. However, as a share of domestic employment levels, imports contained the most labor from Iron and ferroalloy ores mining (116 percent in 1982), Nonferrous metal ores mining (118 percent in 1982), and the Leather tanning and finishing sectors (112 percent in 1982). On the export side, the sectors that contributed the most labor to U.S. exports were Other agricultural products and Wholesale and retail trade. The sectors that contributed the most labor to U.S. exports as a share of the sectors' domestic employment were Iron and ferroalloy ores mining (64 percent in 1982) and Nonferrous metal ores mining (60 percent in 1982).

For the five aggregate sectors examined in this study (Agriculture, Manufacturing, Mining, Petroleum, and Services), the balances in the total labor content of merchandise trade in 1982 were as follows: For agricultural labor, a surplus of 275,000 work-years; for manufacturing labor, a deficit of 1,003,000 work-years; for mining labor, a deficit of 56,000 work-years; for petroleum labor, a deficit of 149,000 work-years; and for services labor, a surplus of 483,000 work-years.

Among the trading partners examined in this study, the United States ran deficits with the other members of the OECD as a group, the NIC's as a group, Japan, Hong Kong, Korea, and Taiwan in both 1978 and 1982. The largest deficits were with Japan (573,000 work-years in 1982) and with the Asian NIC's—Hong Kong, Korea, and Taiwan (640,000 work-years in 1982).

The labor intensity of U.S. trade varied significantly across trading partners. In general, U.S. exports were more labor intensive than U.S. imports, and this relationship also held true for U.S. trade with most trading partners, including the other members of the OECD as a group, the EEC, Japan, the LDC's, and OPEC. A notable exception to this pattern is U.S. trade with Hong Kong, Korea, and Taiwan. The labor intensity of U.S. imports from these countries was significantly greater than the labor intensity of U.S. exports to these countries.

A similar pattern emerges for the labor intensities of U.S.-manufactured imports and exports, except that the labor intensity of U.S.-manufactured imports exceeded that for U.S.-manufactured exports for U.S. trade with the LDC's, the NME's, the Asian NIC's and OPEC. The labor intensity of U.S.-manufactured exports was fairly constant across trading partners, but the labor intensity of manufactured imports varied widely. In 1982, the labor intensity of U.S.-manufactured exports varied between only 30,000 and 35,000 work-years per billion dollars of exports across trading partners. For U.S.-manufactured imports, the total labor intensity varied from less than 30,000 work-years per billion dollars for U.S. imports from other members of the OECD as a group, the EEC, and Japan, to over 40,000 work-years per billion dollars for U.S. imports from Hong Kong, Korea, Taiwan, and China.

Bibliography

Aho, C. Michael and Orr, James A. "Trade-Sensitive Employment: Who Are the Affected Workers?" Monthly Labor Review, February 1981, pp. 29-35.

Aho, C. Michael and Rousslang, Don. "The Impact of LDC Trade on U.S. Workers: Demographic and Occupational Characteristics of Workers in Trade-Sensitive Industries." Science and Technology for Development: Organized Labor's Concerns, American Association for the Advancement of Science, Washington, D.C., Brookings, 1979.

Boyer, Russell S. "Commercial Policy Under Alternative Exchange Rate Regimes," Canadian Journal of Economics, 43, May 1977, pp. 219-232.

Bureau of the Census. "Origins of Exports of Manufactured Products." Annual Survey of Manufactures, 1977, 1980, and 1981.

Bureau of International Labor Affairs. "The Impact of Changes in Manufacturing Trade on Sectoral Employment Patterns-Progress Report." Trade and Employment, National Commission for Manpower Policy, Special Report No. 30. November 1978.

Davis, Lester A. Domestic Employment Generated by U.S. Exports. Office of Trade and Investment Analysis, International Trade Administration, U.S. Department of Commerce, April 1983.

Economic Consulting Services, Inc. "Fibers, Textiles, Apparel: A Unified Industry Dealing With the Import Problem." January 1981.

Eichengreen, Barry. "A Dynamic Model of Tariffs, Output and Employment Under Flexible Exchange Rates." Journal of International Economics, II May 1981, pp. 341-59.

Eldridge, Donald P. and Saunders, Norman. "Employment and Exports, 1963-72." Monthly Labor Review, August 1973, pp. 16-27.

"Forecast-Review Issue." World Oil, February, various years.

Frank, Charles R. Foreign Trade and Domestic Aid, Washington, D.C. Brookings, 1977.

Grinols, Errol and Thorbeck, Erik. "The Effects of Trade Between the U.S. and Developing Countries on U.S. Employment." Cornell University, Working Paper No. 171, 1978.

Grossman, Gene M. "Import Competition From Developed and Developing Countries," The Review of Economics and Statistics, 64, May 1982, pp. 271-281.

Grossman, Gene M. "The Employment and Wage Effects of Import Competition in the Unites States." Report prepared for the Bureau of International Labor Affairs, U.S. Department of Labor, September 1982.

Martin, J. P.; and Evans, J. "Notes on Measuring the Employment Displacement Effects of Trade by the Accounting Procedure." Oxford Economic Papers, vol. 33, No.1, 1981.

Harberger, Arnold C. "Currency Depreciation, Income and the Balance of Trade." Journal of Political Economy, 58, February 1950, pp. 47-50.

International Ladies' Garment Workers' Union, Research Department. "Estimation of Apparel (Knit and Woven) Imports, Methodological Note." March 1982.

International Trade Administration "Employment Related to Merchandise Exports." U.S. Department of Commerce, Staff Economic Research Report, August 1981.

Jacobs, Eva E. and Kutscher, Ronald E. "Employment in Relation to U.S. Imports." Monthly Labor Review, July 1962, pp. 771-773.

Johnson, Harry G. "Towards a General Approach to the Balance of Payments." International Trade and Economic Growth. London, Allen and Unwin, 1958; reprinted in Richard N. Cooper, ed. International Finance. Middlesex, Penguin Modern Economics, 1969.

Kravis, Irving B. and Lipsey, Robert E. Price Competitiveness in World Trade. New York, Columbia University Press for the National Bureau of Economic Research, 1971.

Kreuger, Anne O. "Protectionist Pressures, Imports and Employment in the United States." Scandanavian Journal of Economics, vol. 82, No. 2, 1980.

--------. "Restructuring for Import Competition from Developing Countries, I: Labor Displacements and Economic Redeployment in the United States," Journal of Policy Modeling, vol. 2, No. 2, 1980.

Laursen, Svend and Metzler, Lloyd A. "Flexible Exchange Rates and the Theory, of Employment." Review of Economic Statistics, 32, November 1950, pp. 281-299.

Leamer, Edward E. "The Leontief Paradox, Reconsidered." Journal of Political Economy, 88, June 1980 pp. 495-503.

Leontief, Wassily. "Domestic Production and Foreign Trade, the American Capital Position Re-examined." Economia Internazionale, 7, February 1954, Reprinted in Richard E. Caves and Harry G. Johnson, eds. Readings in International Economics. Homewood, R. D. Irwin, 1968, pp. 503-527.

Mitchell, Daniel B. "Recent Changes in the Labor Content of U.S. International Trade." Industrial and Labor Relations Review, April 1975, pp. 355-375.

Pelzman, Joseph and Martin, Randolph. "Direct Employment Effects of Increased Imports: A Case Study of the Textile Industry." Southern Economic Journal, October 1981, pp. 412-426.

"Petroleum Extraction: Theory and Application." Oil & Gas Journal, Sept. 13, 1982.

Pomeroy, Roger T. Employment Related to Merchandise Exports. Office of Planning and Research, International Trade Administration, U.S. Department of Commerce, August 1981.

Richardson, J. David. "Some Issues in the Structural Determination of International Price Responsiveness," in Hergert Glejser, ed. Quantitative Studies in International Economic Relations, Amsterdam: North Holland, 1976.

Rousslang, Don and Pelzman, Joseph. "Export-Import Bank Loans and the Trade Balance Inder Flexible Exchange Rates." Mimeo, Bureau of International Labor Affairs, U.S. Department of Labor, January 1983.

Salant, Walter. "The Effects of Increases in Imports on Domestic Employment: A Clarification of Concepts." Special Report of the National Commission for Manpower Policy, January 1978.

Salant, Walter S. and Vaccara, Beatrice N. Import Liberalization and Employment. Wahington, D.C., Brookings, 1961.

Samuelson, Paul. Economics, 10th ed. New York, McGraw-Hill, 1976.

Sohmen, Egon. Flexible Exchange Rates, Chicago, University of Chicago Press, 1969.

Tower, Edward. "Commercial Policy Under Fixed and Flexible Exchange Rates," Quarterly Journal of Economics, 87, August 1973, pp. 436-454.

Tsiang, S.C. "The Role of Money in Trade Balance Stability: A Synthesis of the Elasticity and Absorption Approaches." American Economic Review, 51, December 1961, pp. 912-936; reprinted in Richard E. Caves and Harry G. Johnson, eds. Readings in Internatonal Economics. Homewood, R. D. Irwin, 1968, pp. 389-412.

U.S. Department of Energy. Monthly Energy Review, January and May 1983.

--------. Petroleum Supply Monthly. January 1983.

U.S. International Trade Commission. Certain Ceramic Kitchenware and Tableware from the People's Republic of China. United States International Trade Commission Publication 1279, August 1982.

"Worldwide Reports." Oil & Gas Journal, Dec. 28, 1981, and Dec. 27, 1982.

Appendix A

Country Group Descriptions

OECD Countries

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom.

EC Countries

Belgium, Denmark, France, Federal Republic of Germany, Greece, Irish Republic, Italy, Luxembourg, Netherlands, United Kingdom.

Newly Industrialized Countries

Argentina, Brazil, Hong Kong, Israel, the Republic of Korea, Mexico, Singapore, Taiwan, Yugoslavia.

Less Developed Countries (LDCs)

Angola, Antigua, Bahamas, Bahrain, Bangladesh, Barbados, Belize, Benin, Bhutan, Bolivia, Botswana, Burma, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Chile, Colombia, Comoros, Congo, Costa Rica, Cyprus, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Figi, Gambia, Ghana, Grenada, Guinea Bissau, Guyana, Haiti, Honduras, India, Indonesia, Ivory Coast, Jamaica, Jordan, Kenya, Kiribati, Lebanon, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Morocco, Mozambique, Nauru, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Portugal, Romania, Rwanda, Saint Lucia, Saint Vincent and Grenadine, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Solomon Islands, Somalia, Sri Lanka, Sudan, Suriname, Swaziland, Syria, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Tuvalu, Uganda, Upper Volta, Uruguay, Vanuatu, Venezuela, Western Samoa, Yemen (Sana), Zaire, Zambia, Zimbabwe.

Nonmarket Economy Coutries

Albania, Bulgaria, China, Cuba, Czechoslovakia, East Germany, Hungary, Mongolia, Korea, Poland, Romania, Union of Soviet Socialists Republic, Vietnam.

Organization of Petroleum Exporting Countries

Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirate, Venezuela.

Appendix B

Industry Studies

This appendix analyzes U.S. trade-related employment in six disaggregate industries: Fine earthenware food utensils; Photographic cameras, enlargers, and parts; Crude petroleum; Integrated circuits; Soybean oil; and Wood pulp. These industries were selected for closer inspection in order to explore more fully some of the issues involved in estimating the labor content of U.S. trade. In the Fine earthenware food utensils industry, imports are large relative to domestic output, and it is unlikely that domestic output could expand to replace imports without substantial increases in prices and production costs. In the Photographic cameras, enlargers, and parts industry, the bulk of the imports consist of a product (the 35mm single lens reflex camera) that is not produced domestically. The Crude petroleum industry is an example of an important imported intermediate input whose domestic output could not be expanded at existing prices to replace imports. In the integrated circuits industry, a large part of total exports consists of goods that are exported for assembly and encapsulation abroad, and a large part of total imports consists of the reimport of these goods. Also, the labor intensities of output in the industry are very different for imports and competing domestic output. Automated production methods are used in domestic assembly operations, whereas these operations are very labor intensive abroad.

Calculations of the labor content of imports is easier for the last two industries, Soybean oil and Wood pulp, because imports and domestic output are more directly comparable for these industries than for the others, and domestic production could fairly easily expand to replace the imports. Nevertheless, in these industries as well as the others, we are still unable to account definitively for such factors as possible differences between average labor productivity in the domestic industry and the marginal labor productivity of output that would be affected by a change in imports or exports, or for the short-run response of domestic producers to a change in demand for their output caused by a change in imports or exports.

Fine Earthenware Food Utensils

The U.S. industry

The Fine earthenware food utensils industry (or the earthenware industry) is relatively small, with approximately 15 to 20 firms accounting for nearly all U.S. production. These establishments are concentrated in the Appalachia area (Pennsylvania, West Virginia, and Ohio) and California. Industry concentration is relatively high, with the four largest firms together accounting for about 70 to 80 percent of earthenware production. Capacity utilization of the industry declined during 1978-81, from 63.1 to 45.7 percent. 1/ The declining utilization rate is caused by increased capacity at a time of stable or declining demand and by growing imports. The capacity utilization rate for 1982 was unavailable, but is believed to have declined further from its level in 1981.

The profitability of the industry declined during 1978-81, with a net profit of $3.4 million in 1978 turning to a net loss of $2 million in 1981. The ratio of net profit before income taxes to net sales was 1.8 percent in

1/ Certain Ceramic Kitchenware and Tableware from the People's Republic of China: Report to the President on Investgation No. TA-406-8. . ., USITC Publication 1279, August 1982.

1978, but it dropped to negative 5.1, 2.3, and 2 percent for the years 1979-81, respectively. 1/

The earthenware industry is highly labor intensive, and labor costs account for at least 50 percent of U.S. producers' value of shipments. The cost and availability of energy, particularly natural gas, are other important factors that influence production costs in the industry.

Trends in trade

U.S. imports of earthenware table and kitchen articles accounted for over 50 percent of U.S. consumption of these articles during each year from 1978 to 1982. U.S. imports rose steadily from 23.3 million dozen, valued at $159 million, in 1978 to 28.2 million dozen, valued at $193 million, in 1982. Japan was the primary source of earthenware imports during this period, accounting for 63 percent of these imports in 1982. Taiwan and the United Kingdom were other important suppliers in 1982.

The quality and price of imports vary from country to country. Imports from Europe are generally of high quality and price. Imports from the Far East, except Japan, are usually lower priced than European imports due to low wage rates in these countries.

U.S. exports of earthenware table and kitchen articles were small, accounting for less than 5 percent of U.S. producers' shipments during 1978-82. U.S. exports rose from 699,000 dozen, valued at $3.6 million, in 1978 to a peak of 734,000 dozen, valued at $4.9 million, in 1980. These exports then declined to 590,000 dozen, valued at $4.3 million, in 1982. Canada was the primary U.S. export market during the period, accounting for 30 percent of U.S. exports in 1982. The United Kingdom and Australia were other important U.S. export markets in 1982.

The United States is not a major supplier of earthenware table and kitchen articles to the rest of world. Many U.S. firms have placed emphasis on retaining their shares of the domestic market and have not concentrated on exporting their wares. Other factors that discourage U.S. exports are high prices, especially in comparison with the products of certain Far Eastern countries, and perceived lower quality of U.S. merchandise.

The United States maintained a trade deficit in earthenware table and kitchen articles, growing from $155.6 million in 1978 to $197.1 million in 1981, before falling slightly to $188.3 million in 1982.

Trends in output and employment

U.S. producers' shipments of earthenware table and kitchen articles declined from 11.1 million dozen, valued at $71.2 million, in 1978 to 8.3 million dozen, valued at $98.1 million, in 1981. 2/ U.S. producers' shipments

1/ Ibid. These data are not available for 1982.
2/ Ibid.

are believed to have declined further in 1982 to an estimated 7.5 million dozen (based on partial year figures) due to the sluggish economy and intense foreign competition.

The level of U.S. producers' shipments depends on several factors. The growing bridal market is significant, since many brides register with department and specialty stores for earthenware goods to be bought as gifts. Replacement buying is another variable that influences shipment growth. For commercial earthenware, replacement buying and the number of commercial openings, such as restaurants and hospitals, affect demand for these articles. Competitive products, such as glass tableware or disposables, have a strong influence and can adversely affect the commercial earthenware industry.

Employment in the U.S. earthenware industry declined from roughly 3,900 employees in 1978 to 3,600 employees in 1980, before increasing to 3,800 employees in 1981. 1/ Industry employment is believed to have declined significantly in 1982 to under 3,500 (based on partial-year data) due to the sluggish economy and competition with imported articles. These data indicate that the ratio of employment to U.S. producers' shipments increased from 0.38 employees per 1,000 dozen in 1978 to an estimated 0.47 employees per 1,000 dozen in 1982. This increase reflects a change in product mix to more labor-intensive articles, the closing of one of the industry's least labor-intensive plants, and the limited utilization of highly skilled employees during the recent recession.

Labor content of trade

The labor content of U.S. exports of domestically manufactured earthenware articles rose from an estimated 266 job opportunities in 1978 to 294 job opportunities in 1980, before falling to 275 job opportunities in 1981. It is estimated (from partial-year data) that the labor content of these exports rose to 277 job opportunities in 1982. The labor content of U.S. imports increased steadily during the period, from an estimated 9,000 job opportunities in 1978 to approximately 13,300 job opportunities in 1982. Thus, the labor content of imports exceeded that for exports by a margin that rose from roughly 8,700 job opportunities in 1978 to nearly 13,000 job opportunities in 1982. This margin is over three times as great as total domestic employment in the industry. It is, therefore, unlikely that the industry could expand to replace imports without substantial increases in prices and production costs, at least in the short run.

The most important factor influencing domestic output in this industry during 1978-82 was the growth in imports of earthenware table and kitchen articles. Another factor that affected domestic output was the demand for substitute products, such as glass tableware and Corelle products.

1/ Ibid.

Photographic Cameras, Enlargers, and Parts

The U.S. industry

There are about 40 U.S. producers of photographic cameras, enlargers, and parts. They are located principally in the Middle Atlantic and New England States, Illinois, and California. Approximately 15 of these firms produce motion-picture cameras, whereas two dominate the domestic amateur still-picture camera industry. These two are the only domestic firms that produce both cameras and film, and they are the only producers of instant-print cameras in the world. The larger of the two has production facilities in several foreign countries, including assembly operations in Canada, Brazil, and Australia. The other reportedly has one of the largest plants in Europe for manufacturing cameras. Cameras produced overseas by these companies are generally for foreign consumption. Other camera production by the U.S. industry includes microfilm cameras, cameras for aerial photography, view cameras, surveillance cameras, and medical cameras. About 12 firms produce photographic enlargers and camera-enlargers, including highly specialized enlargers used in the graphic arts and in the custom laboratory industry.

Manufacturers often provide retailers with suggested retail prices, but price competition, which is keen at both the wholesale and retail levels of the industry, results in small markups. Retailers in particular often sell cameras at a very small profit in order to attract customers for the more lucrative camera accessories. The photographic camera industry produces a new camera technology approximately every 10 years in order to counter the stagnating sales that tend to develop due to market saturation.

After-tax profits for 1982 varied widely from firm to firm within the photographic industry, depending upon the product mix and the size of the corporate base. For the industry as a whole, after-tax profits probably averaged about 5 percent of sales in 1982.

Trends in trade

Total U.S. imports of photographic cameras, enlargers, and parts decreased from $704.4 million in 1978 to $571.5 million in 1980, before increasing to $692.6 million in 1981 and settling at $660.2 million in 1982 (table B-1). Imports of motion-picture cameras and parts declined steadily from $58.5 million in 1978 to $13.2 million in 1982. This fall in imports was due to declining interest among consumers for amateur motion-picture systems, new advances in video technology, and general economic conditions. Imports of still-picture cameras, enlargers, and parts stagnated over the period, going from $645.9 million in 1978 to $647.0 million in 1982. This stagnation can be attributed to a slowdown in the rate of growth of the 35mm camera market and to a decline in imports of fixed-focus cameras. Also, imports of cartridge cameras were dampened by the 1982 introduction of the new disc camera system by a major U.S. manufacturer. U.S. firms are highly competitive in the cartridge camera market and produce a high-quality product, but Japanese firms dominate the 35mm still-picture camera market.

U.S. exports of photographic cameras, enlargers, and parts increased from $215.1 million in 1978 to $318.3 million in 1982 (table B-1). The only year that exports showed a decline was 1980, and this was primarily due to the worldwide recession. Exports of motion-picture cameras and parts increased steadily, from $14.5 million in 1978 to $24.9 million in 1982. Exports of still-picture cameras, enlargers, and parts increased from $200.5 million in 1978 to $293.4 million in 1982. The growth in these exports was due largely to shipments of the new disc camera that was introduced early in 1982.

Table B-1.--Photographic cameras, enlargers, and parts: U.S. producers' shipments, exports of domestic merchandise, imports, and apparent consumption, 1978-82

Year	Producers' shipments 1/	Exports	Imports	Apparent consumption	Ratio of imports to consumption
	1,000 dollars				Percent
1978	712,214	215,056	704,436	1,201,594	58.6
1979	734,547	261,034	670,953	1,144,466	58.6
1980	735,038	253,333	571,537	1,053,242	54.3
1981	732,910	266,365	692,561	1,159,106	59.7
1982	884,557	318,290	660,224	1,226,491	53.8

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ On a c.i.f. duty-paid basis.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Trends in output and employment

U.S. producers' shipments of all photographic cameras, enlargers, and parts increased from $712.2 million in 1978 to $735.0 million in 1980, before declining to $732.9 million in 1981, and then increasing to $884.6 million in 1982 (table B-1). The leveling off of shipments in 1980 was due to a temporary decline in production of camera parts for assembly overseas and to the continuing decline in production of motion-picture cameras. The 1981 decline in producers' shipments was due primarily to a decline in enlarger production as darkroom hobbyists affected by the recession postponed purchases of expensive darkroom equipment. Producers' shipments in 1982 increased significantly, despite a second consecutive year of decline for enlarger production, due to the introduction of the disc camera by a major U.S. manufacturer.

As shown in table B-2, estimated employment for the camera, enlarger, and parts industry increased from 17,700 production workers in 1978 to 24,420 workers in 1981, before declining to 22,330 workers in 1982. A small part of this decline can be attributed to closings of production lines by two producers of enlargers and to increased automation in the production of enlargers. The largest part of the 1982 decline in employment was due to the decline in demand for consumer products such as instant-print cameras.

Table B-2.—Photographic camera, enlarger, and parts industry: Estimated productivity of production workers, 1978-82

Year	Number of production workers	Output	Output 1/	Output per employee	
				Value	Quantity
		1,000 dollars	1,000 units		Units
1978	17,700	712,214	17,949	$40,238	1,014
1979	20,900	734,547	15,798	35,146	756
1980	21,850	735,038	15,350	33,640	703
1981	24,420	732,910	12,126	30,012	496
1982	22,330	884,557	15,368	39,613	688

1/ Estimate does not include parts.

Source: Estimated by the staff of the U.S. International Trade Commission.

Table B-1 also indicates that average output per employee declined steadily, from 1,014 units valued at $40,238, in 1978 to 496 units, valued at $30,012, in 1981, before increasing to 688 units, valued at $39,613, in 1982. Employee productivity declined during most of this period as manufacturers anticipated a continuation of the 1978 boom in photographic sales. However, sales of instant-print and cartridge camera systems failed to pick up significantly, capacity utilization diminished, inventories increased slightly, and productivity was adversely affected. A large increase in employee productivity occurred in 1982 as the two major manufacturers reduced their work force, and the largest manufacturer began production of its new disc camera, which proved to be a success, selling 8 million units in its first year.

Labor content of trade

It is estimated that for photographic enlarger, camera, and parts, the labor content of U.S. imports exceeded the labor content of U.S. exports by 12,161 job opportunities in 1978 and by 12,719 job opportunities in 1982 (table B-3). However, these labor content figures are based on the average labor-output ratio in the U.S. photographic industry, whereas most of the imports ($450 billion in 1982) were 35mm, single lens reflex cameras, which are not produced domestically.

Table B-3.—Photographic cameras, enlargers, and parts: Actual employment and labor contents of trade, 1978-82

Year	Actual employment (1)	Labor content of imports (2)	Labor content of imports (3)	-Net labor content of trade (2) -(3)
	—Number—	----------Work-years----------		
1978	17,700	17,506	5,345	-12,161
1979	20,900	19,091	7,427	-11,644
1980	21,850	16,989	7,531	-9,458
1981	24,420	23,143	8,875	-14,268
1982	22,330	20,754	8,035	-12,719

Source: Estimated by the staff of the U.S. International Trade Commission.

Crude Petroleum

The U.S. industry

The 1977 Census of Mineral Industries reported 6,217 companies operating a total of 8,573 establishments in Standard Industrial Classification (SIC) 1311, Crude petroleum and natural gas. 1/ About 31 percent of these establishments were located in Texas, and about 13 percent were located in Oklahoma.

Industry sources report that the number of U.S. firms engaged in the production of crude petroleum in 1982 probably exceeded 19,000. 2/ This number includes large, integrated companies, as well as those that are restricted to specific operations such as production and exploration. The largest of these firms have annual net incomes of nearly $6 billion per year. However, the vast majority of the firms (90 percent) are independent operators with annual sales from about $1 million to $50 million.

In 1982, there were about 580,140 operational crude petroleum wells located in 31 of the 50 states. There were about 516,750 such wells in 1978. 3/ In 1982, Texas accounted for about 32 percent of the total number of wells, and Oklahoma accounted for another 16 percent of the total. The value

1/ Many of the crude petroleum firms also produce natural gas. Frequently, while exploring for crude petroleum natural gas is found instead. About 25 to 33 percent of all natural gas in the United States is produced simultaneously from the same well with crude petroleum. Therefore, employees are virtually interchangeable, and data are not available which allocate employees by production of crude petroleum or natural gas.

2/ Based on telephone conversations with officials of the American Petroleum Institute.

3/ "Forecast-Review Issue," World Oil, February, various years.

of crude petroleum produced amounted to about $28.6 billion in 1978, climbed steadily to about $99.4 billion in 1981, 1/ and then declined to about $90.3 billion in 1982. 2/

As the readily accessible crude petroleum reserves become depleted and the recoverable reserves become less accessible, more sophisticated technology has become necessary for extracting crude petroleum. The crude petroleum industry is already very capital intensive.

Trends in trade

U.S. imports of crude petroleum declined irregularly, from 2.4 billion barrels in 1978 to 1.4 billion barrels in 1982 (table B-4). Mexico, Nigeria, Saudi Arabia, and the United Kingdom were the four leading sources of U.S. imports of crude petroleum in 1981 and 1982. These four countries together accounted for 58 percent of both the volume and the value of U.S. crude petroleum imports in 1982.

U.S. exports of crude petroleum, which are prohibited except as approved by the Government, 3/ declined in volume from about 29 million barrels in 1978 to 13 million barrels in 1982; the value of these exports increased from $389 million in 1978 to $469 million in 1982 (table B-4). Canada has been the only market for U.S. exports of crude petroleum, and most of these exports are composed of sweet, light, crude petroleum. These exports are part of a commercial exchange agreement between the United States and Canadian refiners that has been approved by the Secretary of Energy.

Trends in output and employment

The level of domestic production of crude petroleum changed very little during 1978-82. It declined from 3.2 billion barrels in 1978 to 3.1 billion barrels per year in 1979-81, and then increased back to 3.2 billion barrels in 1982 (table B-4). In early 1983, domestic output was apparently running at near capacity.

The estimated proven reserves of crude petroleum in the United States were 29.78 billion barrels at the start of 1983; in spite of increased drilling, this is the same level as reported for the start of 1982. 4/ Proven reserves denote the amount of crude petroleum in known deposits that is estimated to be recoverable under current economic and operating conditions.

The level of domestic production of crude petroleum depends on the demand. This demand generally fell during 1978-82, principally because of the economic downturn of 1981 and 1982 and the practice of energy conservation by the nation. Further, if the U.S. average wellhead price for crude petroleum

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1/ U.S. Department of Energy, Monthly Energy Review, January 1983; and, U.S. Department of Energy, Petroleum Supply Monthly, January 1983. This figure represents the actual domestic average wellhead price, which is the average price for all domestic crude petroleum.

2/ U.S. Department of Energy, Monthly Energy Review, May 1983.

3/ U.S. Department of Energy, Petroleum Supply Annual 1981, vol. 2, July 1982, p.255

4/ "Worldwide Reports," Oil & Gas Journal, Dec. 28, 1981, p. 81; and "Worldwide Reports," Oil & Gas Journal, Dec. 27, 1982, p. 79.

continues to decline, as it did from about $32 per barrel in 1981 to about $29 per barrel in 1982, then it is likely that the estimated proven reserves will also decline, because these reserves are a function of existing economic and operating conditions. 1/ As the price per barrel of crude petroleum declines, it becomes less economical to drill as deep or to use costly recovery techniques.

Table B-4.--Crude petroleum: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1978-82

(Quantity in thousands of barrels; value in thousands of dollars; unit value per barrel)

Year	Production	Exports	Imports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1978	3,178,055	28,762	2,405,798	5,555,091	43.3
1979	3,121,480	26,079	2,464,920	5,558,321	44.3
1980	3,137,905	30,567	1,974,774	5,082,112	38.9
1981	3,128,780	16,447	1,750,964	4,863,297	36.0
1982	3,164,915	13,083	1,416,884	4,568,716	31.0
	Value				
1978	28,602,495	389,443	32,297,838	60,510,890	53.4
1979	39,455,507	394,036	46,058,234	85,119,705	54.1
1980	67,747,369	750,541	61,899,003	128,895.831	48.0
1981	99,401,340	576,795	61,457,915	160,282,460	38.3
1982	90,263,376	468,870	45,723,820	135,518,326	33.7
	Unit value 1/				
1978	$9.00	$13.54	$13.42	-	-
1979	12.64	15.11	18.69	-	-
1980	21.59	24.55	31.34	-	-
1981	31.77	35.07	35.10	-	-
1982	28.52	35.84	32.27	-	-

1/ The unit value of production is based on the actual domestic average wellhead price.

Source: Production was compiled from official statistics of the U.S. Department of Energy; exports and imports were compiled from official statistics of the U.S. Department of Commerce.

1/ "Petroleum Extraction: Theory and Application," Oil & Gas Journal, Sept. 13, 1982, pp. 60 and 61. In this article, an official of the U.S. Department of Energy states that in the United States alone, more than 300 billion barrels of crude petroleum, worth $1 trillion, will be left underground in reservoirs as economically unrecoverable unless petroleum extraction technology is improved.

During 1978-82 drilling for crude petroleum increased from about 17,775 new wells in 1978 to about 40,335 new wells in 1982, largely as a result of the phased Federal decontrol of the price of domestically produced crude petroleum beginning in April 1979. In spite of the economic downturn, the number of crude petroleum wells drilled in 1982 increased by about 7 percent over the number in 1981.

From 1978 to 1982, employment in the crude petroleum, natural gas, and natural gas liquids industries (SIC 131 and 132) increased as follows (in thousands):

Year	All employees	Production workers
1978	178.1	88.2
1979	201.2	95.1
1980	218.3	100.0
1981	256.6	112.8
1982	288.6	126.8

During 1978-82, total employment increased by about 62 percent; the number of production workers increased by about 44 percent. These data also include some personnel involved in drilling and completing and equipping wells, except for contract drilling, which is covered under SIC 138, oil and gas field services. The number of employees required to produce 1 million barrels of crude petroleum apparently increased during 1978-82, as shown in the following tabulation:

Year	All employees per million barrels of crude petroleum	Production workers per million barrels of crude petroleum
1978	56.0	27.8
1979	64.5	30.5
1980	69.6	31.9
1981	82.0	36.1
1982	91.2	40.1

However, since drilling increased during 1978-82, the trend for output of crude petroleum per employee could be unduly influenced by the number of personnel in drilling and give a misleading figure for output per worker.

Labor content of trade

On the basis of the above tabulation of output of crude petroleum per worker and from data on net U.S. trade (imports minus exports) of crude petroleum, the domestic labor content of this trade during 1978-82 is

calculated in the following tabulation:

	All employees	Production workers
1978	133,541	66,029
1979	157,345	74,355
1980	135,014	61,918
1981	142,174	62,618
1982	127,618	56,182
Average	139,138	64,214

These estimates of the labor content of trade do not indicate the increase in domestic employment that would occur if oil imports were eliminated. Domestic production could not be expanded to replace imports in the short run. In the long run, such an expansion would entail significant price increases that would cause substitution away from oil and that would most likely result in much lower productivity in the industry, because the labor and other resources required to obtain an additional barrel of oil domestically would increase. Also, the elimination of oil imports would probably have severe adverse effects on employment in industries that require oil as an input to production.

Integrated Circuits

The U.S. industry

Integrated circuits are produced by about 49 U.S. firms together operating more than 500 domestic establishments. In many of these establishments, discrete semiconductors (transistors and diodes) are also produced. The domestic integrated circuits industry is concentrated, with four firms together accounting for more than 60 percent of the value of domestic shipments. Major U.S. establishments producing integrated circuits are located in Texas, New York, and California. Final assembly plants of many producers are located in developing countries, largely in the Far East.

The integrated circuit industry is characterized by rapid technological change, which causes obsolescence of capital equipment in an increasingly capital-intensive industry.

Trends in trade

Since U.S. firms perform a significant share of the assembly of their integrated circuits abroad, U.S. imports exceeded U.S. exports each year during 1978-82, but the net trade deficit for the industry was very small. Most semiconductor firms produce integrated circuit wafers and chips in the United States, export these parts to low-wage countries for final assembly and encapsulation, and then reimport the finished product. In certain instances, however, the devices are exported to third-country markets. Two of the largest U.S. firms that produce circuit devices for internal consumption do not use foreign labor, but instead have automated their final assembly and encapsulation operations in the United States.

As shown in table B-5, U.S. imports of integrated circuits increased from $1.4 billion in 1978 to $3.6 billion in 1982. The major sources of imports during this period were Malaysia, Singapore, the Philippines, and Japan. Imports from Japan showed the largest increase, from $92 million in 1978 to $505 million in 1982.

Most of these imports were entered under TSUS items 806.30 and 807.00. Under these provisions, U.S. goods and materials exported abroad for further processing reenter the United States free of duty, so that only the value added abroad is subject to duty. About 54 percent of the value of total U.S. imports of integrated circuits consists of foreign value subject to duty. The remainder of the value of these imports represents domestic content.

Table B-5.--Integrated circuits: U.S. imports for consumption, 1978-82

(In thousands of dollars)

Year	Value
1978	1,446,400
1979	2,030,865
1980	2,897,005
1981	3,081,462
1982	3,587,744

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

As shown in the table B-6, U.S. exports of integrated circuits increased from $1.4 billion in 1978 to $3.6 billion in 1982. The largest share of these exports consisted of parts of integrated circuits shipped abroad for final assembly and reimported duty free under items 806.30 and 807.00.

Table B-6.--Integrated circuits: U.S. exports of domestic merchandise, 1978-82

(In thousands of dollars)

Year	Value
1978	1,436,533
1979	1,991,868
1980	2,679,909
1981	2,777,699
1982	3,581,484

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

Trends in output and employment

U.S. shipments of integrated circuits increased from $4.0 billion in 1978 to an estimated $8.3 billion in 1982 (table B-7). A large share of these shipments was assembled abroad and returned to U.S. establishments for final processing and marketing. Estimates based on published data for the semiconductor industry indicate that domestic employment in the production of integrated circuits increased from 108,000 persons in 1978 to 144,000 persons in 1982. However, the number of persons employed in 1982 was lower than those employed in 1980 and 1981 (table B-8).

Table B-7.--Integrated circuits: U.S. shipments, 1978-82

(In thousands of dollars)

Year	Value
1978	4,016,438
1979	5,375,571
1980	7,364,557
1981	1/ 7,833,458
1982	1/ 8,300,000

1/ Projected by the staff of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table B-8.--Integrated circuits: U.S. domestic employment, 1978-82

(In thousands of workers)

Year	Employment
1978	108.4
1979	131.7
1980	162.4
1981	157.7
1982	143.9

Source: Estimated by staff of the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce.

As shown in table B-9 the average value of shipments accounted for by each employee producing integrated circuits increased from $37,052 in 1978 to $57,678 in 1982. However, there is some double counting in U.S. shipments, because the value of foreign labor contained in U.S. imports is also reported as U.S. shipments. Thus, output per employee is probably overstated by 20 to 25 percent due to the foreign value embodied in U.S. shipments.

Labor content of trade

Semiconductor imports are influenced by U.S. producers operating assembly plants in developing countries. Parts of semiconductors are exported by U.S. producers to these plants and reimported as finished articles under TSUS items 806.30 and 807.00. The dutiable value of the articles reimported under these items is approximately the value added by foreign workers. In 1982, an estimated 101,000 persons, largely production and related workers, were employed by U.S. producers in these plants.

Table B-9.--Integrated circuits: Shipments per employee in U.S. plants, 1978-82

Year	Value
1978	$37,052
1979	40,816
1980	45,348
1981	49.673
1982	57,678

Source: Estimated by the staff of the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce.

A return of the assembly operations to the United States would create few additional job opportunities for U.S. workers, because U.S. producers would most likely increase their investment in machinery and equipment and use automated final assembly and encapsulation operations to replace the foreign assembly.

Soybean Oil

The U.S. industry

The Soybean oil industry (SIC 2075) is composed of firms that process soybeans into crude soybean oil, oilcake, and meal. These firms also produce small amounts of once-refined oil, soy flour, grits, and concentrates. Soybean oil is generally shipped to vegetable oil refineries, where the final consumer products such as shortening, margarine, or cooking oil are produced. Soybean meal is sold by the soybean oil mill either directly to livestock farmers or to feed manufacturers or dealers.

The number of soybean oil mills in the United States fell from 96 mills in crop year (CY) 1977 to 80 mills in CY 1981. (The crop year begins September 1 and ends August 31 of the following year.) However, the remaining mills increased the size of their operations. The processing capacity of the mills rose from 1.3 billion bushels in CY 1977 to 1.5 billion bushels in CY 1981. At the same time, capacity utilization declined from a peak of 83 percent in CY 1979 to 70 percent in CY 1981, as shown in table B-10.

Table B-10.—Soybean oil: Processing capacity, crop years 1977-81

Crop year	Number of processing mills	Processing capacity			Average processing capacity per mill
		Total	Utilization	Ratio of utilization to total	
		Million bushels		Percent	Million bushels
1977	99	1,250	927	74	12.6
1978	95	1,300	1,018	78	13.7
1979	94	1,350	1,123	83	14.4
1980	87	1,425	1,020	72	16.4
1981	80	1,477	1,030	70	18.5

Source: Compiled from official statistics of the U.S. Departments of Agriculture and Commerce and from estimates by the National Soybean Processors Association.

Soybean oil mills are generally located in the leading soybean-growing areas or in livestock-producing areas that require sizable quantities of feedstuffs. Approximately 53 percent of the U.S. soybean oil mills in the North Central States; the largest number are located in Iowa (19) and Illinois (16).

Operating margins of soybean oil mills generally have declined in recent years. The difference between the mill value of soybean products derived from a bushel of soybeans and the cash price paid at the mill for a bushel of soybeans fell from 36.0 cents per bushel in CY 1977 to 21.2 cents per bushel in CY 1981.

Trends in trade

U.S. imports of soybean oil and meal are negligible, compared with domestic production or consumption. These imports averaged less than $3 million annually from 1978 to 1982. Most imports of soybean meal come from Canada. U.S. imports of soybean oil consist of high-priced specialty products from Western Europe and averaged less than $200,000 per year from 1978 to 1982.

From 1978 to 1982, U.S. exports of soybean oil reached a high of 2.7 billion pounds in CY 1979 and a low of 1.6 billion pounds in CY 1980 (table B-11). The value of these exports peaked in CY 1979 at $792 million, and then declined to $460 million by CY 1981. Sharply declining world prices for vegetable oils and the stronger U.S. dollar abroad caused U.S. soybean oil export prices to decline during the period. Most U.S. soybean oil exports go to developing countries.

Soybean meal exports from CY 1977 to CY 1981 ranged between a low of 6.1 million tons in CY 1977 and a high of 7.9 million tons in CY 1979 (table B-12). An average 28 percent of the domestic output of soybean meal was sold

abroad. Most of these exports went to the European Community, Canada, and Eastern Europe.

U.S. exports of soybean oil and meal to the U.S.S.R. were disrupted during most of 1980, and up until April 1981, by the U.S. embargo. Although the embargo has been lifted, the U.S.S.R. has not resumed its imports of soybean oil and meal from the United States.

Trends in output and employment

From CY 1977 to CY 1981, U.S. crushings of soybeans varied between 927 million and 1,123 million bushels. During this period, production of soybean oil rose 7 percent, and production of soybean meal rose 10 percent, as shown in table B-13.

Employment in soybean oil mills rose from 9,500 employees in 1976 to 10,300 in 1980 (the latest year for which data are available), as shown in table B-14. Output per employee in this industry, both in terms of value and quantity, rose during 1976-80. Soybeans crushed per employee rose by 20 percent from 1976 to 1980, the output of soybean oil per employee rose by 17 percent, and the output of soybean meal per employee rose by 21 percent. The value of all shipments of the soybean oil industry per employee increased 34 percent during 1976-80. This increase in labor productivity was brought about by the closing of older, smaller mills, and by the addition of improved, efficient, and labor-saving equipment in the larger mills.

Labor content of trade

Labor content estimates are provided only for exports of the U.S. soybean oil industry. Imports are insignificant and are therefore ignored. The labor required per unit of exports is assumed to be the same as the average labor required per unit for all output in the soybean oil industry. Using this assumption, it is estimated that employment in the soybean oil industry directly related to soybean exports increased from 1,600 workers in 1976 to 2,500 workers in 1980, as shown in table B-15.

Table B-11.—Soybean oil: U.S. production, imports, exports, beginning stocks, and apparent consumption, crop years 1977-81

(Quantity in thousands of pounds; value in millions of dollars; unit value in cents per pound)

Crop year	Production	Imports	Exports	Beginning stocks	Apparent consumption 1/	Ratio (percent) of exports to production
	Quantity					
1977	10,288	2/	2,057	771	8,273	20
1978	11,323	2/	2,335	729	8,941	21
1979	12,105	2/	2,690	776	8,981	22
1980	11,270	2/	1,571	1,210	9,173	14
1981	10,979	2/	1,944	1,736	9,668	18
	Value					
1977	2,531	3/	704	4/	4/	-
1978	3,080	3/	707	4/	4/	-
1979	2,942	3/	792	4/	4/	-
1980	2,558	3/	435	4/	4/	-
1981	2,086	3/	460	4/	4/	-
	Unit value					
1977	5/ 24.6	-	26.2	-	-	-
1978	5/ 27.2	-	30.3	-	-	-
1979	5/ 24.3	-	29.5	-	-	-
1980	5/ 22.7	-	27.7	-	-	-
1981	5/ 19.0	-	23.6	-	-	-

1/ Calculated as the sum of production, imports, and beginning stocks for the period, less the sum of exports and beginning stocks of the following period.

2/ Less than 500,000 pounds.

3/ Less than $500,000.

4/ Not available.

5/ Price of crude soybean oil, f.o.b. Decatur, Ill.

Source: Beginning stocks and production, compiled from official statistics of the U.S. Department of Agriculture; exports and imports compiled from official statistics of the U.S. Department of Commerce.

Table B-12.—Soybean meal: U.S. production, imports, exports, beginning stocks, and apparent consumption, crop years 1977 to 1981

(Quantity in thousands of tons; value in millions of dollars; unit value per ton)

Crop year	Production	Imports 1/	Exports	Beginning stocks	Apparent consumption	Ratio (percent) of exports to production
	Quantity					
1977	22,371	2	6,080	228	16,278	27
1978	24,354	3	6,610	243	17,630	27
1979	27,105	2	7,932	350	19,309	29
1980	24,312	2	6,767	226	17,610	28
1981	24,634	2	6,907	163	17,717	28
	Value					
1977	3,669	2/	1,119	2/	2/	-
1978	4,627	2/	1,375	2/	2/	-
1979	4,933	2/	1,653	2/	2/	-
1980	5,300	2/	1,596	2/	2/	-
1981	4,508	2/	1,453	2/	2/	-
	Unit value					
1977	3/ $164	-	$184	2/	2/	-
1978	3/ 190	-	208	2/	2/	-
1979	3/ 182	-	209	2/	2/	-
1980	3/ 218	-	236	2/	2/	-
1981	3/ 183	-	210	2/	2/	-

1/ Estimated, as imports are not reported separately.
2/ Not available.
3/ Bulk, Decatur, 44 percent protein.

Source: Beginning stocks and production compiled from official statistics of the U.S. Department of Agriculture, except as noted; exports compiled from official statistics of the U.S. Department of Commerce, except as noted.

Note.—Apparent consumption is calculated as the sum of production, imports, and beginning stocks for the period, less the sum of exports and beginning stocks of the following period.

Table B-13.--Soybean oil: Domestic production, crop years 1977-81

Crop year	Soybeans crushed	Soybean oil	Soybran meal
	Million bushels	Million pounds	1,000 tons
1977	927	10,288	22,371
1978	1,018	11,323	24,354
1979	1,123	12,105	27,105
1980	1,020	11,270	24,312
1981	1,030	10,979	24,634

Source: Official statistics of the U.S. Department of Agriculture.

Table B-14.--Soybean oil: U.S. domestic employment and productivity, 1976-80

Year	Soybean oil mill employment	Value of all shipments per employee	Soybeans crushed per employee	Soybean oil output per employee	Soybean meal output per employee
	1,000 employees	1,000 dollars	1,000 bushels	Million pounds	1,000 tons
1976	9.5	709	91	1.01	2.18
1977	9.4	806	84	.91	1.97
1978	9.9	832	94	1.04	2.26
1979	10.2	891	100	1.11	2.39
1980	10.3	947	109	1.18	2.63
Average	9.9	837	96	1.05	2.29

Source: Official statistics of the U.S. Departments of Agriculture and Commerce.

Table B-15.--Soybean oil: Trade-related employment, 1976-80

Year	Value of all shipments of domestic soybean oil mills (1)	Value of exports of: soybean oil and soybean meal (2)	Ratio of exports to shipments (3)	Total domestic employment (4)	Trade-related employment in soybean oil mills (3) X (4)
	Million dollars	Million dollars	Percent	1,000 employees	
1976	6,740	1,102	16.4	9.5	1.6
1977	7,580	1,375	18.3	9.4	1.7
1978	8,234	1,801	21.9	9.9	2.2
1979	9,085	2,163	23.8	10.2	2.4
1980	9,752	2,320	23.8	10.3	2.5

Source: Official statistics of the U.S. Department of Commerce.

Wood Pulp

The U.S. industry

In recent years, continued modernization and expansion has resulted in the wood pulp industry reducing the number of mills while slightly increasing production and capacity. The number of mills declined from 331 in 1978 to 313 in 1982. 1/ Wood pulp production is concentrated in the Southeastern United States, with over one-fourth of the production in 1980 located in Georgia, Alabama, and Louisiana collectively. The remainder of U.S. production is concentrated in the Pacific and Central States. Wood pulp is used largely for making paper.

Continued advances in computerization (e.g., optimization systems) have raised productivity in the industry. Normal plant operations involve a high degree of maintenance and fairly frequent equipment replacement. Industry operations generally proceed at near-capacity levels.

Capital spending by market pulp mills as a share of value of shipments dropped from 20 percent in 1978 to near 10 percent in 1982. Most of this relative decline occurred because large outlays of capital were made in the 1970's for pollution control equipment, and the bulk of this equipment is now installed and currently requires only normal maintenance. In 1982, environmental spending accounted for only 10 percent of all capital spending. The remainder was concentrated in energy, miscellaneous plant expenditures, and pulping operations.

Most pulp mills operate as part of multi-product forest products companies. About 90 percent of the wood pulp produced in the United States is by integrated mills for captive consumption. Only about 10 percent is sold in the market. After-tax net profits for the integrated companies increased from about 6 percent in 1978 to 7 percent in 1979, before declining to 3 percent in 1982. Profits of mills that produce for the market rose from 5 percent in 1978 to 7 percent in 1979, and then dropped to 4 percent in 1982. The estimated price f.o.b. mill for market wood pulp of all types increased from about $405 per short ton in 1978 to $555 per short ton in 1982. The value of bleached softwood sulphate wood pulp, as reflected in the Producer Price Indexes, increased from 257.1 in 1978 to 357.0 in 1982.

Trends in trade

Imports of wood pulp declined irregularly during 1978-82, from 4.0 million short tons in 1978 to 3.7 million short tons in 1982, with a high of 4.3 million short tons in 1979 (table B-16). However, the value of such imports rose from $1.1 billion in 1978 to $1.8 billion in 1981, and amounted to $1.5 billion in 1982. In 1982, Canada accounted for 92 percent of the quantity and 93 percent of the value of total U.S. imports. Small quantities are also supplied by Brazil, Sweden, and the Republic of South Africa.

1/ Does not include deinking, rag, soda, rope, flax, bagasse, or cotton linter pulp mills.

Imports of chemical wood pulp accounted for about 95 percent of all wood pulp imports, by quantity, in 1982; mechanical wood pulp accounted for 4 percent; and all other wood pulps, primarily semichemical pulps, accounted for 1 percent.

U.S. imports of chemical wood pulp from Canada declined irregularly, from 3.9 million short tons, valued at $1.0 billion, in 1978 to 3.4 million short tons, valued at $1.5 billion, in 1982. The decrease in the quantity of these imports reflects the recession and consequent decline in demand for paper. However, the quantity of imports of such pulps from Brazil rose from 11,000 short tons in 1978 to 139,000 short tons in 1982. Brazil's wood pulp industry is growing, and it is able to export to the United States at competitive prices.

The quantity of imports of mechanical wood pulp declined from 157,000 short tons, valued at $27 million, in 1978 to 144,000 short tons, valued at $33 million, in 1982. This decline was also due mostly to the decline in U.S. demand caused by the recession.

The quantity of U.S. exports of wood pulp increased 31 percent overall during 1978-82, from 2.6 million short tons, valued at $0.8 billion, in 1978 to 3.8 million short tons, valued at $1.7 billion, in 1981, before declining to 3.4 million short tons, valued at $1.4 billion, in 1982 (table B-16). The decline from 1981 to 1982 was caused by the decline in worldwide demand for papermaking stock.

Chemical pulp exports accounted for virtually all U.S. wood pulp exports from 1978 to 1982. The leading markets in 1982 were Japan (19 percent of the total quantity exported), West Germany (14 percent), the United Kingdom (8 percent), and Italy (7 percent).

Trends in output and employment

Production of wood pulp increased from 50.0 million short tons in 1978 to 53.4 million short tons in 1981, before declining to 51.1 million short tons in 1982. The decline in production in 1982 was due largely to the drop of demand caused by the recession.

Employment in the U.S. wood pulp industry increased 2 percent overall from 139,000 employees in 1978 to 141,000 in 1982, with a high of 148,000 in 1981, as shown in table B-17. Roughly 80 percent of all employees are directly involved with production. Wages for production workers increased steadily from an estimated $9.50 per hour in 1978 to $13.75 per hour in 1982.

Labor contents of trade

The U.S. trade balance in wood pulp is negative and averages 1 percent of domestic production. The ratio of imports to consumption during 1978-82 ranged from a high of 8.2 percent in 1979 to a low of 7.1 percent in 1982 and showed a downward trend. The ratio of exports to production during 1978-82 ranged from a low of 5.2 percent in 1978 to a high of 7.2 percent in 1980 and showed an upward trend.

Table B-16.—Wood pulp: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1978-82

(Quantity in thousands of short tons; value in thousands of dollars; unit value per short ton)

Year	Production 1/	Exports 2/	Imports 1/	Apparent consumption	Ratio (percent) of imports to production
	Quantity				
1978	50,020	2,599	4,025	51,446	7.8
1979	51,117	2,935	4,318	52,560	8.2
1980	52,959	3,806	4,051	53,204	7.6
1981	53,413	3,678	4,087	53,822	7.6
1982	3/ 51,081	3,395	3,656	51,342	7.1
	Value				
1978	4/	817,102	1,086,438	-	-
1979	4/	1,103,783	1,465,169	-	-
1980	4/	1,652,099	1,683,655	-	-
1981	4/	1,661,311	1,764,289	-	-
1982	4/	1,414,557	1,493,241	-	-
	Unit value				
1978	-	$314.40	$269.95	-	-
1979	-	376.10	339.35	-	-
1980	-	434.13	415.62	-	-
1981	-	451.73	431.71	-	-
1982	-	416.70	408.46	-	-

1/ Includes rag and cotton linter pulps which are believed to be insignificant.

2/ Does not include rag or cotton linter pulps.

3/ Estimated by staff of U.S. International Trade Commission.

4/ Not available.

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

Table B-17.--Wood pulp: U.S. employment, by type of worker, 1978-82

(In thousands)

Mill sector employees	1978	1979	1980	1981	1982
Production	109	112	115	116	111
Nonproduction	30	30	32	32	30
Total	139	142	147	148	141

Source: U.S. Bureau of Labor Statistics.

Raw-material supplies during 1978-82 were adequate to supply total domestic needs for wood pulp. The labor supply in the wood pulp industry during 1978-82 was also sufficient to meet these needs, although highly skilled workers needed by the industry, such as electrical and chemical engineers, were somewhat in short supply during this period. Plant capacity was also adequate to meet these needs. Capacity utilization during 1978-82 ranged from a low of about 85 percent in 1982 to a high of over 95 percent in 1980. During this period, capacity rose about 2 percent annually, from 55 million short tons in 1978 to 60 million short tons in 1982.

Although the United States was a net importer of wood pulp during 1978-82, the trade deficit decreased irregularly from 1.4 million short tons, valued at $385 million, in 1978 to 0.3 million short tons, valued at $107 million, in 1982. The ratio of imports to production in the wood pulp sector trended downward during 1978-82, as shown in table B-18.

On the basis of the average domestic production per employee, the labor content of imports exceeded the labor content of exports in the wood pulp sector by a margin that trended downward from 4,000 job opportunities in 1978 to 700 job opportunities in 1982.

Table B-18.--Wood pulp: U.S. production , net imports, employment in mills and labor content of net imports, 1978-82

Year	Domestic production of all wood pulp	Net imports of all wood pulp	Ratio of net imports to production	Total domestic employment in wood pulp mills	Labor content of net imports
	1,000 short tons		Percent	Work-years	Number
1978	50,020	1,426	2.9	139,000	4,000
1979	51,117	1,383	2.7	142,000	3,800
1980	52,959	245	.5	147,000	700
1981	53,413	409	.8	148,000	1,200
1982	51,081	261	.5	141,000	700

Source: U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics.

Appendix C

Substitution Between Imports and Domestic Output

It is often argued that the assumption of dollar-for dollar substitution between imports and competing domestic output is inappropriate, because imports generally are lower priced than domestic output of comparable quantity and quality, and, therefore, that estimates of the labor content of imports such as those contained in this report significantly understate the employment impact of imports. According to this view, quantity measures, rather than dollar measures, should be used to calculate employment related to imports. Since substitutability between imports and domestic output is notoriously difficult to determine, 1/ it is difficult to judge the merits of this view. For many individual sectors, it is certainly possible that the assumption of dollar-for-dollar substitution significantly understates the impact of imports on domestic employment.

For all sectors, however, this view can be accurate only if the volume of actual output were to remain unchanged with the elimination of imports or, what is the same thing, if aggregate income were to increase sufficiently to cover the increase in prices that would accompany substitution of domestic output for all imports. This result is unlikely to occur in the long run, because long-run aggregate income would almost certainly be lower if the United States were deprived of all imports.

Apparel

One sector where the dollar-for-dollar assumption appears to be least appropriate is Apparel (IO 18). The International Ladies Garment Workers' Union has done research to obtain dollar values of imports that are equivalent to comparable domestic output. 2/ They first compared prices of imports with prices of the domestic substitute for disaggregate classifications of apparel, adjusting for quality differences. They then derived the following conversion

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1/ See, for example, Gene M. Grossman, "Import Competition From Developed and Developing Countries," The Review of Economics and Statistics 64 (May 1982), pp. 271-281; Irving B. Kravis and Robert E. Lipsey, Price Competitiveness in World Trade (New York, Columbia University Press for the National Bureau of Economic Research, 1971); and J. David Richardson, "Some Issues in the Structural Determination of International Price Responsiveness," in Hergert Glejser, (ed.) Quantitative Studies in International Economic Relations (Amsterdam: North Holland, 1976).

2/ International Ladies' Garment Workers' Unions, op. cit. The I.L.G.W.U. definition of apparel differs slightly from the one used in this report. They define Apparel to include the following standard Industrial Classifications (SICs): 2251, 2252, 2253, 2254, 2311, 2321, 2322, 2323, 2327, 2328, 2329, 2331, 2335, 2339, 2341, 2342, 2351, 2353, 2361, 2363, 2369, 2381, 2384, 2385, and 2389. In this report, Apparel includes SIC's 2251 through 2254, 2257 through 2259, and 231 through 238.

factors to be multiplied with the value of imports to obtain comparable domestic value: 1/

Year	Conversion factor
1978	2.777
1979	2.745
1980	2.830
1981	2.947
1982	2.947

These conversion factors multiplied with the direct labor content of imports estimates in this study would tend to overstate the job content of these imports, even given the assumption that imports and domestic output substitute on a unit-for-unit basis. This is true, because the International Ladies' Garment Workers' Union uses the foreign value of the imports to construct the import prices, whereas the value of imports in the present study includes international transportation and insurance costs, as well as tariff duties collected: Nevertheless, their methodology indicates a direct labor content of imports for apparel more than double the one presented in table 3.

Other Sectors

Extensive resources would be required to perform calculations for other industries that are comparable with the International Ladies' Garment Workers' Union apparel calculations. However, this section does address an issue raised by Dr. Rudy Oswald regarding the effects of the recent dollar appreciation on the labor content of a dollar of imports. 2/ He argued that, even if dollar-for-dollar substitution held in some initial base period, the recent dollar appreciation has greatly reduced import prices, so that the dollar-for-dollar assumption currently significantly understates the labor content of the imports. Two factors could reduce this effect of the dollar appreciation. First, increased import demand could raise foreign prices toward the new U.S. level (in terms of foreign exchange) caused by the dollar appreciation. Second, U.S. import-competing prices could fall as a result of the lower dollar price of imports caused by the dollar appreciation.

One approach to calculating the change in the relative price of imports is to use price indexes for imports and domestic output constructed by the BLS. 3/ The BLS collects import prices for approximately 14,500 products from over 6,000 companies. Import prices are based on U.S. dollar prices paid by the U.S. importer. Prices are collected for March, June, September, and December, and are not seasonally adjusted. For many products, the price

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1/ The International Ladies' Garment Workers' Union also points out that Commerce Department data on the value of shipments in Apparel are overstated by about 2 percent, because these data include resales. This overstatement causes the domestic labor-output ratio to be understated, so that the jobs related to imports are also understated if they are obtained from this ratio.

2/ Rudy Oswald, op. cit., p. 8-12.

3/ Although the BLS gathers data on actual prices, it does not release these price data to the public. Instead, the BLS publishes only price indexes.

series data begin only recently. The BLS also collects domestic producer prices. These prices cover nearly 3,400 commodities and are based on approximately 26,000 quotations. The prices are chosen to represent prices of all commodities produced in manufacturing, agriculture, forestry, fishing, mining, gas and electricity, and public utilities. Unfortunately, in some cases, these prices also include import prices. Thus, the BLS indexes for import prices and domestic prices may understate differences in these prices, although the understatement is quite small. Another problem is that it is difficult to use the BLS price indexes to construct comparable indexes of import prices and domestic prices for the input-output categories used in this study. Nevertheless, ratios of domestic price indexes to import price indexes can be constructed for several input-output categories in manufacturing. The resulting index of ratios for each category was set equal to unity in the first year where sufficient data were available to construct the ratio. These ratio indexes do not begin in 1978 in all cases, because import price indexes were not always available in that year. The results are reported in table C-1.

Table C-1.--Indexes of ratios of domestic price to import price for selected input-output sectors and U.S. dollar effective exchange rate

(1978=100)

Input-output sector	1978	1979	1980	1981	1982
18 Apparel	100	96	99	102	104
20 Lumber and wood products, except containers	-	-	-	100	101
24, 25 Paper and allied products	100	101	103	102	105
32 Rubber and miscellaneous plastic products	100	100	96	98	100
47 Metal working machinery and equipment	100	100	103	115	123
48 Special industry machinery and equipment	-	-	-	100	102
49 General machinery and equipment	-	-	-	100	106
50 Miscellaneous machinery, except electrical	-	-	100	114	127
53 Electric industrial equipment and apparatus	-	-	-	100	104
54 Household appliances	100	100	104	111	125
Index of the U.S. dollar effective exchange rate	100	98	98	110	123

Source: Effective exchange rate, International Financial Statistics, March 1983; ratios of price indexes, calculated from official statistics of the U.S. Bureau of Labor Statistics.

In only three of the above sectors, Metalworking machinery and equipment (IO 47), Miscellaneous machinery, except electrical (IO 50), and Household appliances (IO 54), did the recent large dollar appreciations appear to significantly affect the ratio of domestic to import prices. In most cases, adjustments of domestic dollar prices and of import prices in terms of foreign exchange apparently have offset the large bulk of the initial price effects of the dollar appreciations.

Appendix D

Calculating the Labor Content of U.S. Trade—the Equations

The total labor content of U.S. imports or exports is the sum of the direct labor content and the indirect labor content. The indirect labor content is the labor content of the intermediate inputs required to produce the imports or exports. The two types of indirect labor content are: the full indirect labor content and the domestic indirect labor content. The full indirect labor content is the labor content of intermediate inputs, assuming none of these inputs are imported. The full indirect labor content of imports or exports are estimated by first calculating the vector of intermediate inputs needed to produce the imports or exports and then applying labor-output ratios to this vector to get the labor content. The equation for the inputs needed to produce the imports or exports is

$$FI = (I-A)^{-1} V - V \qquad (D1)$$

where FI is a vector (nx1) of inputs needed to produce the imports or exports, I is the identity matrix (nxn), A is the matrix (nxn) of direct requirement coefficients of the input-output table, V is the vector (nx1) of imports or exports, and n is the number of industry categories in the input-output table. The term $(I-A)^{-1}$ is the total requirements input-output table. Thus, $(I-A)^{-1}V$ gives the total output in each industry required to produce V, and $(I-A)^{-1}V - V$ gives the output of intermediate inputs needed to produce V. The labor content of these intermediate inputs is given by the equation

$$FLC = FI \times LO \qquad (D2)$$

where FLC is a vector (nx1) of full indirect labor contents of V, LO is a vector of labor-output ratios, and X denotes element-by-element multiplication of the vectors.

The domestic output of intermediate inputs needed to produce V is given by the equation

$$DI = (I-ZA)^{-1} V - V \qquad (D3)$$

where DI is a vector (nx1) of domestic outputs of intermediate products and Z is a diagonal matrix (nxn) whose elements are the ratios of domestic sales by domestic producers to total domestic sales in each industry sector. The domestic labor content of the intermediate inputs needed to produce V is given by the equation

$$DLC = DI \times LO \qquad (D4)$$

where DLC is a vector (nx1) of domestic indirect labor contents of V.

The direct labor content of V is given by the equation

$$LC = V \times LO \qquad (D5)$$

where LC is a vector (nx1). The total labor content of V is given by the equation

$$TLC = FLC + LC, \qquad (D6)$$

where TLC is a vector (nx1). The total domestic labor content of V is given by the equation

$$TDLC = DLC + LC \qquad (D7)$$

where TDLC is a vector (nx1) of total domestic labor content.

The full indirect labor content of a given element in V (exports or imports of a particular industry) is obtained by setting all other elements of V equal to zero, calculating FI using (D1) and FLC using (D2), and then summing the elements of FLC. The domestic indirect labor content of an element in V is obtained in an exactly analogous fashion using (D3) and (D4). The total labor content of this element is obtained by adding the nonzero element from LC in (D5) to the full indirect or domestic indirect labor content of the element.

There is one additional factor to those mentioned so far that must be considered for the case of U.S. exports. The input-output analysis accounts only for the labor inputs embodied in final output at the production site. It does not include the labor embodied in transporting and handling the finished export between the production site and the U.S. port of debarkation. Therefore, the labor involved in this transport and handling was added to the sectors Transportation and warehousing (IO 65) and Wholesale and retail trade (IO 69) for the direct labor contents of exports. In calculating the total labor embodied in exports in each sector, the labor involved in transporting and handling finished exports between the production site and the port of debarkation was reallocated to the sectors where the exports occurred.

Appendix E

Data for U.S. Imports and Exports

Table E1.--U.S. world trade, 1978-82

(In millions of dollars)

Input-output sector	Description	1978	1979	1980	1981	1982
		Imports				
1	Livestock and livestock products	647	675	692	675	756
2	Other agricultural products	7,421	7,616	7,414	6,577	6,548
3	Forestry and fishery products	919	1,162	1,109	1,109	834
4	Agricultural, forestry, and fishery services	0	0	0	0	0
5	Iron and ferroalloy ores mining	1,477	1,435	1,385	1,627	834
6	Nonferrous metal ores mining	1,212	1,484	1,663	1,459	1,574
7	Coal mining	0	0	0	0	0
8	Crude petroleum and natural gas	2,532	3,878	5,274	5,793	6,016
9	Stone and clay mining and quarrying	1,729	1,735	1,385	827	609
10	Chemical and fertilizer mineral mining	850	1,076	1,274	1,434	1,134
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	27	19	18	17	10
13	Ordnance and accessories	130	138	152	173	184
14	Food and kindred products	10,563	12,839	13,686	14,789	13,652
15	Tobacco manufactures	58	60	102	226	259
16	Broad and narrow fabrics, yarn and thread mill-	1,921	1,765	1,927	2,516	2,286
17	Miscellaneous textile goods and floor covering-	522	642	677	710	655
18	Apparel	7,195	7,298	8,092	9,507	10,355
19	Miscellaneous fabricated textile products	252	279	348	447	436
20	Lumber and wood products, except containers	4,573	4,948	3,861	3,877	3,274
21	Wood containers	69	69	98	88	71
22	Household furniture	767	931	958	1,114	1,210
23	Other furniture and fixtures	234	248	293	314	348
24	Paper and allied products, except containers	4,106	4,959	5,403	5,712	5,374
25	Paperboard containers and boxes	16	20	21	25	44
26	Printing and publishing	554	597	677	686	728
27	Chemicals and selected chemical products	4,057	4,474	5,157	5,629	5,530
28	Plastics and synthetic materials	501	487	522	703	667
29	Drugs, cleaning and toilet preparations	958	1,033	1,112	1,262	1,284
30	Paints and allied products	83	90	69	24	30
31	Petroleum refining and related industries	42,336	59,829	77,256	78,708	62,161
32	Rubber and miscellaneous plastic products	3,708	4,149	4,182	4,125	3,543
33	Leather tanning and finishing	246	310	237	382	342
34	Footwear and other leather products	2,787	3,189	3,026	3,804	4,972
35	Glass and glass products	606	662	702	765	817
36	Stone and clay products	2,004	2,001	2,066	2,237	2,041
37	Primary iron and steel manufacturing	9,240	9,392	9,533	13,688	11,431
38	Primary nonferrous metals manufacturing	6,247	8,107	10,731	9,499	7,729
39	Metal containers	88	65	54	68	75
40	Heating, plumbing, and structural metal prod.-	488	496	439	536	657

Table E1.--U.S. world trade, 1978-82--Continued

(In millions of dollars)

Input-output sector	Description	1978	1979	1980	1981	1982
		Imports--Continued				
41	Screw machine products and stampings	730	834	946	941	882
42	Other fabricated metal products	2,679	2,988	3,145	3,376	3,311
43	Engines and turbines	198	287	218	171	155
44	Farm and garden machinery	572	806	1,853	1,654	1,286
45	Construction and mining machinery	931	919	916	1,329	951
46	Materials handling machinery and equipment	514	624	630	802	796
47	Metalworking machinery and equipment	1,624	2,268	2,667	2,914	2,488
48	Special industry machinery and equipment	1,467	1,614	1,846	1,991	1,978
49	General machinery and equipment	1,350	1,854	1,961	2,529	2,560
50	Miscellaneous machinery, except electrical	6	7	8	7	6
51	Office, computing, and accounting machines	2,377	2,666	3,099	3,763	4,561
52	Service industries machines	86	97	95	104	119
53	Electric industrial equipment and apparatus	774	989	1,233	1,423	1,432
54	Household appliances	1,292	1,288	1,389	1,622	1,927
55	Electric lighting and wiring equipment	534	659	735	856	881
56	Radio, TV, and communication equipment	7,611	7,695	8,417	10,823	11,304
57	Electronic components and accessories	2,603	3,500	4,552	5,003	5,596
58	Misc. electrical machinery and supplies	1,276	1,587	1,789	2,034	2,213
59	Motor vehicles and equipment	26,036	27,900	28,272	30,846	33,843
60	Aircraft and parts	968	1,457	3,065	4,117	3,915
61	Other transportation equipment	1,732	2,191	2,448	2,414	1,958
62	Scientific and controlling instruments	1,656	1,833	2,205	2,592	2,288
63	Optical, ophthalmic, and photographic equip.	2,211	2,308	2,503	2,860	2,928
64	Miscellaneous manufacturing	9,196	10,259	11,407	13,092	14,174
65	Transportation and warehousing	0	0	0	0	0
66	Communications, except radio and TV	0	0	0	0	0
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	0	0
69	Wholesale and retail trade	0	0	0	0	0
70	Finance and insurance	0	0	0	0	0
71	Real estate and rental	0	0	0	0	0
72	Hotels, personal and repair services exc. auto-	0	0	0	0	0
73	Business services	0	0	0	0	0
74	Eating and drinking places	0	0	0	0	0
75	Automobile repair and services	0	0	0	0	0
76	Amusements	0	0	0	0	0
77	Medical, educ. services and nonprofit org.	0	0	0	0	0
78	Federal Government enterprises	0	0	0	0	0
79	State and local government enterprises	0	0	0	0	0
	Total	189,548	224,789	256,994	278,397	260,024

Table E1.--U.S. world trade, 1978-82--Continued

(In millions of dollars)

Input-output sector	Description	1978	1979	1980	1981	1982
		Exports				
1	Livestock and livestock products	230	248	257	326	361
2	Other agricultural products	16,574	19,577	23,487	25,045	21,049
3	Forestry and fishery products	97	124	156	156	144
4	Agricultural, forestry, and fishery services	0	0	0	0	0
5	Iron and ferroalloy ores mining	447	788	897	616	359
6	Nonferrous metal ores mining	96	233	407	329	329
7	Coal mining	0	0	0	0	0
8	Crude petroleum and natural gas	153	168	266	386	456
9	Stone and clay mining and quarrying	196	262	287	330	310
10	Chemical and fertilizer mineral mining	298	397	520	449	395
11	New construction	0	0	0	0	0
12	Maintenance and repair construction	0	0	0	0	0
13	Ordnance and accessories	64	70	101	99	100
14	Food and kindred products	8,199	9,600	10,861	11,247	9,880
15	Tobacco manufactures	720	907	1,025	1,188	1,219
16	Broad and narrow fabrics, yarn and thread mill-	1,048	1,546	1,668	1,494	1,084
17	Miscellaneous textile goods and floor covering-	435	580	803	788	659
18	Apparel	627	891	1,158	1,174	903
19	Miscellaneous fabricated textile products	315	389	344	346	287
20	Lumber and wood products, except containers	3,786	5,614	5,803	4,647	4,464
21	Wood containers	25	32	41	28	24
22	Household furniture	203	224	288	374	333
23	Other furniture and fixtures	118	132	192	268	258
24	Paper and allied products, except containers	2,201	2,870	4,146	4,200	3,693
25	Paperboard containers and boxes	0	0	0	0	0
26	Printing and publishing	720	846	971	1,148	1,182
27	Chemicals and selected chemical products	8,944	12,879	15,852	17,040	16,337
28	Plastics and synthetic materials	2,090	3,507	4,378	4,432	3,886
29	Drugs, cleaning and toilet preparations	1,665	1,894	2,263	2,566	2,569
30	Paints and allied products	131	145	165	191	185
31	Petroleum refining and related industries	1,460	1,832	2,677	3,503	5,316
32	Rubber and miscellaneous plastic products	1,518	1,868	2,270	2,525	2,241
33	Leather tanning and finishing	182	233	249	256	263
34	Footwear and other leather products	123	163	221	227	202
35	Glass and glass products	548	638	756	812	732
36	Stone and clay products	601	724	836	937	803
37	Primary iron and steel manufacturing	2,164	3,158	3,954	3,110	2,481
38	Primary nonferrous metals manufacturing	3,144	8,238	10,517	7,143	4,370
39	Metal containers	85	100	130	142	106
40	Heating, plumbing, and structural metal prod.-	921	1,059	1,404	1,657	1,429

Table E1.--U.S. world trade, 1978-82--Continued

(In millions of dollars)

Input-output sector	Description	1978	1979	1980	1981	1982
		Exports--Continued				
41	Screw machine products and stampings	233	260	299	319	265
42	Other fabricated metal products	1,193	1,356	1,594	1,725	1,502
43	Engines and turbines	2,128	2,705	3,418	3,874	3,949
44	Farm and garden machinery	1,546	1,866	2,197	2,586	1,757
45	Construction and mining machinery	4,657	5,506	7,296	8,416	7,671
46	Materials handling machinery and equipment	836	915	1,103	1,236	1,030
47	Metalworking machinery and equipment	2,106	2,437	3,125	3,596	2,851
48	Special industry machinery and equipment	1,412	1,995	2,515	2,654	2,467
49	General machinery and equipment	2,276	2,644	3,173	3,491	3,341
50	Miscellaneous machinery, except electrical	907	982	1,262	1,450	1,388
51	Office, computing, and accounting machines	4,482	5,793	7,787	8,780	9,138
52	Service industries machines	1,822	2,020	2,288	2,623	2,248
53	Electric industrial equipment and apparatus	2,296	2,682	3,329	3,826	3,592
54	Household appliances	826	1,004	1,166	1,218	998
55	Electric lighting and wiring equipment	636	679	722	886	830
56	Radio, TV, and communication equipment	3,224	3,644	4,322	4,830	4,882
57	Electronic components and accessories	2,539	3,374	4,334	4,543	4,756
58	Misc. electrical machinery and supplies	1,418	1,770	2,056	2,417	2,243
59	Motor vehicles and equipment	11,074	12,669	12,059	13,549	11,351
60	Aircraft and parts	7,786	10,906	14,214	15,548	11,919
61	Other transportation equipment	693	818	1,271	1,651	1,660
62	Scientific and controlling instruments	2,727	3,338	3,986	4,660	4,735
63	Optical, ophthalmic, and photographic equip.	1,410	1,642	1,951	1,985	1,901
64	Miscellaneous manufacturing	3,337	4,221	4,897	4,982	3,907
65	Transportation and warehousing	5,076	6,517	7,816	8,108	7,354
66	Communications, except radio and TV	0	0	0	0	0
67	Radio and TV broadcasting	0	0	0	0	0
68	Electric, gas, water, and sanitary services	0	0	0	0	0
69	Wholesale and retail trade	10,724	13,302	15,939	17,194	15,582
70	Finance and insurance	0	0	0	0	0
71	Real estate and rental	0	0	0	0	0
72	Hotels, personal and repair services exc. auto-	0	0	0	0	0
73	Business services	0	0	0	0	0
74	Eating and drinking places	0	0	0	0	0
75	Automobile repair and services	0	0	0	0	0
76	Amusements	0	0	0	0	0
77	Medical, educ. services and nonprofit org.	0	0	0	0	0
78	Federal Government enterprises	0	0	0	0	0
79	State and local government enterprises	0	0	0	0	0
	Total	137,489	176,980	213,465	225,329	201,726

Source: Compiled from official statistics of the U.S. Bureau of the Census.

Note.--Because of rounding, figures may not add to the totals shown.
Imports are measured as cost, insurance and freight (CIF) plus calculated duties.

Table E2.--U.S. trade with the world (summary), 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	8,988	9,452	9,216	8,360	8,138
Manufacturing	130,397	145,881	159,523	180,172	179,547
Mining	5,268	5,729	5,707	5,348	4,151
Petroleum	44,868	63,707	82,530	84,501	68,178
Services	27	19	18	17	10
Total	189,548	224,789	256,994	278,397	260,024
	Exports				
Agriculture	16,902	19,949	23,900	25,527	21,553
Manufacturing	102,139	133,532	160,757	168,886	150,071
Mining	1,036	1,679	2,111	1,724	1,394
Petroleum	1,613	2,000	2,942	3,889	5,772
Services	15,800	19,819	23,755	25,302	22,936
Total	137,489	176,980	213,465	225,329	201,726

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. for notes.

Table E3.--U.S. trade with the Organization for Economic Cooperation and Development (OECD), 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	1,199	1,274	1,332	1,377	1,454
Manufacturing	93,444	101,914	110,089	123,840	123,574
Mining	2,649	2,926	2,619	2,592	1,905
Petroleum	6,400	9,145	12,328	16,509	17,180
Services	24	16	12	11	7
Total	103,717	115,275	126,379	144,329	144,119
	Exports				
Agriculture	9,084	9,757	11,676	12,381	10,963
Manufacturing	62,241	83,215	95,986	98,423	87,643
Mining	793	1,344	1,718	1,376	1,057
Petroleum	1,114	1,340	1,887	2,464	3,189
Services	9,507	11,900	13,735	14,336	13,180
Total	82,739	107,556	125,001	128,979	116,033

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. 122 for notes.

Table E4.--U.S. trade with the European Economic Community (EEC), 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	561	552	562	514	526
Manufacturing	30,469	34,153	36,149	37,845	37,948
Mining	766	590	381	222	173
Petroleum	1,360	2,567	2,702	6,502	7,149
Services	21	3	5	1	2
Total	33,177	37,866	39,798	45,084	45,798
	Exports				
Agriculture	4,368	4,377	5,017	5,079	4,507
Manufacturing	22,918	32,048	40,292	38,695	34,378
Mining	380	710	864	559	427
Petroleum	355	480	590	871	1,343
Services	3,617	4,616	5,618	5,562	5,197
Total	31,637	42,230	52,380	50,767	45,852

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. for notes.

Table E5.--U.S. trade with Japan, 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	12	13	12	16	21
Manufacturing	27,820	29,548	34,360	41,625	41,542
Mining	27	95	41	19	8
Petroleum	38	27	63	108	68
Services	1	7	5	6	1
Total	27,898	29,689	34,481	41,773	41,640
	Exports				
Agriculture	2,855	3,354	4,076	4,331	3,517
Manufacturing	8,923	12,941	14,850	14,645	14,397
Mining	130	254	352	317	283
Petroleum	209	264	377	560	770
Services	1,760	2,378	2,693	2,718	2,626
Total	13,877	19,190	22,349	22,572	21,593

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p.122 for notes.

Table E6.--U.S. trade with the newly industrializing countries (NICs), 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	2,192	2,113	2,310	2,151	1,977
Manufacturing	23,338	26,839	29,964	35,311	36,822
Mining	364	391	434	553	428
Petroleum	1,710	3,336	6,973	7,708	9,801
Services	1	2	3	3	2
Total	27,605	32,682	39,685	45,727	49,030
	Exports				
Agriculture	2,987	3,516	4,916	5,086	3,677
Manufacturing	14,391	21,151	27,981	29,449	23,401
Mining	117	164	213	159	148
Petroleum	261	372	575	788	1,600
Services	2,294	3,139	4,186	4,431	3,712
Total	20,051	28,341	37,871	39,913	32,537

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. for notes.

Table E7.--U.S. trade with Brazil, 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	1,073	827	1,187	980	806
Manufacturing	1,885	2,481	2,691	3,410	3,174
Mining	135	138	149	160	79
Petroleum	6	16	44	319	688
Services	0	1	0	0	1
Total	3,100	3,463	4,071	4,869	4,747
	Exports				
Agriculture	442	403	555	595	434
Manufacturing	2,042	2,467	3,144	2,665	2,444
Mining	38	53	63	32	27
Petroleum	60	61	36	14	60
Services	360	409	497	428	399
Total	2,941	3,393	4,294	3,734	3,363

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. 122 for notes.

Table E8.--U.S. trade with Mexico, 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	970	1,109	965	1,002	1,027
Manufacturing	3,699	4,667	4,918	5,481	5,711
Mining	157	195	208	286	257
Petroleum	1,544	3,156	6,694	6,989	8,592
Services	0	0	0	0	0
Total	6,370	9,127	12,787	13,758	15,587
	Exports				
Agriculture	562	576	1,566	1,510	644
Manufacturing	5,050	7,744	11,233	13,454	8,063
Mining	33	56	60	66	54
Petroleum	159	235	356	398	971
Services	735	1,052	1,663	1,906	1,274
Total	6,539	9,664	14,877	17,333	11,006

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. for notes.

Table E9.--U.S. trade with Hong Kong, 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	9	7	7	7	9
Manufacturing	4,241	4,810	5,580	6,357	6,516
Mining	1	0	1	1	2
Petroleum	0	0	3	0	0
Services	0	1	1	0	0
Total	4,251	4,818	5,592	6,366	6,527
	Exports				
Agriculture	220	212	258	212	204
Manufacturing	1,150	1,552	2,000	1,990	1,823
Mining	2	1	2	2	2
Petroleum	4	4	8	16	8
Services	182	226	279	277	255
Total	1,557	1,995	2,547	2,498	2,292

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p.122 for notes.

Table E10.--U.S. trade with Korea, 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	25	29	16	5	1
Manufacturing	4,493	4,741	4,854	6,024	6,597
Mining	6	3	0	7	2
Petroleum	2	0	0	9	48
Services	0	0	1	0	0
Total	4,526	4,773	4,872	6,045	6,649
	Exports				
Agriculture	784	1,005	1,255	1,475	1,119
Manufacturing	1,784	2,384	2,572	2,820	3,319
Mining	27	34	51	27	43
Petroleum	7	17	43	110	273
Services	363	477	544	609	653
Total	2,966	3,917	4,465	5,041	5,406

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. for notes.

Table E11.--U.S. trade with Taiwan, 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	7	9	9	12	17
Manufacturing	6,229	6,936	8,011	9,395	10,405
Mining	0	4	4	2	3
Petroleum	5	6	0	0	0
Services	0	0	0	0	0
Total	6,241	6,956	8,025	9,410	10,426
	Exports				
Agriculture	638	827	810	853	844
Manufacturing	1,322	1,925	2,854	2,714	2,715
Mining	4	5	7	20	11
Petroleum	14	26	45	88	71
Services	263	366	452	469	453
Total	2,241	3,149	4,168	4,144	4,094

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p.122 for notes.

Table E12.--U.S. trade with the less developed countries (LDCs), 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	4,931	5,249	4,819	4,296	4,118
Manufacturing	8,319	10,107	11,978	13,054	11,716
Mining	1,173	1,255	1,316	1,218	930
Petroleum	10,828	14,437	17,692	18,608	16,162
Services	0	1	2	2	2
Total	25,252	31,048	35,807	37,178	32,928
	Exports				
Agriculture	2,215	2,587	3,758	4,153	3,788
Manufacturing	14,271	17,616	22,781	24,176	23,320
Mining	56	93	121	117	107
Petroleum	135	172	325	336	617
Services	2,149	2,587	3,436	3,695	3,499
Total	18,825	23,055	30,420	32,477	31,331

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. for notes.

Table E13.--U.S. trade with the nonmarket economies (NMEs), 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	79	84	77	96	106
Manufacturing	1,855	2,448	2,430	3,156	2,958
Mining	52	86	116	122	97
Petroleum	150	183	208	594	750
Services	0	0	0	0	0
Total	2,135	2,801	2,831	3,968	3,911
	Exports				
Agriculture	2,342	4,058	3,765	3,843	3,092
Manufacturing	1,411	2,158	2,720	2,856	2,503
Mining	54	70	47	59	57
Petroleum	26	21	24	53	77
Services	654	1,079	1,082	1,118	944
Total	4,487	7,385	7,638	7,930	6,674

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. 122 for notes.

Table E14.--U.S. trade with the People's Republic of China, 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	19	26	30	30	46
Manufacturing	391	560	983	1,708	1,911
Mining	10	30	76	106	85
Petroleum	0	105	149	325	631
Services	0	0	0	0	0
Total	420	720	1,237	2,170	2,673
	Exports				
Agriculture	449	795	1,780	1,616	1,241
Manufacturing	252	691	1,495	1,589	1,463
Mining	0	0	5	0	0
Petroleum	0	1	2	0	1
Services	117	230	509	491	416
Total	818	1,716	3,790	3,697	3,121

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. for notes.

Table E15.--U.S. trade with the Organization of Petroleum Exporting Countries (OPEC), 1978-82

(In millions of dollars)

Industry sector	1978	1979	1980	1981	1982
	Imports				
Agriculture	1,225	1,271	1,180	1,053	899
Manufacturing	595	714	806	910	900
Mining	182	142	143	201	81
Petroleum	31,292	43,097	52,515	49,369	30,803
Services	0	0	0	2	0
Total	33,294	45,224	54,645	51,535	32,683
	Exports				
Agriculture	871	898	1,058	1,426	1,162
Manufacturing	12,196	11,818	13,843	16,707	16,696
Mining	26	20	32	32	44
Petroleum	75	86	124	173	201
Services	1,591	1,557	1,864	2,311	2,209
Total	14,758	14,379	16,921	20,648	20,311

Source: Compiled from official statistics of the U.S. Bureau of the Census.

See p. 122 for notes.

Note.--Imports are measured as cost, insurance and freight (c.i.f.), plus calculated duties.

Agriculture = IO sectors 1 through 3.

Manufacturing = IO sectors 13 through 64, except IO sector 31.

Mining = IO sectors 5, 6, 7, 9, and 10.

Petroleum = IO sectors 8 and 31.

Services = IO sectors 4, 11, 12, and 65 through 79.

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

Appendix F

Notice and Agenda for the Commission's Hearings on U.S. Trade-Related Employment

1982), and part 201, subparts A through E (19 CFR part 201, and amended by 47 FR 33682, August 4, 1982).

This notice is published pursuant to § 207.20 of the Commission's rules (19 CFR 207.20).

By order of the Commission.

Issued: February 25, 1983.

Kenneth R. Mason,

Secretary.

[FR Doc. 83-5271 Filed 3-1-83; 8:45 am]

BILLING CODE 7020-02-M

[322-154]

U.S. Trade-Related Employment; Investigation

AGENCY: International Trade Commission.

ACTION: In accordance with the provisions of section 332 of the Tariff Act of 1930 (19 U.S.C. 1332), the Commission has instituted investigation No. 332-154 for the purpose of estimating the labor content of U.S. exports and of U.S. imports. This trade-related employment will be estimated for U.S. trade with all other countries and for U.S. trade with particular trading partners, including Japan, the European Community, the newly industrializing countries, the less development countries, and the nonmarket economies.

EFFECTIVE DATE: February 22, 1983.

FOR FURTHER INFORMATION CONTACT: Dr. Donald Rousslang, Chief, Research Division, U.S. International Trade Commission, Washington, D.C. 20436 (Phone 202-523-0075).

SUPPLEMENTARY INFORMATION: *Public Hearing:* A public hearing will be held in connection with the investigation. At least 60 days prior to the hearing, a **Federal Register** notice will be posted giving the time and place. All persons shall have the right to appear by counsel or in person, to present information, and to be heard. Requests to appear at a public hearing should be filed with the Secretary, United States International Trade Commission, 701 E Street, NW., Washington, D.C. 20436.

Written Submissions: In lieu of or in addition to appearances at the public hearing, interested persons are invited to submit written statements concerning the investigation. Commercial or financial information which a submitter desires the Commission to treat as confidential must be submitted on separate sheets of paper, each clearly marked "Confidential Business Information" at the top. All submission requesting confidential treatment must conform with the requirements of § 201.6 of the Commission's *Rules of Practice and Procedure* (19 CFR 201.6). All written submissions, except for confidential business information, will be made available for inspection by interested persons. To be ensured of consideration by the Commission, written statements should be submitted at the earliest practicable date, but no later than June 23, 1983. All submissions should be addressed to the Secretary at the Commission's office in Washington, D.C.

By order of the Commission.

Issued: February 23, 1983.

Kenneth R. Mason,

Secretary.

[FR Doc. 83-5273 Filed 3-1-83; 8:45 am]

BILLING CODE 7020-02-M

JOINT BOARD FOR THE ENROLLMENT OF ACTUARIES

Enrolled Actuary Examinations

AGENCY: Joint Board for the Enrollment of Actuaries.

ACTION: Proposed restructure of examination program.

SUMMARY: This notice contains a proposal by the Joint Board for the Enrollment of Actuaries to restructure its examination program. It also accords the public an opportunity to comment on the proposal.

DATE: Comments must be in writing and must be received on or before May 2, 1983.

FOR FURTHER INFORMATION CONTACT: Mr. Leslie S. Shapiro, Executive Director, Joint Board for the Enrollment of Actuaries, c/o Department of the Treasury, Washington, D.C. 20220, 202-634-5135.

SUPPLEMENTARY INFORMATION: The Joint Board for the Enrollment of Actuaries (Joint Board) is responsible for the enrollment of individuals who wish to perform actuarial services under the Employee Retirement Income Security Act of 1974 (ERISA). Consistent with that mandate, regulations governing eligibility for enrollment have been promulgated by the Joint Board. Those regulations appear at 20 CFR Part 901. An individual who wishes to be enrolled may qualify for that status by successfully completing two examinations offered by the Joint Board—one in basic actuarial mathematics and one in pension actuarial mathematics. The examinations have been offered in their current format since the year 1977.

The enactment of ERISA has resulted in the adoption of a large body of implementing regulations. In addition, new legislation affecting the private pension system has been enacted. The emergence of new laws and regulations has resulted in a belief by the Joint Board that its current examination structure is not adequate to meet its responsibility to be assured that those who qualify for enrollment have demonstrated competence in the pension law which is relevant to the performance of pension actuarial services.

The matter was discussed by the Advisory Committee on Actuarial Examinations and the public at a meeting held for that purpose on November 17, 1982. A great deal of further consideration has been given the issues involved, and it is felt that a redesign of the examination program is needed to adequately test prospective enrolled actuaries.

Executive Order 12291

Since there is no modification to regulations contemplated, Executive Order 12291 does not affect this Notice.

Regulatory Flexibility Act

Since there is no modification to regulations contemplated, the Regulatory Flexibility Act does not affect this Notice.

Drafting Information

The principal author of the notice is Mr. Leslie S. Shapiro, Executive Director, Joint Board for the Enrollment of Actuaries.

Proposed Modification

The Joint Board for the Enrollment of Actuaries has under consideration a restructuring of the examinations it offers under 20 CFR 901.13(c)(1) and 901.13(d)(1). The need for restructure is based on the emerging body of law under the Employee Retirement Income Security Act of 1974 (ERISA) and subsequent Congressional acts affecting the private pension system and the enrolled actuary's responsibilities. The current pension actuarial examination, one of the two a prospective enrolled actuary must pass in order to satisfy the knowledge requirement of eligibility for enrollment, does not provide sufficient opportunity in its syllabus to test a candidate's knowledge of pension law.

As a result of discussion at a public meeting held on November 17, 1982 and a great deal of evaluation, the Joint Board and its examination co-administrators, the Society of Actuaries and the American Society of Pension Actuaries, contemplate redesigning the pension actuarial examination to cover only pension law and its application to specific problems. The basic actuarial

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

(332-154)

U.S. Trade-Related Employment

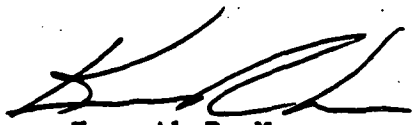
AGENCY: United States International Trade Commission

ACTION: The Commission will hold a public hearing for the purpose of affording all interested parties an opportunity to present views on the effects of exports and imports on U.S. employment. The initial notice of the investigation indicating the scope of the study, contact persons, and other related information was published in the Federal Register of March 2, 1983 (48 F.R. 8877).

PUBLIC HEARING: A public hearing in connection with the investigation will be held in the Commission Hearing Room, 701 E Street, NW., Washington, D.C. 20436, beginning at 10 a.m., e.d.t., on June 30, 1983, to be continued on July 1, 1983, if required. All persons shall have the right to appear by counsel or in person, to present information, and to be heard. Requests to appear at the public hearing should be filed with the Secretary, United States International Trade Commission, 701 E Street, NW., Washington, D.C. 20436, not later than noon, June 23, 1983.

WRITTEN SUBMISSIONS: In lieu of or in addition to appearances at the public hearing, interested persons are invited to submit written statements concerning the investigation. Commercial or financial information which a submitter desires the Commission to treat as confidential must be submitted on separate sheets of paper, each clearly marked "Confidential Business Information" at the top. All submissions requesting confidential treatment must conform with the requirements of section 201.6 of the Commission's Rules of Practice and Procedure (19 CFR 201.6). All written submissions, except for confidential business information, will be made available for inspection by interested persons. To be ensured of consideration by the Commission, written statements should be submitted at the earliest practicable date, but no later than June 23, 1983. All submissions should be addressed to the Secretary at the Commission's office in Washington, D.C.

By order of the Commission.



Kenneth R. Mason
Secretary

Issued: May 2, 1983

TENTATIVE CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject : U.S. Trade-Related Employment

Inv. No. : 332-154

Date and time: June 30, 1983 - 10:00 a.m.

Sessions were held in connection with the investigation in the Hearing Room of the United States International Trade Commisison, 701 E Street, N.W., in Washington.

WITNESS AND ORGANIZATION:

American Federation of Labor and Congress of Industrial Organizations (AFL-CIO), Washington, D.C.

Dr. Rudy Oswald, Director, Department of Economic Research

International Ladies' Garment Workers' Union, New York, N.Y.

Dr. Herman Starobin, Director of the ILGWU Research Department appearing on behalf of Sol C. Chaikin, President

Dr. Lazare Teper, Director of Special Projects

International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW), Washington, D.C.

Lee Price, Representative of the International Union

Joint Board Fur, Leather & Machine Workers Union, Local 1-FLM, New York, N.Y.

Henry Foner, President

United Food and Commercial Workers, New York, N.Y.

Samuel Delfino, Vice President

Joseph Pelzman, Professor of Economics, George Washington University, Washington, D.C.

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