An analysis of U.S. industries sensitive to foreign trade, 1982-87

Although open trading favors many industries, workers in industries that are affected adversely often have difficulty relocating; the Trade Adjustment Assistance program reaches only a small fraction of those potentially eligible for assistance

Robert W. Bednarzik

Concern over the effects of international trade on U.S. industries and workers heightened during the 1980's, as the trade deficit reached record levels. Exports rose modestly between 1982 and 1987, while imports increased substantially. The deficit peaked in 1987, with imports exceeding exports by $160 billion. Many U.S. firms feared that imports would drive them out of business or force them to cut back operations. U.S. export firms were looking for accelerated economic growth to allow them to expand production.

Under the Trade Act of 1974, the Bureau of Labor Statistics (BLS) and the Bureau of the Census were given the responsibility of monitoring U.S. imports, exports, and related domestic production and employment. In fulfillment of this responsibility, these agencies jointly publish quarterly and annual tabulations of imports and exports of merchandise, as well as tabulations of industry employment, based on the Standard Industrial Classification (SIC) system. This information is intended to apprise both administrators of adjustment assistance programs and the Congress of those industries in which adjustments will likely be needed as a result of the expansion of international trade. Although the trade and employment data were used in conjunction with other data to assess U.S. trade performance by industrial sector in the 1970's,[1] there has been no such analysis for the 1980's. However, given U.S. participation in the Uruguay Round—multilateral trade negotiations under the General Agreement on Tariffs and Trade (GATT)—and in the North American Free Trade Agreement (NAFTA) proposals, it is important for public policy to identify U.S. industries with current, significant trading activity. This article updates and builds upon the work of Gregory K. Schoepfle by identifying import- and export-sensitive manufacturing industries and by drawing a worker profile in each of those industries.[2] Such an analysis will give some idea of industries and worker groups likely to be affected by a more open trading environment.

It should be noted that this is not a study of the impact of trade on employment. Rather, the approach here is more limited: It simply tracks job trends in trade-sensitive manufacturing industries, with special emphasis on earnings levels, during a period (1982–87) when the economy recovered from the 1981–82 recession, but the U.S. trade deficit expanded. The final year of the analysis, 1987, is the year that changes in the SIC system went into effect, causing a change in the scope of many four-digit SIC industries, thus making comparisons of early 1980's data with later 1980's data impossible.

Earnings are analyzed to shed an empirical light on the predominant finding in the literature on trade: that higher import shares lead to lower earnings.[3] In particular, the article will compare earnings levels in job-losing and job-gaining industries and in import-sensitive and export-sensitive industries.[4]

Finally, the number of workers, by industry, who were certified for Federal aid under the Trade

Robert W. Bednarzik is a senior economist in the Bureau of International Labor Affairs, U.S. Department of Labor.

Adjustment Assistance program (which provides reemployment assistance to U.S. workers adversely affected by increased imports) is examined to determine the strength of the link between import sensitivity, employment change, and certification. That is, the question is raised, Is the program that was designed to serve workers displaced by increasing foreign trade doing its job?

Data and concepts

The numbers of jobs in specific industries are available from the BLS Current Employment Statistics (CES) program, a national survey of a representative sample of establishments. Establishments are classified, according to the type of activity in which they are engaged, by the SIC system, which, as mentioned, was revised in 1987. However, data used in this article are based on 1972 SIC's, in order that BLS employment data by industry be comparable to Commerce Department trade and shipments data by industry. At the time of this writing, for the 1982–87 period, employment data were available on both a 1972 and 1987 SIC basis, but trade and shipments data were available only on a 1972 SIC basis.

Product-based U.S. trade and shipments data were provided and matched with SIC data by the Department of Commerce, Industry Statistics Division, Office of Industry Assessment. That is, trade commodities were assigned to the closest appropriate four-digit 1972 SIC industry group, and comparable product shipments data were likewise matched with SIC data and tabulated.[5] Placing trade and shipments data on the same industry basis allows the calculation of ratios relating domestic shipments to the volume of international merchandise trade. Of interest for examining possible employment adjustments are the share of the domestic market captured by imports and the share of total sales accounted for by exports.

Two measures are used to assess the trade sensitivity of four-digit U.S. manufacturing industries, namely,

(a) $M / (M + S)$

and

(b) X / S,

where M = U.S. imports
X = U.S. exports
S = U.S. product shipments
$M + S$ = new supply.

Measure (a), the ratio of imports to new supply (that is, imports plus total domestic product shipments), is commonly used to assess *import penetration*. Because it includes domestically produced goods that are exported for foreign consumption, as well as those that are consumed domestically, it captures the offsetting nature of an industry's export activity. Measure (b), the ratio of exports to total domestic product shipments, is a commonly used *export penetration* indicator. It directly reflects the importance of exports in domestic production. For the 1982–87 period, for each four-digit SIC manufacturing industry, the average level and change in import and export penetration are calculated to determine trade-sensitive industries.

Published and unpublished CES survey data and unpublished Current Population Survey (CPS) data are used to provide a profile of trade-sensitive industries. For four-digit SIC industries, CES data give the average hourly earnings of production workers and the number of jobs held by all employees, by production workers, and by women. For three-digit industries, CPS data supply workers' ages, part- or full-time status, race, ethnicity, occupations, and so on. Data from the Trade Adjustment Assistance program show the extent to which individual industries were certified as affected by foreign trade.[6]

Trade sensitivity

Import and export penetration rates were calculated for all four-digit manufacturing industries engaged in trading merchandise. Table 1 shows the distribution of industries by average import and export penetration rates for the 1982–87 period. Most manufacturing industries do only a small amount of foreign trading relative to their output. Threshold levels were chosen so that trade-sensitive industries would include those in which a large share of output is traded. Industries with an average import penetration of 30 percent or more in the period were deemed import sensitive, and those with an average export penetration of 20 percent or more were deemed export sensitive. In examining sensitivity to trade, it is also important to consider industries undergoing a sizable increase in trading activity. Accordingly, industries with an average annual increase in import penetration of 2 percentage points or more or an average annual increase in export penetration of 1 percentage point or more from 1982 to 1987 were also deemed trade sensitive.

The analysis showed that, by either of the two criteria, about a fourth of the industries with import activity were import sensitive, a little higher than the percentage found in Schoepfle's study.[7] Using two criteria to determine trade sensitivity minimizes somewhat the arbitrariness of selecting cutoff points. For example, 17 industries fell between the import penetration rates of 25 and 30

Table 1. **Distribution of four-digit SIC manufacturing industries, by average import and export penetration rates, 1982–87**

Penetration rate[1]	Imports			Exports		
	Number of industries	Frequency	Cumulative frequency	Number of industries	Frequency	Cumulative frequency
All four-digit SIC's	377	100.0	...	446	100.0	...
Under 1 percent	30	8.0	8.0	31	7.0	7.0
1 to under 2 percent	35	9.2	17.2	66	14.7	21.7
2 to under 5 percent	60	16.0	33.2	113	25.4	47.1
5 to under 10 percent	88	23.3	56.5	97	21.7	68.8
10 to under 20 percent	81	21.5	78.0	82	18.4	87.2
20 to under 30 percent	35	9.3	87.3	38	8.5	95.7
30 to under 50 percent	34	9.0	96.3	14	3.2	98.9
50 percent or more	14	3.7	100.0	5	1.1	100.0

[1]Import penetration is a ratio of import value to new supply (imports plus domestic product shipments); export penetration is a ratio of exports to the value of product shipments.

NOTE: Sums of individual items do not necessarily add to totals, due to rounding.

percent, or just below the cutoff level for deeming them import sensitive by the first criterion. However, 6 (35 percent) of the 17 were categorized as import sensitive because they satisfied the second criterion of having had an average annual change of 2 percentage points or more in import penetration from 1982 to 1987.

Employment in import-sensitive industries was 11 percent, and employment in export-sensitive industries 16 percent, of total 1987 manufacturing employment. Because import-sensitive industries accounted for a smaller share of employment, but had more industries, than export-sensitive industries, they were smaller in average size than export-sensitive industries.

Over the 1982–87 period, most import-sensitive four-digit industries fell into three two-digit manufacturing groups: leather, miscellaneous manufacturing, and apparel. Most export-sensitive industries were in machinery (electrical and nonelectrical), instruments, transportation equipment, and chemicals. (See chart 1.)

Import penetration rates among major manufacturing industries were generally higher in the 1980's than in the 1970's, especially in the leather and miscellaneous manufacturing industries, while export penetration rates were about the same. Industries that were sensitive to imports in the 1980's, but not in the 1970's, were mainly in the machinery and the electrical equipment and supply industry groups.

Surprisingly, the auto industry (SIC 3711) did not make the import-sensitive list for the 1980's. In the 1970's, average import penetration in that industry was 16 percent, just above the 15-percent threshold chosen by Schoepfle.[8] During 1982–87, the average rate was 28 percent, just below the 30-percent threshold chosen for this analysis. This represented an increase of a little under 1 percentage point per year, about the rate posted in the 1970's.

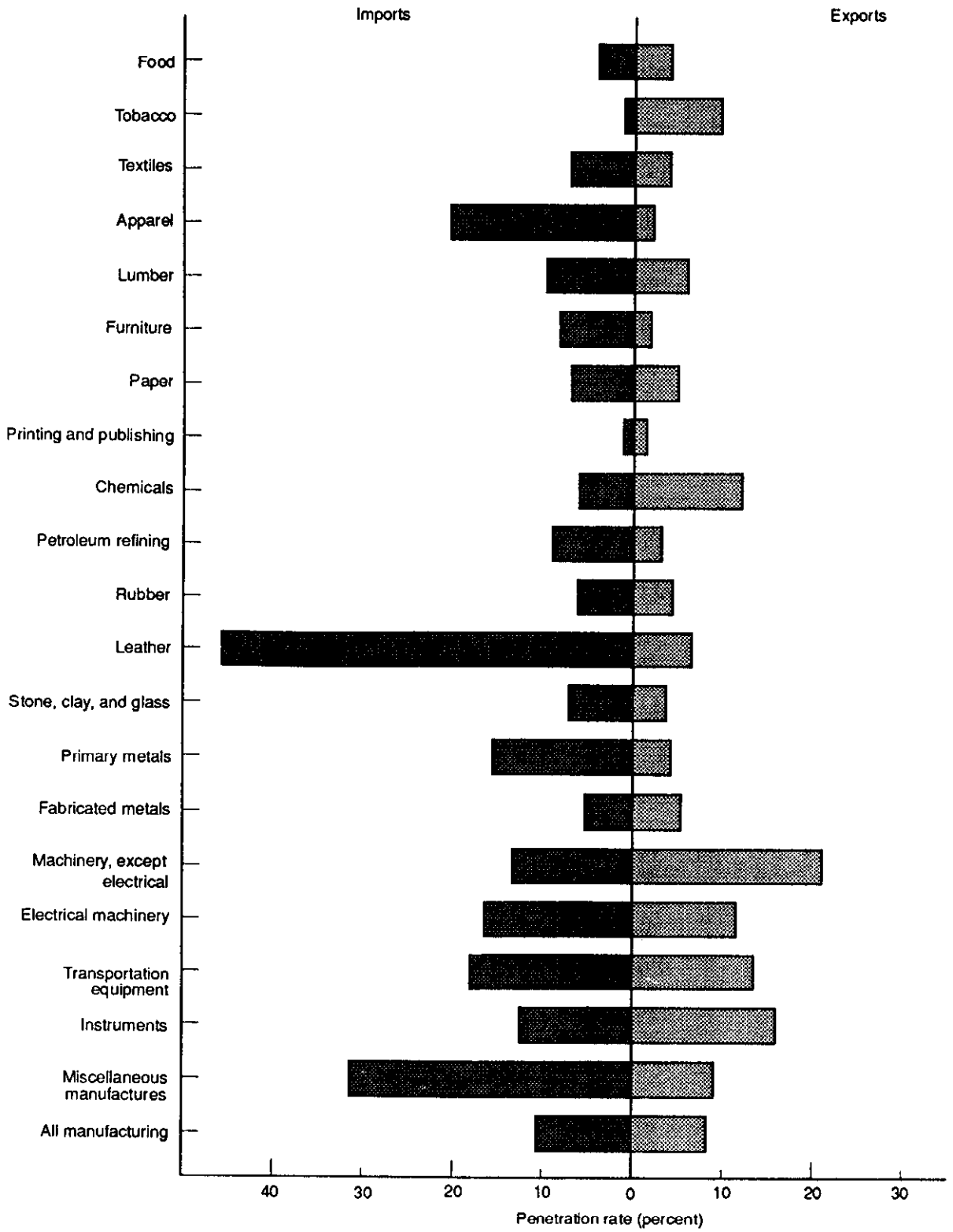
There are three reasons for the differing outcomes in the 1970's and 1980's. (1) The 1973–75 recession dampened sales of domestic autos more than it did those of imported autos, tending to raise the level of import penetration. By contrast, the 1982–87 period included only part of the 1981–82 recession. (2) In 1981, the United States signed a Voluntary Export Restraint agreement with Japan, limiting Japanese exports of cars to the Nation. Thus, U.S. imports of cars from Japan were lower in the 1980's than they would have been absent the agreement.[9] (3) Between 1982 and 1987, Japanese automakers established four assembly plants in the United States, thus lessening the need to import vehicles.

Employment trends

While the total number of U.S. nonfarm payroll jobs rose by more than 12-1/2 million between 1982 and 1987, including an increase of 250,000 in manufacturing, both import- and export-sensitive manufacturing industries posted net job losses: 281,000 and 133,000, respectively. Seven of every 10 manufacturing industries that were identified as trade sensitive lost jobs in the 1982–87 period. (See exhibit 1.) In sharp contrast, jobs in other manufacturing industries increased by more than half a million.[10]

Import-sensitive industries that lost around 15,000 jobs or more were farm machinery and equipment (–37,000); photographic equipment and supplies (–32,000); women's footwear, except athletic (–20,700); men's footwear, except athletic (–18,400); women's, misses', and juniors' suits, skirts, and coats (–17,300); typewriters and calculating and accounting machines, ex-

Chart 1. **Import and export penetration rates for U.S. manufacturing industries, 1982-87 average**



NOTE: Import penetration is a ratio of import value to new supply (imports plus domestic product shipments); export penetration is a ratio of exports to the value of product shipments.

cept electronic computing equipment (15,400); women's, misses', and juniors' blouses, waists, and shirts (–14,200); and dolls, games, and toys (–13,500). These declines reduced employment in each of these industries by some 25 percent or more. Women's handbags and purses, which lost more than half of its jobs (–8,200), was the only other four-digit industry to lose a significant percentage of its jobs over the 1982–87 period. (See table 2.)

Export-sensitive industries that lost 15,000 or more jobs from 1982 to 1987 were construction machinery and equipment (–28,000) and machine tools, metal cutting (–18,700), both of which were also import sensitive, and oil field machinery (–76,500), industrial inorganic chemicals (–18,900), turbines and turbine generators (–15,600), and mining machinery (–15,000). All but industrial organic chemicals were in the machinery category.

However, most of the four-digit trade-sensitive manufacturing industries posting significant job gains over the 1982–87 period were export industries. The job-gaining export-sensitive group included aircraft and related industries (99,100), semiconductors and related industries (21,300), and electronic computing equipment (17,800). (See table 3.) A few import-sensitive industries also posted job gains in 1982–87: electronic components (40,700), electrical equipment for internal combustion engines (11,700), and woven carpets and rugs (11,400). (See table 2.)

Earnings. Scanning the average hourly earnings listed in tables 2 and 3 for production workers in the industries recording large employment gains or losses over the 1982–87 period reveals that *both* low- and high-earnings industries lost and gained employment. Thus, based upon aggregate results, it is not clear whether job losses were more prevalent in low- or high-earnings industries. To clarify the situation somewhat, average hourly earnings were calculated for job-gaining and job-losing, and trade-sensitive and other industry groups. (See exhibit 1.)[11]

First, the number of jobs in trade-sensitive manufacturing industries (1982–87 average hourly earnings, $9.14) declined, while the number of jobs in other manufacturing industries (average hourly earnings, $9.22) increased. Second, there was a greater decline in the number of jobs among import-sensitive industries (average hourly earnings, $8.06) than there was among export-sensitive industries (average hourly earnings, $10.13). It was exactly this type of relative employment decline over the 1980–84 period that led L. R. Katz and L. Summers to conclude that there was little evidence to support the thesis of a relative deterioration in the high-earnings portion of the U.S. traded goods sector.[12]

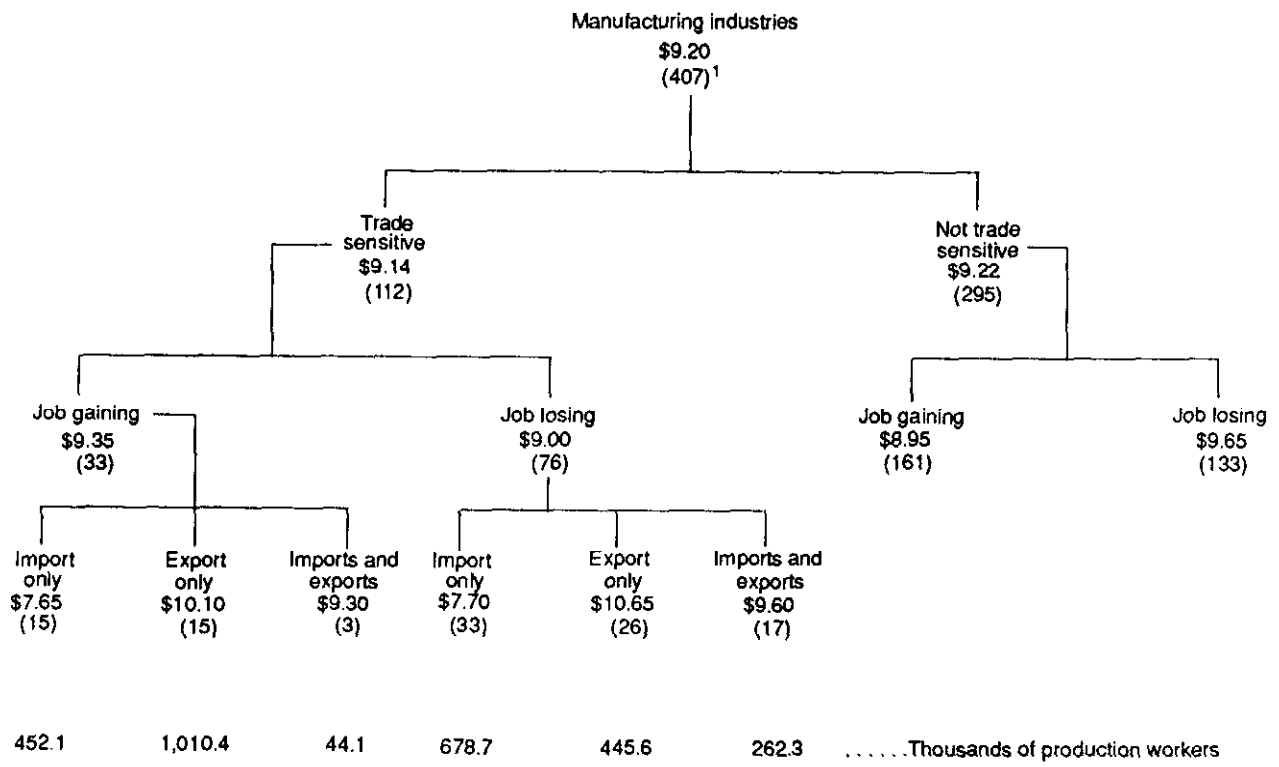
However, analyzing earnings in job-gaining and job-losing industries *separately* reveals a story different from what Katz and Summers saw. First, there was a *net* increase in the number of jobs in manufacturing industries not deemed sensitive to trade, but some of these industries recorded significant job *losses* that were more than offset by other, job-gaining industries. Among the industries not in the trade-sensitive category, the hourly earnings rate in those industries losing jobs was significantly higher than in those industries gaining jobs: $9.65 versus $8.95. (See exhibit 1.) Even though the data do not permit the assessment of specific occupational gains and losses by earnings at the industry level, this is not what one would expect if there were a shift to higher paying manufacturing jobs.

Second, there were also some revealing employment change and earnings patterns among trade-sensitive industries over the period. Overall, in the trade-sensitive group, job-gaining industries had higher earnings than job-losing industries. Conventional wisdom would say that this reflects job growth in higher paying *export* industries and job losses in lower paying *import* industries. To an extent, that is indeed the case. But the conventional wisdom is not always borne out by the data. Separating trade-sensitive industries into those that are importers, those that are exporters, and those that are both importers and exporters shows quite clearly that, in each of these groups, average earnings were *lower* in job-gaining than in job-losing industries during the 1982–87 period. (See exhibit 1.) The aggregate figures result from the large number of production workers still employed in higher paying export industries and lower paying import industries. Although in direct contrast to Katz and Summers, the finding that earnings were lower, on average, in job-gaining than in job-losing industries during 1982–87 is in keeping with studies that have found that higher import shares could lead to lower earnings.[13]

It is possible, of course, that irrespective of trade sensitivity, job-losing industries are losing low-earnings jobs and job-gaining industries are gaining high-earnings jobs, which would drive up overall average earnings. Given the sharp *decrease* in the rate of growth of earnings in manufacturing from 1982 to 1987, however, this did not occur overall, although it could still be the case for smaller subgroups.

Nevertheless, the lower average earnings posted in job-gaining versus job-losing trade-sensitive industries are consistent with the finding of a National Bureau of Economic Research study of the 1979–84 period that "Industries in which the import share has grown most rapidly experience relative decline in wages, implying that industry

Exhibit 1. **Average hourly earnings in job-gaining and job-losing manufacturing industries, 1982-87**



[1] Out of 409 four-digit manufacturing industries for which BLS tabulates data from the Current Employment Statistics Survey.

NOTE: Number in parentheses is the number of four-digit SIC industries upon which the hourly wage was based.

SOURCE: Bureau of Labor Statistics, published and unpublished data from the Current Employment Statistics survey.

wage structure is 'flexible' with respect to changes in imports."[14]

Worker proportions. At the four-digit SIC level, production workers were slightly more concentrated in import-sensitive than in export-sensitive manufacturing industries. On average, jobs held by production workers made up 68 percent of all jobs in import-sensitive industries and 65 percent of all jobs in export-sensitive industries.

Job losses in these industries, however, did not affect production workers disproportionately. There was only a slight tendency for industries with increasing import penetration to report job losses for production workers (correlation coefficient $r = -0.15$).[15] Similarly, a study found a 56-percent decline in employment between 1979 and 1984 in industries with the most rapid rise in import shares, despite large relative wage cuts in those industries.[16]

Over the same period, women, like production workers, were also more concentrated in import-sensitive industries (32 percent of workers) than in export-sensitive industries (28 percent). However, job losses in both types of industries affected men slightly more than women, largely because the higher the earnings in import- and export-sensitive industries, the higher was the proportion of jobs

(Text continues on page 24.)

Table 2. **Employment and earnings of import-sensitive four-digit SIC manufacturing industries, 1982–87**

SIC	Industry	1987 employment level	Employment change, 1982–87	Average hourly earnings, production workers, 1987	Import penetration rates, 1982–87	
					Average	Average annual percent change
	All manufacturing	18,973,600	243,000	$9.30	—	—
	Import-sensitive industries	2,047,600	280,800	8.06	—	—
	Food and kindred products					
2066	Chocolate and cocoa products[1,2]	20,200	700	10.00	25.9	2.5
2091	Canned and cured seafoods [1]	12,100	–6,700	7.10	35.1	4.8
	Textile mill products					
2271	Woven carpets and rugs [1,3]	58,200	11,400	6.80	31.3	.6
2279	Carpets and rugs, n.e.c. [1]	—	—	—	55.7	2.1
2292	Lace goods, [1,4]	24,700	6,000	7.20	48.5	6.6
2299	Textile goods, n.e.c. [1]	—	—	—	47.5	4.2
	Apparel and other finished products					
2321	Men's, boys' shirts and nightwear [1]	83,500	–8,800	5.00	27.1	2.0
2323	Men's, boys' neckwear	8,000	1,300	5.60	13.8	2.0
2331	Women's, misses', and juniors' blouses and shirts [1]	46,400	–14,200	5.00	18.2	2.8
2337	Women's, misses', and juniors' suits, skirts, and coats	39,300	–17,300	6.20	26.3	3.7
2369	Girls', infants' outerwear, n.e.c. [1]	33,000	2,800	5.10	30.0	5.1
2371	Fur goods	2,800	–900	10.80	45.0	6.3
2381	Dress and work gloves, except knit/leather	7,400	–1,700	5.30	31.2	.8
2385	Raincoats and other waterproof outerwear	6,300	–4,200	6.00	46.3	6.0
2386	Leather and sheep-lined clothing	3,000	–1,500	6.30	66.3	4.4
2387	Apparel belts	10,500	0	5.40	18.9	3.4
	Lumber and wood products					
2429	Special product sawmills, n.e.c.	3,600	100	7.90	53.3	1.6
2435	Hardwood veneer and plywood	23,800	1,900	6.40	29.5	.4
	Chemical and allied products					
2833	Medicinal chemicals and botanical products	17,700	–100	13.10	29.8	3.2
	Rubber and miscellaneous plastic products					
3021	Rubber and plastics footwear	11,200	–7,500	5.60	35.7	1.2
	Leather and leather products					
3131	Boot/shoe cut stock	6,100	–4,400	6.00	39.4	3.6
3143	Men's footwear, except athletic	36,400	–18,400	5.80	31.3	2.9
3144	Women's footwear, except athletic	30,700	–20,700	5.20	49.6	6.3
3149	Footwear, except rubber, n.e.c.	12,500	–7,900	5.30	87.8	1.2
3151	Leather gloves and mittens	3,200	–800	5.10	34.8	2.5
3161	Luggage	10,600	–3,100	6.30	45.9	3.6
3171	Women's handbags	8,100	–8,300	5.60	55.7	3.7
3172	Personal leather goods and women's handbags	8,800	–2,900	5.40	35.3	4.3
3199	Leather goods, n.e.c.	8,600	–100	5.60	24.8	3.1
	Stone, clay, and glass					
3253	Ceramic wall and floor tile [5]	13,300	2,000	7.50	32.5	1.9
3262	Vitreous china[6] and earthenware	6,700	–2,100	8.00	48.3	.6
3269	Pottery products, n.e.c.[2]	11,000	0	6.00	51.7	3.8
3281	Cut stone and stone products	12,700	2,000	7.40	29.8	2.3
	Primary metal industries					
3313	Electrometallurgical products	7,800	–1,800	12.40	38.9	1.2
3315	Steelwire, nails, and spikes	18,800	400	9.70	[7]34.7	[7]0
3333	Primary smelting / refining of lead [1,8]	3,300	–2,500	12.40	46.8	1.1
3339	Primary smelting/ refining of nonferrous metals, n.e.c.	9,200	–200	12.80	48.4	3.6

See footnotes at end of table.

Table 2. **Continued—Employment and earnings of import-sensitive four-digit SIC manufacturing industries, 1982–87**

SIC	Industry	1987 employment level	Employment change, 1982–87	Average hourly earnings, production workers, 1987	Import penetration rates, 1982–87	
					Average	Average annual percent change
	Machinery, except electrical					
3523	Farm machinery and equipment [1]	67,700	–37,000	$10.40	16.4	2.4
3531	Construction machinery and equipment	77,900	–28,000	11.60	9.7	2.7
3537	Industrial trucks, tractors, etc. [1]	24,700	–3,400	9.30	14.3	3.4
3541	Machine tools, metal cutting	46,200	–18,700	10.40	33.0	3.4
3542	Machine tools, metal forming	17,200	–3,800	10.80	17.6	4.1
3546	Power driven hand tools	20,800	–3,200	8.20	23.3	2.6
3547	Rolling mill machinery and equipment	5,000	–3,100	11.00	20.0	3.3
3552	Textile machinery	19,700	–2,100	7.90	44.6	2.6
3553	Woodworking machinery	10,500	900	9.40	21.0	3.7
3554	Paper industries machinery	16,400	–1,600	10.90	22.1	2.1
3555	Printing trades machinery	26,900	–8,500	10.30	21.7	3.1
3559	Special industries machinery, n.e.c. [1]	51,500	–300	10.10	17.1	3.7
3563	Air and gas compressors	21,000	–7,800	10.10	13.8	2.1
3564	Exhaust and ventilation fans	29,900	–6,800	8.90	29.4	2.8
3574	Typewriters and calculating/accounting machines,except electronic computing equipment [9]	46,800	–15,400	[10]9.20	65.1	3.9
3576	Scales and balances, except laboratory	6,300	–1,100	8.20	13.2	2.3
3579	Office machines, n.e.c.[1]	—	—	—	13.9	2.9
	Electric and electronic equipment					
3623	Welding apparatus, electric [1]	13,700	–3,100	10.30	11.3	2.3
3636	Sewing machines[1,11]	28,400	1,200	9.60	59.9	4.6
3639	Household appliances, n.e.c. [1]	—	—	—	13.9	2.9
3651	Radio, television receiving sets	61,900	–8,900	9.10	59.2	3.4
3679	Electronic components, n.e.c. [1]	262,000	40,700	7.40	13.8	2.9
3693	X-ray apparatus and tubes	31,400	100	9.80	17.4	2.2
3694	Electrical equipment for internal combustion engines	66,600	11,700	10.60	9.8	2.5
	Transportation equipment					
3743	Railroad equipment	27,500	–9,600	12.10	12.0	3.5
3751	Motorcycles, bicycles, and parts	11,600	–2,800	9.80	52.9	.1
	Instruments and related products					
3811	Engineering, scientific, and associated equipment [1]	85,500	5,300	9.60	31.6	–.5
3851	Ophthalmic goods	37,300	1,100	6.80	32.0	2.6
3861	Photographic equipment and supplies	107,800	–32,000	11.90	17.3	2.1
3873	Watches, clocks, clockwork operated devices, and parts	11,700	–6,000	6.70	55.4	3.6
	Miscellaneous manufacturing industries					
3911	Jewelry, precious metal	37,900	1,700	7.70	27.6	2.5
3914	Silverware, plated ware, and stainless steel	7,500	–3,400	8.40	31.3	2.5
3915	Jewelers' materials and lapidary work	8,000	200	6.80	91.5	.6
3931	Musical instruments	12,600	–5,900	6.90	35.1	5.8
3942	Dolls[12]	43,600	–13,500	6.30	65.9	7.5
3944	Games and toys, except dolls and bikes	—	—	—	34.1	3.7
3949	Sporting goods, n.e.c. [1]	53,000	0	6.80	24.9	2.1
3951	Pens, mechanical pencils, and parts	9,000	–600	7.50	15.7	2.0
3961	Costume jewelry and novelties	22,200	1,900	5.40	26.7	3.4

[1] Classification as import sensitive based on 1982–86 data.
[2] Employment and earnings data are for SIC's 2066 and 2067.
[3] Employment and earnings data are for SIC's 2271, 2272, and 2279.
[4] Employment and earnings data are for SIC's 2291–2293, 2297, and 2299.
[5] Employment and earnings data are for SIC's 3253 and 3259.
[6] Employment and earnings data are for SIC's 3262 and 3263.
[7] 1987 data only.
[8] Employment and earnings data are for SIC's 3332 and 3333.
[9] Employment and earnings data are for SIC's 3572, 3574, and 3579.
[10] Earnings rate is for SIC 357.
[11] Employment and earnings data are for SIC's 3635, 3636, and 3639.
[12] Employment and earnings data are for SIC's 3942 and 3944.

NOTE: Import penetration is a ratio of import value to new supply (Imports plus domestic product shipments); import-sensitive industries are those with an average 1982–87 penetration rate of 30 percent or more or an average annual percent change in penetration rate from 1982 to 1987 of 2 percentage points or more.

Dash indicates data included in figures for related SIC; see footnotes for specific SIC.

n.e.c. = not elsewhere classified.

SOURCES: Department of Commerce, U.S. trade data, 1982–87; Bureau of Labor Statistics, published and unpublished data, CES survey. Earnings figures are based on data from the Bureau's CES survey.

Table 3. **Employment and earnings of export-sensitive four-digit SIC manufacturing industries, 1982–87**

SIC	Industry	1987 employment level	Employment change, 1982–87	Average hourly earnings, production workers, 1987	Export penetration rates, 1982–87	
					Average	Average annual percent change
	All manufacturing	18,973,600	243,000	$9.30	—	—
	Export-sensitive industries	3,073,000	–133,000	10.13	—	—
	Food and kindred products					
2044	Rice milling	5,700	–500	7.90	46.3	–1.3
2046	Wet corn milling	8,800	–2,400	12.70	20.4	.2
2075	Soybean oil mills[1]	13,800	–4,600	7.60	20.9	–1.3
2077	Animal and marine fats and oils	8,500	–1,300	8.80	24.9	–1.5
2091	Canned and cured seafoods[2]	12,100	–6,700	7.10	22.0	2.9
2092	Fresh or frozen packages of fish	38,900	5,200	5.60	21.7	1.3
	Tobacco manufactures					
2131	Other tobacco manufactures[3]	11,300	–3,200	6.60	9.9	3.2
	Textile mill products					
2291	Other textile goods[2,4]	24,700	–2,100	7.20	24.2	–2.5
	Apparel and other finished products					
2386	Leather and sheep-lined clothing	3,000	–1,500	6.30	6.8	1.8
	Paper and allied products					
2611	Pulp mills[2]	14,900	–500	14.40	39.7	.2
	Chemicals and allied products					
2812	Alkalies and chlorine	11,000	–8,700	13.30	15.9	1.5
2819	Industrial inorganic chemicals[2]	87,500	–18,900	12.50	26.9	.6
2822	Synthetic rubber	14,000	–200	12.90	20.0	1.3
2823	Cellulosic manmade fibers	13,600	–4,100	8.60	43.8	2.5
2833	Medicinal chemicals and botanical products	17,700	–1,000	13.10	43.8	2.5
2865	Cyclic crudes and intermediates	28,800	–6,000	13.10	21.0	1.1
2874	Phosphatic fertilizers	10,600	–4,600	10.80	26.7	.8
2895	Other chemical preparations[5]	43,800	–200	11.00	14.3	2.5
	Petroleum refining and related industries					
2992	Miscellaneous petroleum and coal products[6]	12,000	500	9.70	49.8	–7.5
	Rubber and miscellaneous plastics products					
3069	Fabricated rubber products	101,500	3,500	8.10	11.1	1.2
	Leather and leather products					
3149	Footwear, except rubber, n.e.c.	12,500	–7,900	5.30	7.6	3.1
	Stone, clay, and glass					
3262	Vitreous china and earthenware[7]	6,700	–2,100	8.00	8.8	1.1
3264	Porcelain electrical supplies	9,000	–1,500	9.30	19.5	.3
3292	Asbestos products	8,700	–4,200	9.70	28.4	6.1
	Primary metal industries					
3355	Aluminum and nonferrous roll[8]	18,100	–4,400	11.80	17.0	2.1
	Fabricated metal products, except machinery and transportation equipment					
3482	Small arms ammunition[9]	33,400	–4,100	10.60	23.0	2.3
	Machinery, except electrical					
3511	Turbines and turbine generators	26,100	–15,600	12.20	25.2	–2.7
3519	Internal combustion engines	64,400	–8,500	12.80	21.6	–.9
3531	Construction machinery and equipment[2]	77,900	–28,000	11.60	32.5	–5.0
3532	Mining machinery	16,700	–15,000	11.10	19.6	–.4
3533	Oil field machinery	36,400	–76,500	10.80	65.9	5.2

See footnotes at end of table.

Table 3. **Continued—Employment and earnings of export-sensitive four-digit SIC manufacturing industries, 1982–87**

SIC	Industry	1987 employment level	Employment change, 1982–87	Average hourly earnings, production workers, 1987	Export penetration rates, 1982–87	
					Average	Average annual percent change
3541	Machine tools, metal cutting	46,200	−18,700	$10.40	18.0	1.3
3542	Machine tools, metal forming	17,200	−3,800	10.80	24.2	.7
3547	Rolling mill machinery and equipment	5,000	−3,100	11.00	25.6	−1.0
3551	Food products machinery [2]	36,200	−3,500	10.20	28.4	−1.9
3552	Textile machinery	19,700	−2,100	7.90	26.2	.5
3554	Paper industries machinery	16,400	−1,600	10.90	21.8	−1.4
3555	Printing trades machinery [2]	26,900	−8,500	10.30	21.0	−2.0
3559	Special industry machinery, n.e.c. [2]	51,500	−300	10.10	24.0	−.7
3563	Air and gas compressors	21,000	−7,800	10.10	21.5	−.9
3567	Industrial furnaces and ovens [2]	16,300	−1,400	9.20	17.7	1.1
3569	General industrial machinery [2]	49,700	2,100	9.20	23.8	−.8
3573	Electronic computing equipment [2]	421,000	17,800	9.10	27.3	1.0
3599	Machinery, except electrical [2]	232,000	3,900	9.50	17.3	1.0
	Electrical and electronic equipment					
3629	Electrical industrial apparatus	10,300	−1,000	8.40	33.2	.0
3635	Other household appliances [2,10]	28,400	1,200	9.60	51.1	4.2
3643	Current-carrying wire devices	77,200	−100	8.00	22.7	2.3
3652	Phonograph records	21,000	500	7.80	16.1	3.3
3674	Semiconductors and related devices	247,000	21,300	9.40	32.2	.2
3676	Electronic resistors	11,900	−700	7.00	19.8	1.3
3693	X-ray apparatus and tubes	31,400	100	9.80	27.6	.6
3699	Other miscellaneous electrical equipment [2]	12,300	−800	7.30	50.0	−1.4
	Transportation equipment					
3721	Aircraft	356,400	36,500	13.00	28.4	1.3
3724	Aircraft engines and engine parts	158,200	9,400	12.40	20.5	.6
3728	Aircraft equipment, n.e.c.	185,500	53,200	11.30	34.3	−2.4
3795	Tanks and tank components	18,300	1,200	13.00	19.7	.0
	Instruments and related products					
3825	Instruments to measure electricity	103,900	2,300	9.10	25.7	−.3
3829	Measuring and controlling devices [2]	30,600	4,700	8.70	43.0	−2.5
	Miscellaneous manufacturing industries					
3914	Silverware, plated ware, and stainless steel	7,500	−3,400	8.40	13.1	1.3
3915	Jewelers' materials and lapidary work	8,000	200	6.80	178.5	18.9
3931	Musical instruments	12,600	−5,900	6.90	16.3	1.0

[1] Employment and earnings data are for SIC's 2074–2076.
[2] Classification as export sensitive based on 1982–86 data.
[3] Employment and earnings data are for SIC's 2131 and 2141.
[4] Employment and earnings data are for SIC's 2291–2293, 2297, and 2299.
[5] Employment and earnings data are for SIC's 2895 and 2899.
[6] Employment and earnings data for SIC's 2992 and 2999.
[7] Employment and earnings data are for SIC's 3262 and 3263.
[8] Employment and earnings data are for SIC's 3355 and 3366.
[9] Employment and earnings data are for SIC's 3482, 3484, and 3489.
[10] Employment and earnings data are for SIC's 3635, 3636, and 3639.

NOTE: Export penetration is a ratio of exports to the value of product shipments; export-sensitive industries are those with an average 1982–87 penetration rate of 20 percent or more or an average annual percent change in penetration rate from 1982 to 1987 of 1 percentage point or more.

n.e.c. = not elsewhere classified.

SOURCES: Department of Commerce, U.S. trade data, 1972–87; Bureau of Labor Statistics, published and unpublished data, CES survey. Earnings figures are based on data from the Bureau's CES survey.

held by men, and job losses were more prevalent in higher paying industries. Job losses for women were concentrated in low-earnings, import-sensitive industries. In fact, there was a tendency for workers in industries with higher import penetration rates to have lower earnings ($r = -0.30$) and to report job losses for women ($r = -0.19$) between 1982 and 1987.

Worker characteristics

So far, the analysis has focused on *jobs* at the four-digit SIC level. Information on the characteristics of *workers* was available only at the three-digit level, beginning in 1983. Trade sensitivity was determined at that level using CES data, and the results were matched with three-digit industry Census Bureau codes used in the CPS. The same method and thresholds for measuring sensitivity at the four-digit level were used, and 17 import-sensitive and 16 export-sensitive industries were identified. Table 4 presents worker characteristics for all manufacturing and for the import- and export-sensitive groups within the manufacturing sector.[17]

Age, race, Hispanic origin, and workweek. Women comprised a larger percentage of workers in import-sensitive industries, compared with export-sensitive industries and manufacturing in general. Part-time workers exhibited the same pattern—not surprisingly, because most part-time workers are women. Youth (16–24 years), blacks, and Hispanics also were more prevalent in import- than in export-sensitive industries.

Women, blacks, Hispanics, youth, and part-time workers accounted for large shares of employment in the following import-sensitive industries: apparel and accessories, except knitting; leather products, except footwear; and footwear, except rubber and plastic. Workers in these industries were the lowest paid among the 16 three-digit industries deemed import sensitive. Hispanic and young workers also made up a larger percentage than their share of total manufacturing employment in the cycle and miscellaneous transportation equipment, the watches, clocks, and clockwork-operated devices, and the miscellaneous manufacturing industries.

Among three-digit export-sensitive industries, there were sizable percentages of women workers in the electrical machinery and supplies industry and of blacks in the tobacco industry.

Unionization, occupation, and education. Mirroring the distribution of jobs by hourly earnings, a larger percentage of workers in import-sensitive industries earned less (1983–87 average, $8.60) than workers in manufacturing in general ($9.30) and workers in export-sensitive industries ($10.20). Workers in import-sensitive industries were also less likely than workers in all manufacturing and workers in export-sensitive industries to be union members, to be college graduates, and to hold professional or technical jobs.

The larger percentage of union members in export-sensitive than import-sensitive industries contradicts findings of other studies.[18] Export-sensitive industries with a high rate of unionization were pulp, paper, and paperboard mills (60 percent); engines and turbines (50 percent); and aircraft and parts (35 percent).

In both import- and export-sensitive industries, there was a correlation among educational level, skill level (occupation), and earnings. Industries having large shares of workers with 13 or more years of schooling also had large shares of workers earning more than $10.00 per hour and holding managerial, professional, or technical jobs. More export-sensitive than import-sensitive industries exhibited this pattern in workers' characteristics—most notably, agricultural chemicals, industrial miscellaneous chemicals, aircraft and parts, scientific and controlling equipment, and office and accounting machines.

Export-sensitive industries usually had higher proportions of managers and professionals, technical workers, and craftworkers and lower proportions of machine operators and laborers than did import-sensitive industries. There were increases in the 1980's in the number of workers holding managerial and professional jobs in import-sensitive industries, but those gains were more than offset by losses among machine operators, assemblers, and inspectors. Interestingly, import-sensitive industries posted gains for jobs requiring the fewest skills: equipment handlers, cleaners, and laborers. Export-sensitive industries reported gains in managerial and professional jobs, but few changes in other job categories.

Trade adjustment assistance

The Trade Adjustment Assistance program is based on the premise that liberalization of trade benefits society at large, but imposes heavy costs on some workers, who therefore should be assisted in certain ways. Specifically, those who become unemployed or have their hours reduced as a direct result of increased imports are entitled to trade readjustment allowances, job search and relocation allowances, and training. "Entitlement" means that the benefits are guaranteed to workers meeting an established set of eligibility criteria.

A brief history of the Trade Adjustment Assistance program, presented in exhibit 2, shows that early, very stringent eligibility requirements were loosened and then tightened again. Initially, few petitions were approved, because trade liberalization, not competition from imports, had to be the primary cause of job loss. That is, the Trade Expansion Act stated unambiguously that increased imports must be, *in major part*, the result of trade agreement concessions. The 1974 Trade Act removed the linkage between loss of employment and a tariff reduction. Workers became eligible for adjustment assistance if expanding trade alone, whether related to a tariff reduction or not, *con-*

Table 4. **Distribution of manufacturing employment by trade sensitivity, selected characteristics, and hourly earnings, 1983–87 average**

Characteristic	Manufacturing	Import sensitive[1]	Export sensitive[2]
Average hourly earnings [3]	$9.28	$8.59	$10.20
Total employment (in thousands)	20,834	4,695	5,504
Percent distribution	100.0	100.0	100.0
Gender:			
Men	67.5	57.9	71.0
Women	32.5	42.1	29.0
Race and Hispanic origin:			
White	87.1	87.3	89.3
Black	10.0	8.3	7.4
Hispanic origin	7.4	9.4	6.5
Age:			
16 to 24 years	14.0	13.9	12.1
25 to 54 years	72.7	72.2	74.0
55 years and over	13.3	14.0	13.9
Educational attainment:			
Less than high school	8.4	9.8	5.9
High school	45.2	45.3	45.4
More than high school	33.2	30.9	38.2
Workweek:			
Full time (35 hours or more per week)	93.3	92.8	95.9
Part time (1–34 hours per week)	6.7	7.2	4.1
Union Status:[4]			
Member of union	25.2	20.5	25.0
Represented by union	27.3	22.3	27.5
Nonunion	72.7	77.7	72.5
Occupation:			
Managerial and professional specialty	18.4	17.7	21.9
Executive, administrative, and managerial	10.6	10.8	11.6
Professional specialty	7.8	6.9	10.2
Technical, sales, and administrative support	19.0	18.8	20.5
Technicians and related support	3.5	3.7	4.9
Sales	3.4	3.1	2.8
Administrative support	12.1	12.1	12.7
Service occupations	1.8	1.4	1.6
Precision production, craft, and repair	19.2	19.4	24.1
Operators, fabricators, and laborers	41.2	42.7	31.8
Machine operators, assemblers, and inspectors	32.0	37.8	26.6
Transport and material moving occupations	4.0	1.4	2.1
Handlers, cleaners, helpers, and laborers	5.1	3.4	3.1

NOTE: The percentage distribution of some groups (for example, educational attainment) may not add to 100 because of missing values; smaller differences may be due to rounding.

Import sensitivity is a ratio of import value to new supply (imports plus domestic product shipments); import-sensitive industries are those with an average 1982–87 level of 30 percent or more or an average annual percent change from 1982 to 1987 of 2 percentage points or more. Export sensitivity is a ratio of exports to the value of product shipments; export-sensitive industries are those with an average 1982–87 level of 20 percent or more or an average annual percent change from 1982 to 1987 of 1 percentage point or more.

SOURCE: Data are based on special tabulations provided by BLS from CPS data.

[1]The following industries, with their CPS codes in parentheses, were deemed import sensitive: apparel and accessories, except knitting (151); rubber products, except tires and tubes, and plastic footwear and belting (211); footwear, except rubber and plastic (221); leather products, except footwear (222); miscellaneous nonmetallic mineral and stone products (262); other primary metal industries (280); construction and material handling machines (312); office and accounting machines (321); machinery, except electrical, n.e.c. (331); radio, television, and communications equipment (341); railroad locomotives and equipment (361); cycles and miscellaneous transportation equipment (370); scientific and controlling equipment (371); optical and health services supplies (372); photographic equipment and supplies (380); watches, clocks, and clockwork operated devices (381); and miscellaneous manufacturing industries (391). [n.e.c.= not elsewhere classified.]

[2]The following industries, with their CPS codes in parentheses, were deemed export sensitive: tobacco manufactures (130); pulp, paper, and paperboard mills (160); agricultural chemicals (191); industrial and miscellaneous chemicals (192); miscellaneous petroleum and coal products (201); rubber products, except tires and tubes, and plastic footwear and belting (211); other primary metal industries (280); engines and turbines (310); construction and material handling machines (312); office and accounting machines (321); machinery, except electrical, n.e.c. (331); electrical machinery and equipment, n.e.c. (342); aircraft and parts (352); cycles and miscellaneous transportation equipment (370); scientific and controlling equipment (371); and miscellaneous manufacturing industries (391). [n.e.c = not elsewhere classified.]

[3]In the CPS, wage data are collected for individual wage and salary *workers*, whereas in the CES, wage data are collected for individual establishments and are reported as the average hourly wage for all jobs in a specific industry. Wages for individual *jobs* are not collected in the CES. Thus, when CPS data are used, the average hourly earnings for import-sensitive industries are determined by averaging the wage rates of wage and salary workers employed in import-sensitive industries. When CES data are used, the average hourly earnings for import-sensitive industries are determined by a weighted average of industry wage rates of import-sensitive industries. (See footnote 10 in text.)

[4]Wage and salary workers only.

tributed importantly to the job loss. Certifications then skyrocketed, and subsequent evaluations showed that many recipients of trade adjustment assistance were eventually recalled to their old jobs.[19] Benefits, which were distributed on top of unemployment insurance and which raised the total benefit level to 70 percent of the worker's average gross weekly wage for a maximum of 52 weeks, were deemed too generous.[20] Accordingly, the 1981 Omnibus Budget Reconciliation Act reduced payments to the level of regular unemployment insurance, effective upon its exhaustion, making trade adjustment assistance equivalent to an extended unemployment insurance program. The act also tightened eligibility requirements, but they were later rescinded. The last major change to the Trade Adjustment Assistance program occurred in 1988, when workers were required to register for training in order to collect monetary benefits.

A preliminary evaluation of trade adjustment assistance, as it evolved in the 1980's, found the program better able to target job losers who had difficulty finding comparable work; however, it did little to reduce the long-term earnings losses of most workers.[21] The study also found that mandatory training delayed the person's return to work without materially raising his or her wages.[22]

Certification for Trade Adjustment Assistance benefits is obtained by petitioning the U.S. Department of Labor, which determines, through a factfinding procedure, whether imports contributed importantly to decreased sales or production in the candidate's company and, thereby, to layoffs. If so, the petition is granted. Data are generated that include the number of workers certified, by four-digit SIC industry. Thus, it is possible to determine how well this administrative determination of trade sensitivity, which involves surveying the petitioning firms' customers to ascertain whether they have switched to buying products that were imported, compares with the measures of import penetration used in the analysis presented in this article. Such information is important to know from a policy perspective, because of the ongoing debate regarding whether workers displaced as a result of NAFTA or GATT trade liberalizations will actually be covered and served in a timely manner under the Trade Adjustment Assistance program. It takes from 60 to 90 days for the Department of Labor, using current investigative procedures, to determine whether a job cutback at the firm level was due to an increase in imports.

Exhibit 2. **History of Trade Adjustment Assistance program**

Legislation	Major features	Comments
Trade Expansion Act of 1962	Created Trade Adjustment Assistance program: workers losing jobs because of trade concessions are entitled to receive income support, training, and relocation benefits.	Very few petitions were approved, because trade liberalization, not import competition, had to be the main source of job loss.
Trade Act of 1974	Eased eligibility criteria for the program and enriched the benefit package. Those qualifying could receive cash benefits on top of unemployment insurance, up to 70 percent of the previous wage, for 52 weeks. Job search assistance was added.	Resulted in a significant increase in the number of petitions submitted and approved.
Omnibus Budget Reconciliation Act of 1981	Called for termination of the program in 1983, reduced the level of cash benefit to the unemployment insurance level, and stipulated that payment could begin only after unemployment insurance benefits were exhausted.	Resulted in a decline in the number of petitions received. Approval rate also declined because of more stringent certification (later rescinded).
Public Law 98–120	Extended the program through 1985.	.....
Deficit Reduction Act of 1984	Increased the availability of training allowances and the levels of job search and relocation benefits.	.....
Consolidated Omnibus Budget Reconciliation Act of 1985	Reauthorized the program retroactively through 1991. Required all workers to participate in a job search program to receive benefits.	.....
Omnibus Trade and Competitiveness Act of 1988	Extended the program through 1993 and expanded it to include oil and gas industries engaged in exploration. Required all workers to enter a training program to receive benefits.	Expanded program to include supplier industries, contingent upon the imposition of an import fee to fund the cost of this extension. The fee was never imposed.

Table 5 shows the number of workers certified for trade adjustment assistance, by two-digit manufacturing industry. In the 1982–87 period, more than 250,000 workers were certified, and about 95 percent of all certifications affected manufacturing industries. Two-thirds of certified workers were in durable goods industries, especially primary metals, transportation equipment, and machinery. Nondurable goods industries, such as apparel and leather, also had large numbers of certified workers.

As a measure of how the Trade Adjustment Assistance program performs, it is important to know how many of the workers who were displaced because of trade were actually served by the program. There is no precise measure of need, so a proxy measure must be developed. Because a job loser must exhaust unemployment insurance benefits, which typically can be received for 26 weeks, to be eligible for trade adjustment assistance, the number of long-term unemployed job losers would be a good estimate of the upper bound of need. Table 5 shows the number of unemployed wage and salary workers with a duration of unemployment of 26 weeks or longer, by industry of their longest held job. About 6 percent of unemployed factory workers with durations of unemployment of 26 weeks or longer were certified for trade adjustment assistance in the 1982–87 period. Among the two-digit manufacturing industries that were deemed import sensitive (machinery, miscellaneous manufacturing, apparel, and leather), about 9 percent of the long-term unemployed were certified for assistance. The two-digit manufacturing industries with the highest percentage of long-term unemployed who were certified for trade adjustment assistance were leather (30 percent), primary metals (19 percent), apparel (12 percent), and electrical machinery (10 percent).

Of all two-digit industries, leather had the largest share of certified workers. Significantly, it also had the highest import penetration rate over the 1982–87 period. Other two-digit industries reporting both a large share of certified workers and high import penetration rates were apparel and electric and electronic machinery. Steel (14.1 percent) and autos (6.3 percent), each with a sizable proportion of workers certified for trade adjustment assistance relative to all manufacturing (1.4 percent),

Table 5. **Long-term unemployment and certification for trade adjustment assistance, by two-digit manufacturing industries, 1982–87**

SIC	Industry	Long-term unemployed, 1982–87 cumulative[1]	Workers certified for trade adjustment assistance		Percent distribution of worker certifications	Percent of petitions certified
			Number, 1982–87 cumulative	Percent of unemployed		
	Manufacturing	4,699,000	267,946	5.7	100.0	42.3
	Durable goods	2,779,000	182,836	6.6	68.2	36.0
24	Lumber and wood products	285,000	2,877	1.0	1.1	42.7
25	Furniture and fixtures	157,000	2,026	1.3	.8	66.6
32	Stone, clay, and glass products	139,000	5,992	4.3	2.2	45.3
33	Primary metal industries	258,000	48,567	18.8	18.1	36.2
34	Fabricated metal products	347,000	11,512	3.3	4.3	38.6
35	Machinery, except electrical	528,000	32,781	6.2	12.2	37.7
36	Electrical and electronic equipment	383,000	30,655	10.2	11.4	42.4
37	Transportation equipment	435,000	35,981	8.3	13.4	17.5
38	Instruments and related products	83,000	7,186	8.7	2.7	52.5
39	Miscellaneous manufacturing	164,000	5,259	3.2	2.0	62.2
	Nondurable goods	1,919,000	85,110	4.4	31.8	50.5
20	Food and kindred products	606,000	1,419	.2	.5	16.4
21	Tobacco products	22,000	60	.3	.02	33.3
22	Textile mill products	147,000	4,065	2.8	1.5	28.7
23	Apparel and other textile products	340,000	39,817	11.7	14.9	51.0
26	Paper and allied products	88,000	1,065	1.2	.4	40.6
27	Printing and publishing	247,000	621	.3	.2	57.1
28	Chemicals and allied products	182,000	4,214	2.3	1.6	36.9
29	Petroleum and coal products	26,000	635	2.4	.2	20.7
30	Rubber and miscellaneous plastics products	177,000	8,193	4.6	3.1	50.7
31	Leather and leather products	84,000	25,021	29.8	9.3	74.7

[1]Industry of longest held job for unemployed with work experience as wage and salary workers with duration of unemployment of 26 weeks or longer.

SOURCE: Employment and Training Administration, *Trade Adjustment Assistance, Summary Report by SIC from January 1, 1982 to December 31, 1987* (unpublished); and BLS tabulations from the CPS.

had above-average import penetration rates, but were just below the threshold rates for classification as import sensitive. One exception was the miscellaneous manufacturing industry, where the relationship between the share of workers certified for assistance and import penetration was weak. Although the industry had both a high level and a high growth rate of import penetration during 1982–87, only a moderate share of its work force was certified.

Interestingly, workers in miscellaneous manufacturing, including jewelers, dollmakers, those involved with sporting goods, and manufacturers of musical instruments, did not often petition the Department of Labor for trade adjustment assistance. But when they did, the certification had a good chance of being granted. Nearly two-thirds of the petitions submitted in miscellaneous manufacturing were certified, a rate surpassed only by the leather industry rate of 75 percent. The transportation equipment industry posted the lowest certification rate, particularly for auto workers, among whom only about 18 percent of those petitioning for assistance from 1982 to 1987 received certification.

Industries identified as import sensitive by the Department of Labor correlate with industries deemed import sensitive in this study. At the four-digit industry level, there was a positive relationship ($r = 0.34$) between the percentage of workers in an industry certified for trade adjustment assistance and the import sensitivity level of that industry. Also, the relationship between the size of the change in employment in an industry and the percentage of workers certified was negative ($r = -0.29$). This implies that the Department of Labor certification procedure captures the notion of trade sensitivity. Further, these results indicate that perhaps more use of import penetration measures would facilitate the certification process.[23]

Conclusion

U.S. trade of merchandise, as a percent of gross national product, increased over the 1982–87 period, and the trade deficit worsened. Import activity in the 1980's exceeded that in the 1970's. The number and proportion of high-wage machinery industries that were import sensitive increased, although most import-sensitive industries still were found among the lower wage apparel and leather groups. Thus, there is a sizable and growing number of import-sensitive industries that could be adversely affected by a more open international trading environment (assuming that U.S. manufacturers compete specifically with low-wage foreign industries). Export-sensitive industries—particularly food, chemicals, and aircraft equipment—are the likely beneficiaries of increased market access in a more open world trading structure.

Workers in import-sensitive manufacturing industries were more likely than those in export-sensitive industries to be women, young, Hispanic, black, part time, and nonunionized, and less likely to be college graduates and to hold professional, managerial, or technical jobs. This suggests that, except for youth, the workers most likely to lose their jobs in a more open trading environment are those who have the most difficulty relocating. Studies have shown that women, blacks, older workers, and less educated workers experience longer spells of unemployment than do other workers.[24]

Because industries with a large proportion of Trade Adjustment Assistance recipients were also deemed import sensitive using penetration rate measures, more use of readily available measures of import penetration would shorten the time it takes to process petitions. This is an important factor to those needing benefits and to officials trying to plan budgets. However, it is noteworthy that less than 10 percent of workers who were potentially eligible for employment assistance were certified.

Average hourly earnings were higher in job-losing than in job-gaining industries for the 1982–87 period, which is consistent with the sharply curbed growth in earnings in manufacturing during the 1980's. While export-sensitive industries, in which earnings are higher than in import-sensitive industries, will likely gain jobs from new open-trade agreements, these jobs are subject to the wage restraints that are generally prevalent in our intensely competitive international environment. It will be interesting to see how the competitive pressures, coupled with a fairly strong union presence in many export-sensitive industries, play when collective bargaining agreements are renegotiated in the 1990's.

Trends in export-sensitive industries toward higher proportions of managers, professionals, technicians, and craft artisans, and in import-sensitive industries toward jobs requiring lesser skills, seem to fit the dichotomy of a choice between high skills and low wages. In 1990, a nonpartisan commission found that most firms still organize work in a way that does not require high levels of skill.[25] New forms of work organization to accommodate more frequent product innovations call for a higher skilled and educated work force. Workers in export-oriented industries fall into the latter category, while, to some extent, import-sensitive industries still promote the low-wage, standardized production approach. To take full advantage of a more open international trading environment, export-oriented industries must secure a quality work

force and must reorganize work to allow for more worker input and job rotation. Work organization is especially important to import-sensitive industries that cannot compete on wages alone. □

Footnotes

ACKNOWLEDGMENT: The author thanks Robert Shelburne and John Bloomquist for assistance in preparing the data and providing background information.

[1] Gregory K. Schoepfle, "Imports and domestic employment: identifying affected industries," *Monthly Labor Review*, August 1982, pp. 13–26.

[2] Schoepfle, "Imports and domestic employment."

[3] See D. A. Macpherson and J. B. Stewart, "The Effect of International Competition on Union and Nonunion Wages," *Industrial and Labor Relations Review*, April 1990, pp. 434–46; C. Lawrence and R. Z. Lawrence, "Manufacturing Wage Dispersion: An End Result Game," *Brookings Papers on Economic Activity, 1* (Washington, The Brookings Institution, 1985); A. C. Orr and J. A. Orr, "Job cuts are only one means firms use to counter imports," *Monthly Labor Review*, June 1984, pp. 39–41; and G. M. Grossman, *The Employment and Wage Effects of Import Competition in the United States* (National Bureau of Economic Research, December 1982), Working Paper No. 1041.

[4] Average hourly earnings cited for the trade groupings and time periods are based on the author's calculations, using CES data.

[5] Basically, the rule employed was the same as that used by Schoepfle. For a detailed discussion of the conceptual and measurement-related difficulties involved in comparing domestic output and employment data with commodity trade data, see Schoepfle, "Imports and domestic employment," pp. 24–26.

[6] "Trade Adjustment Assistance," special tabulation prepared for Bureau of International Labor Affairs by Employment and Training Administration, 1991.

[7] Schoepfle, "Imports and domestic employment," p. 20.

[8] *Ibid.*

[9] Including the automobile industry (SIC 3711) on the list of import-sensitive industries would not change the results or conclusions of this article.

[10] Typically, although international trade does not have a major impact on the total number of jobs generated in the U.S. economy, it does have an effect on the industrial and geographical distribution of jobs. Job growth depends more on the level of aggregate demand set by monetary and fiscal policy than on particular components of that demand. Factors that determine the effect of trade on employment include the exchange rate, productivity levels, and the flexibility of wages. Also, there are secondary effects whereby, for example, a decline in the import of a product may lower employment in industries associated with servicing and selling that product or in industries where the imported product is an important input. Sorting out the importance of each of these factors is beyond the scope of this article.

[11] The average hourly earnings for each manufacturing industry group were calculated by (1) multiplying (weighting) the average hourly earnings per production worker by the number of production workers for each four-digit industry in the group, (2) totaling the results (products), and (3) dividing the total by the number of production workers in the entire group of four-digit industries. For example, the average hourly earnings in industries that both were import and export sensitive and also reported job increases from 1982 to 1987 were calculated as follows:

1972 SIC	*Hourly earnings*	*Production workers*	*Weighted earnings*
	(1)	(2)	(1) x (2)
3635	$9.60	22,100	$212,160
3693	9.80	16,100	157,780
3915	6.80	6,000	40,800
Totals		44,200	$410,740

Average earnings = $410,740/44,200 = $9.29 ($9.30, rounded).

That is, average hourly earnings in each industry were weighted by the number of production workers in that industry. Further weighting by average weekly hours could have been done, especially if there were a significant differential in the percentage of each industry's job total that was part time. However, jobs in the manufacturing industry are predominantly full time, so no further weighting was necessary. Official BLS hourly earnings data for industry groups are determined using both weekly hours and number of production jobs.

[12] L. R. Katz and L. Summers, *Can Inter-industry Wage Differentials Justify Strategic Policy?* (National Bureau of Economic Research, October 1988), Working Paper No. 2379.

[13] Macpherson and Stewart, "The Effect of International Competition"; Lawrence and Lawrence, "Manufacturing Wage Dispersion"; Orr and Orr, "Job cuts"; and Grossman, "Employment and Wage Effects."

[14] L. R. Katz, "The Impact of Trade on Industry Labor Markets," in R. B. Freeman, ed., *Immigration, Trade, and the Labor Market* (Cambridge, MA, National Bureau of Economic Research, 1988), pp. 22–28.

[15] The direction of change of all correlation coefficients discussed in this article is reported at a 90-percent level of statistical confidence.

[16] "Katz, The Impact of Trade."

[17] The data for each import- and export-sensitive industry are available from the author on request.

[18] Katz and Summers, *Can Inter-industry Wage Differentials*, p. 32; and C. M. Aho and J. A. Orr, "Trade-sensitive employment: who are the affected workers?" *Monthly Labor Review*, February 1981, pp. 29–35.

[19] R. W. Bednarzik and J. A. Orr, "The Effectiveness of Trade-Related Worker Adjustment Policies in the United States" (U.S. Department of Labor, Bureau of International Labor Affairs, 1984), Economic Discussion Paper No. 15.

[20] W. Corson, W. Nicholson, D. Richardson, and A. Vayda, "Survey of Trade Adjustment Recipients" (U.S. Department of Labor, Bureau of International Labor Affairs, 1979), Contract Report No. J9K70010.

[21] L. Jacobson, "The Trade Adjustment Assistance (TAA) Program in Pennsylvania 1979–89: The Effect of Economic Conditions, UI and TAA Program Changes on Benefit Receipt, and the Ability of UI and TAA to Offset Earnings Losses," unpublished paper, W. E. Upjohn Institute for Employment Research, October 1991.

[22] *Ibid.*

[23] *Dislocated Workers: Improvements Needed in Trade*

Adjustment Assistance Certification Process, GAO/HRD–93–36 (General Accounting Office, Human Resources Division, October 1992).

[24] Report of the Secretary of Labor's Task Force, *Economic Adjustment and Worker Dislocation in a Competitive Society* (U.S. Department of Labor, December 1986).

[25] Report of the Commission on the Skills of the American Workforce, *America's Choice: High Skills or Low Wages* (Rochester, NY, National Center on Education and the Economy, June 1990).

Migration decisions

The U.S. population is relatively mobile, certainly more so than in most other developed countries. Household migration decisions are based on a host of factors: demographics, wages, job opportunities, local amenities, government services and taxes, climate, culture, and proximity to family. Of these factors, age has consistently been shown to be the single most important factor in determining who migrates. Studies show that the peak mobility years are ages 22 to 24, when nearly 20 percent of this age group migrates across county or State lines. By age 30, only 10 percent of this population segment migrates. Education is the single best predictor of who will move within an age group. However, it is not simply more education that increases the likelihood of a move; rather, it is a college education, per se, that makes migration more likely.

—Randall W. Eberts and Joe A. Stone

Wage and Employment Adjustment in Local Labor Markets (Kalamazoo, MI, W. E. Upjohn Institute for Employment Research, 1992), p. 18.