IMPACT OF 1980-82 CHANGES IN TRADE RATIOS ON OUTPUT AND EMPLOYMENT IN SELECTED INDUSTRIES

Purpose

Historically net U.S. exports have tended to decline following most recessions. The decline since the 1980-82 recession has been particularly sharp and has been a source of wide-spread concern.

This paper focuses on and is limited to the question of what would have happened to shipments and employment in selected manufacturing industries and in manufacturing as a whole in 1982, if exports/shipments [1/] ratios and import penetration ratios had remained the same in 1982 as in 1980, which was a peak year in terms of net U.S. exports. The import penetration ratio is defined as imports divided by apparent consumption. [2/] This type of analysis is useful in identifying specific industries that are significantly affected by changes in trading patterns in the short run. Although in the long run, losses in some adversely affected industries may be made up by gains in some others, the overall impacts on output and employment in the U.S. economy are not examined in this paper.

The procedure used for this analysis was to take domestic apparent consumption of manufactured products in 1982 as given and compute what hypothetical shipments, exports, and imports would have been in 1982 if:

-- imports had supplied the same fraction of domestic apparent consumption in 1982 as they did in 1980; and

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1/ Shipments are value of domestic output plus or minus inventory changes.

2/ Apparent consumption equals shipments plus imports minus exports.

-- exports were the same fraction of shipments in 1982 as in 1980.

Actual shipments in 1982 were lower than the computed hypothetical shipments by $22.7 billion, or by about one percent. This, in turn, implies roughly a quarter million fewer manufacturing jobs than if trade ratios had remained at the 1980 levels. This difference is equivalent to about 1 percent of all manufacturing employment in 1980 and about 16 percent of the decline in manufacturing jobs from 1980 to 1982. (See Table 4). The steel, aircraft, and electronic computing equipment industries exhibited the most pronounced adverse effects. Modest positive effects of changes in trade ratios were found for the aircraft equipment, n.e.c. (not elsewhere classified), construction machinery, and farm machinery industries.

Procedure and Limitations

Hypothetical 1982 shipments were computed, as indicated earlier, by assuming that the import penetration ratios and exports to shipments ratios were the same in 1982 as in 1980. The effects of the changes in the ratios on direct employment in total manufacturing and 15 selected industries were then estimated individually based on the difference between actual and hypothetical shipments in 1982. 3/ Fifteen industries were selected for illustrative individual study (see Table 1) on the basis of their major roles in U.S.- foreign

3/ No attempt was made to estimate the effects that the changes in the manufacturing sector had on other sectors of the economy, or the economy as a whole.

trade. They accounted for about 40 percent of total exports and imports of manufactured products in 1981. Nine of these industries were among the leading 20 industries in both the value of exports and the value of imports. The other six industries were among the top 20 in either the value of exports or the value of imports. 4/

The indirect employment effects on other industries were estimated for the 15 industries on the basis of historical industry input-output relationships and employment-output relationships. Indirect effects reflect the output and employment created in other industries which supply goods and services to the industries examined.

The procedure used for this study involves several simplifying assumptions. The first assumption is that a dollar's worth of change in exports has the same effect on output and employment as a dollar's worth of change in imports within a particular industry. The second assumption is that the price movements of shipments, imports, and exports between 1980 and 1982 were similar within each industry. The realism of these assumptions varies widely from industry to industry and requires analysis which goes well beyond the limited scope of this paper.

This study does not address the causes of changes in the exports to shipments ratios or the import penetration ratios. Nor does this study take into account the effects on the selected industries of changes in exports by other industries whose products embody part of

4/ U.S. Department of Commerce, Bureau of Industrial Economics, 1983 U.S. Industrial Outlook (January, 1983), Table 4 (p. xxv) and Table 6 (p. xxvii).

the output of these industries. Therefore, the total effects on output and employment in these industries, resulting from changes in U.S. trade balances, are not revealed in this study.

A Caveat

Changes in trading patterns and trading ratios are an integral part of the dynamic economic process. They occur as a result of changes in comparative advantage among trading nations. Analyzing the effect of changes in trade ratios does not imply that these ratios should be restored to their former values through some specific policy measures. This paper focuses only on the industry-specific effects and ignores the effects on the aggregate economy. These macro considerations are important, but they were beyond the scope of this paper. For example, rising imports do not necessarily imply lower aggregate output in this country; imports often enhance domestic output. A rise in imports permits greater domestic consumption and even investment in some sectors of the economy. Also, the increasing trade deficit and capital inflow in recent years may have moderated interest rates in this country, thereby benefiting some interest-sensitive U.S. industries.

Changes in Trade Ratios

Table 1 shows the import penetration ratios and the exports to shipments ratios for the selected industries. The import

penetration ratios increased for 12 of the 15 industries between 1980 and 1982. The exports to shipments ratios increased for four industries and decreased for the remaining eleven.

The dollar volume of imports in these industries grew substantially from 1980 to 1982 while exports declined. In current dollars, actual exports decreased by $1.1 billion or roughly 2.0 percent, while imports increased by $8.3 billion or 18.2 percent (see Table 2).

The import penetration ratio for all manufactured products increased from 8.1 percent in 1980 to 8.8 percent in 1982. Meanwhile, the exports to shipments ratio decreased from 9.0 percent to 8.7 percent. The total value of actual manufactured exports declined by half a billion dollars during this period while actual imports rose by nearly 21 billion dollars.

Impacts on Shipments and Employment

Table 3 shows the effects of the 1980-82 changes in import penetration ratios and exports to shipments ratios on 1982 shipments and employment. Actual changes and computed hypothetical changes in employment are shown in Table 4. Figure 1 shows a comparison of changes in actual employment during the 1980-82 period with hypothetical changes in direct employment attributable to the 1980-82 changes in trade ratios. The net effect of the changes in the trade ratios on the 15 selected industries was that product shipments in 1982 were lower by $13.2 billion, and consequently,

Table 1

U.S. Trade Ratios, 1980 and 1982

Product Group	Import Penetration Ratios 1/ 1980	Import Penetration Ratios 1/ 1982	Exports/Shipments Ratios 1980	Exports/Shipments Ratios 1982
Motor vehicles 2/	20.9%	21.4%	4.7%	3.5%
Motor vehicle parts 2/	7.1	8.0	7.3	7.7
Aircraft	6.4	7.1	39.4	33.2
Aircraft equipment, n.e.c.	12.5	17.7	35.7	42.1
Construction machinery	7.4	12.6	38.5	42.4
Farm machinery	16.1	13.8	22.2	24.3
Oil field machinery	1.2	1.2	50.2	49.2
Steel mill products	11.7	15.9	4.7	3.3
Industrial organic chemicals, n.e.c.	5.0	4.2	16.4	15.3
Electronic computing equipment	6.0	8.3	29.1	26.1
Semiconductors	34.5	36.7	36.2	34.6
Radio and TV communication equipment	5.1	6.8	8.5	8.0
Radio and TV receiving sets	52.2	57.7	19.7	14.5
Photographic equipment and supplies	12.8	13.2	17.1	14.7
Paper and paperboard	11.1	10.6	7.5	6.3
All Manufacturing	8.1	8.8	9.0	8.7

1/ The Import Penetration Ratio is the ratio of imports to apparent consumption (shipments plus imports minus exports).

2/ Trade between the United States and Canada is excluded from the calculations for motor vehicles and parts because of the integrated nature of the automobile industry in the two countries.

Source: U.S. Department of Commerce, Bureau of Industrial Economics.

Table 2

U.S. Exports and Imports of Manufactured Products
Selected Industries and All Manufacturing - 1980 and 1982

SIC CODE	Industry (Product Group)	1980 Exports (millions)	1980 Imports (millions)	1980 Balance (millions)	1982 Exports (millions)	1982 Imports (millions)	1982 Balance (millions)	1980-1982 Net Change (millions)
3711	Motor vehicles 1/	$2,896	$15,453	$-12,557	$2,211	$16,529	$-14,318	$-1,761
3714	Motor vehicle parts 1/	2,615	2,516	99	2,876	3,031	-155	-254
3721	Aircraft	9,206	970	8,236	7,236	1,160	6,076	-2,160
3728	Aircraft equipment, n.e.c.	3,555	917	2,638	4,401	1,320	3,081	443
3531	Construction machinery	5,742	736	5,006	3,968	779	3,189	-1,817
3523	Farm machinery	2,631	1,773	858	2,378	1,180	1,198	340
3533	Oil field machinery	3,271	38	3,233	5,130	65	5,065	1,832
3312, 5,6,7	Steel mill products	2,557	6,887	-4,330	1,601	8,958	-7,357	-3,027
2869	Industrial organic chemicals, n.e.c.	4,443	1,190	3,253	4,387	1,055	3,332	79
3573	Electronic computing equipment	7,468	1,159	6,309	8,957	2,295	6,662	353
3674	Semiconductors	3,422	3,183	239	3,769	4,128	-359	-598
3662	Radio and TV communication equip.	1,971	1,139	832	2,402	2,022	380	-452
3651	Radio and TV receiving sets	1,107	4,919	-3,812	765	6,150	-5,385	-1,573
3861	Photographic equipment and supplies	2,394	1,698	696	2,390	2,107	283	-413
2621, 31,61	Paper and paperboard	2,059	3,159	-1,100	1,766	3,291	-1,525	-425
	Totals	$55,337	$45,737	$9,600	$54,237	$54,070	$ 167	$-9,433
	All manufacturing 2/	$166,157	$148,137	$18,020	$165,711	$168,756	$3,045	-$14,975

1/ Trade between the United States and Canada is excluded from the calculations for motor vehicles and parts.

2/ Excludes imports and exports of gold bullion and products that are not allocated to 4-digit SIC industries.

Source: U.S. Department of Commerce, Bureau of Industrial Economics.

Table 3

Effects of Changes in Trade Ratios Between 1980 and 1982
on Domestic Industry Shipments and Employment in 1982

Product Group	1982 Product Shipments			1982 Employment Effects 3/		
	Actual 1/ (millions)	Computed 2/ (millions)	Difference (millions)	Direct	Indirect	Total
Motor vehicles (3711) 4/	$62,830	$64,053	$-1,223	-4,491	-18,413	-22,904
Motor vehicle parts (3714) 4/	37,500	37,760	-260	-2,419	-4,828	-7,247
Aircraft (3721)	21,791	25,249	-3,458	-37,878	-37,764	-75,642
Aircraft equipment, n.e.c.(3728)	10,469	10,169	300	4,246	4,233	8,479
Construction machinery (3531)	9,366	9,303	63	687	898	1,585
Farm machinery (3523)	9,779	9,249	530	5,410	8,521	13,931
Oil field machinery (3533)	10,432	10,653	-221	-1,605	-2,098	-3,703
Steel mill products (3312,5,6,7)	48,870	52,082	-3,212	-22,561	-35,828	-58,389
Industrial organic chemicals, n.e.c. (2869)	28,675	28,804	-129	-393	-834	-1,227
Electronic computing equip.(3573)	34,335	36,694	-2,359	-21,952	-33,631	-55,583
Semiconductors (3674)	10,888	11,538	-650	-9,089	-8,207	-17,296
Radio and TV communication equipment (3662)	30,100	30,830	-730	-10,739	-12,994	-23,733
Radio and TV receiving sets(3651)	5,267	6,342	-1,075	-8,833	-17,287	-26,120
Photographic equipment and supplies (3861)	16,300	16,856	-556	-3,417	-4,924	-8,341
Paper & paperboard (2621,31,61)	29,450	29,674	-224	-1,326	-2,328	-3,654
Totals	$366,052	$379,256	$-13,204	-114,360	-165,484	-279,844
All Manufacturing	$1,910,100	$1,932,822	$-22,722	-224,210	5/	

Standard Industrial Classification Codes in parentheses.

1/ Actual 1982 product shipments for the individual industries are estimated by the Bureau of Industrial Economics; 1982 Census data are not yet available.

2/ Computed 1982 shipments are the amounts that would have been shipped by domestic industries if the trade ratios had not changed between 1980 and 1982.

3/ Employment effects represent the estimated number of jobs lost or gained in 1982 because of the changes in trade ratios between 1980 and 1982.

4/ Trade between the United States and Canada is excluded from these calculations.

5/ Estimates of indirect employment effects are not available for all manufacturing. However, the direct employment estimate includes all employment, both direct and indirect, that is attributable to industries in the manufacturing sector.

Source: U.S. Department of Commerce, Bureau of Industrial Economics.

Table 4

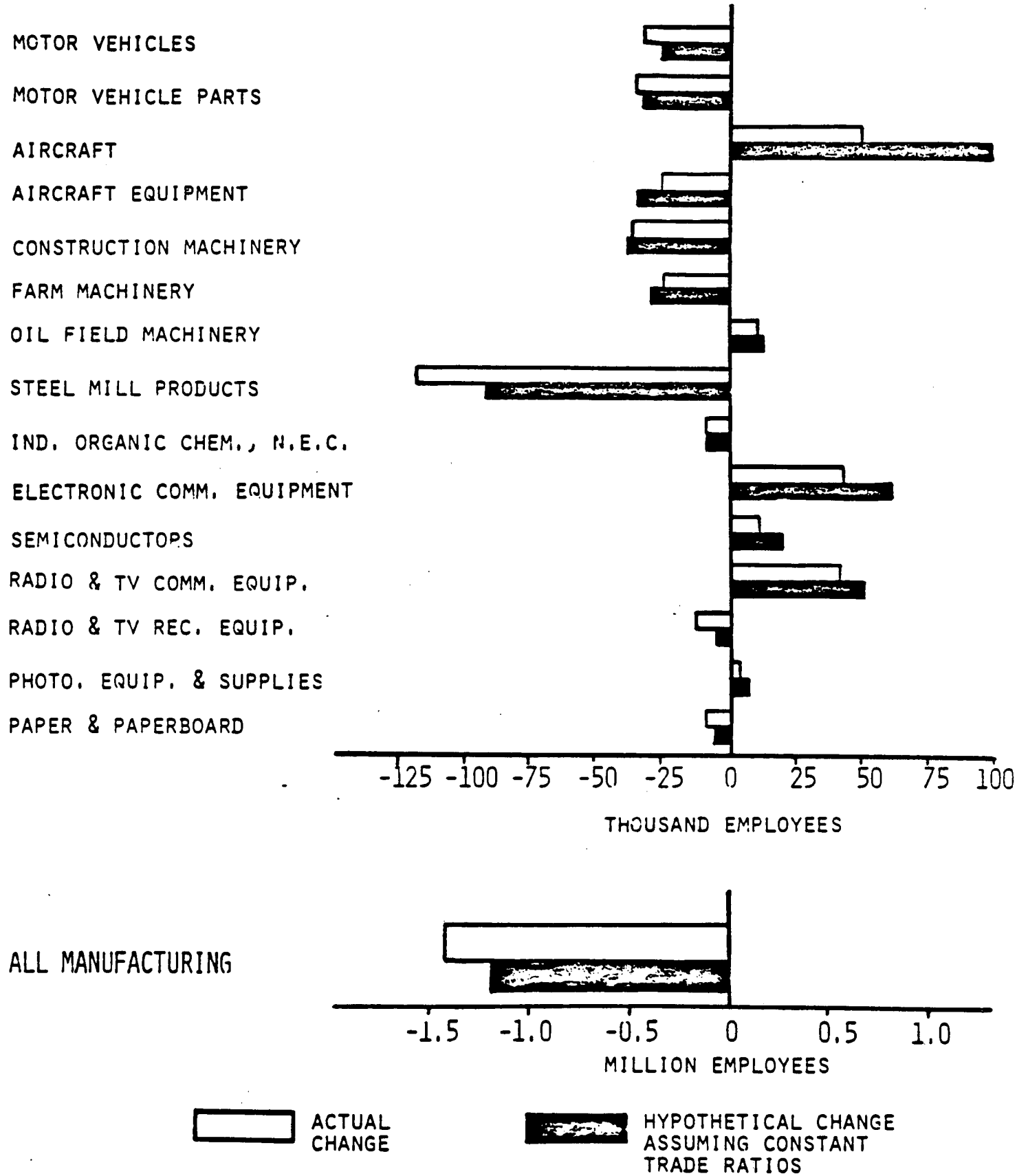
Industry Direct Employment, 1980 and 1982 and Changes in Actual and Hypothetical Direct Employment Between 1980 and 1982

SIC CODE	Industry	Industry Employment				
			Actual		Hypothetical	
		1980 (000's)	1982 (000's)	1980-1982 Change (000's)	1982 (000's)	1980-82 Change (000's)
3711	Motor vehicles	274	244	-30	248	-26
3714	Motor vehicle parts	369	322	-47	324	-45
3721	Aircraft	231	280	49	318	87
3728	Aircraft equipment, n.e.c.	159	134	-25	130	-29
3531	Construction machinery	158	111	-47	110	-48
3523	Farm machinery	133	109	-24	104	-29
3533	Oil field machinery	79	90	11	92	13
3312, 5,6,7	Steel mill products	481	365	-116	388	-93
2869	Industrial organic chemicals, n.e.c.	117	109	-8	109	-8
3573	Electronic computing equipment	305	346	41	368	63
3674	Semiconductors	161	172	11	181	20
3662	Radio and TV communication equipment	413	453	40	464	51
3651	Radio and TV receiving sets	65	53	-12	62	-3
3861	Photographic equipment and supplies	114	117	3	120	6
2621, 31,61	Paper and paperboard	201	192	-9	193	-8
	Totals	3,260	3,097	-163	3,211	-49
	All manufacturing[1/]	20,285	18,853	-1,432	19,077	-1,208

1/ Bureau of Labor Statistics data.

Source: U.S. Department of Commerce, Bureau of Industrial Economics.

FIGURE 1. ACTUAL EMPLOYMENT CHANGE COMPARED WITH HYPOTHETICAL EMPLOYMENT CHANGE RESULTING FROM CHANGES IN TRADE RATIOS, 1980-82



SOURCE: U.S. DEPARTMENT OF COMMERCE, BUREAU OF INDUSTRIAL ECONOMICS

direct employment in these industries declined by over 114,000. Indirect employment was reduced by an additional 165,000 jobs.

Changes in the trade ratios had the largest impact on the aircraft industry. The import penetration ratio for aircraft increased, while the exports to shipments ratio declined. The total effects were to reduce aircraft industry shipments by $3.5 billion in 1982 and to reduce the total number of jobs by about 75,600.

The U.S. aircraft industry's share of the world market for large transport aircraft declined to 80 percent in the 1981-1982 period, from an average share of about 90 percent during the previous ten-year period.

The next largest impact of the changes in the trade ratios was on the steel industry. The import ratio for steel mill products increased while the export ratio declined. Consequently, steel shipments were reduced by $3.2 billion and total employment was reduced by about 58,400 jobs.

The competitiveness of the U.S. steel industry has been gradually declining for more than a decade. High labor costs for domestic producers and the growth of modern, efficient production capacity in Japan and some of the developing countries contributed to the decline. Government subsidies for some of the high-cost European producers have also been a factor. The industry was particularly adversely affected by a sharp world-wide reduction in demand for steel during the 1980-82 period.

The effect of the 1980-82 changes in the trade ratios on the motor vehicles and parts industries was to reduce combined shipments by $1.5 billion and total employment by about 30,000 jobs. (Trade between the U.S. and Canada is excluded from these calculations because of the integrated nature of the automobile industry in the two countries.) Imports have been capturing a rising share of the U.S. automobile market for over a decade. This trend accelerated after the sharp rise in gasoline prices in 1979, when consumers' preferences shifted markedly toward more fuel-efficient smaller cars.

Changes in the trade ratios resulted in a $2.4 billion decrease in shipments by the electronic computing equipment industry. This drop in output resulted in a total reduction of nearly 56,000 jobs in the U.S. economy. Between 1972 and 1980, exports and imports of computing equipment rose at fairly comparable rates, 24 percent and 27 percent, respectively. However, between 1980 and 1982, computer imports increased five times faster than exports and captured over 8 percent of the U.S. market. Japan contributed the bulk of this growth in imports. It increased its total share of U.S. imports from 16 to 35 percent. Domestic manufacturers appear vulnerable to future foreign competition across a wide spectrum of computer equipment, but particularly in high-volume, low-cost products such as personal computers and associated peripheral equipment. The principal challenge in U.S. and world markets will come from Japanese producers.

Some other high technology industries among this group of selected industries also were adversely affected by deteriorating

trade ratios between 1980 and 1982. In addition to the aircraft industry and the electronic computing equipment industry, there were substantial effects on output and employment in the semiconductor industry, radio and TV communication equipment industry, and the photographic equipment industry. 5/

Three of the 15 selected industries had increases in output and employment as a result of changes in the trade ratios between 1980 and 1982. These industries were aircraft equipment, n.e.c., farm machinery, and construction machinery. The total impact was to increase output in these industries by $0.9 billion and direct employment by about 10,000. 5/

For total manufacturing, the 1980-82 changes in the trade ratios resulted in a net decrease of $22.7 billion in 1982 shipments with an associated loss of manufacturing employment of about 224,000 jobs. Some additional employment was lost among nonmanufacturing industries which supply goods and services to the manufacturing industries. However, estimates of these additional jobs are not available. The actual loss of jobs in all manufacturing between 1980 and 1982 was 1.4 million. If the trade ratios had not deteriorated during this period, the loss would have been smaller by nearly a quarter million jobs.

5/ Developments in these, and the other selected industries are discussed in more detail in the Appendix.

Implications

This analysis has the following implications for the manufacturing sector:

- Deteriorating U.S. trade ratios during the 1980-82 period added to the declines in manufacturing output and employment that were already being caused by the recession.
- Even the high technology sectors are not immune to the internal and external forces that have caused U.S. trade balances to deteriorate in recent years.