

John A. Tatom

John A. Tatom is an assistant vice president at the Federal Reserve Bank of St. Louis. Anne M. Grubish and Kevin L. Kliesen provided research assistance.

The Link Between the Value of the Dollar, U.S. Trade and Manufacturing Output: Some Recent Evidence

OBSERVERS widely believe that the decline in the dollar's value against foreign currencies, which began in 1985, has boosted U.S. manufacturing output significantly. The dollar's decline was expected to raise the dollar prices of U.S. imports while lowering the foreign-currency prices of U.S. exports; in response, the quantity demanded of both U.S. exports and import-competing goods would rise.

This demand-based linkage has been central to analyses of both the international and domestic economic prospects of this nation since early in this decade. The emphasis on an inverse relationship between U.S. output and the value of the dollar became preeminent from 1980 to early 1985, when the dollar's value rose dramatically and when a historically large trade deficit emerged.¹

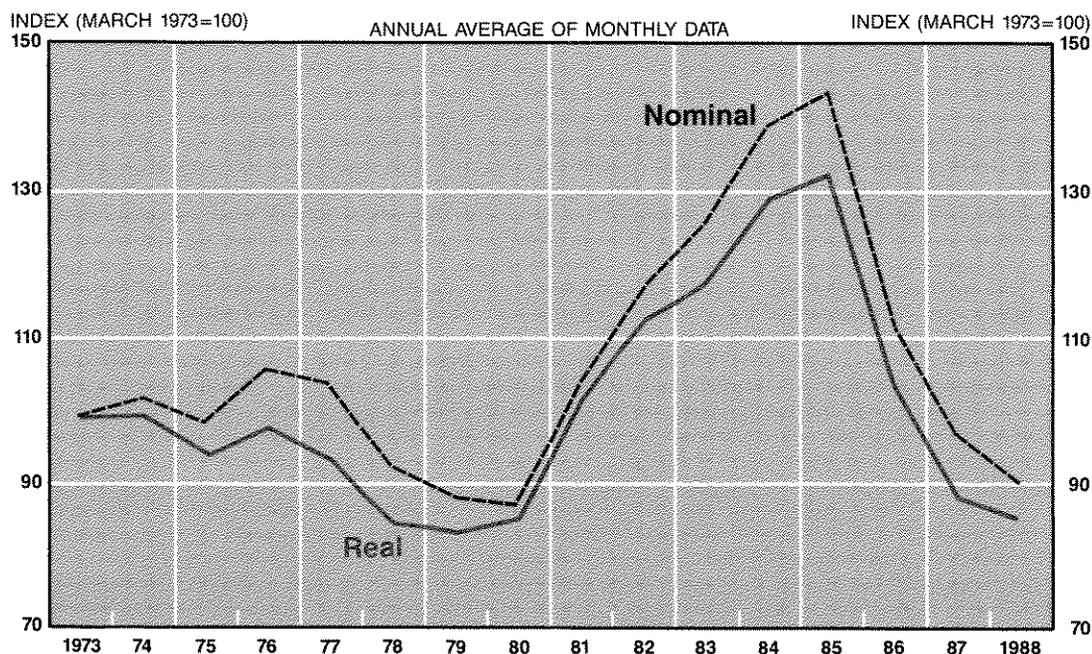
The relevance of this inverse relationship, however, rests on a faulty assumption. Implicit in such analyses is the view that changes in the value of the dollar are independent of U.S. industrial developments rather than being caused by those very changes. When economic policy boosts or retards the productive capacity of the economy, the dominant relationship between the value of the dollar and domestic manufacturing output should be a positive one, so that a rise (or fall) in the value of the dollar is associated with a rise (or fall) in U.S. output.

This article examines whether the U.S. production of manufactured goods in recent years has shown an inverse relationship to movements in the value of the dollar. Its principal focus is whether the industries that are most closely asso-

¹Usually this view is part of a broader analysis of economic policy; see, for example, Meyer (1986), Jonas (1986), *Business Week* (1987), *Business Week* (1988), Peterson (1987) and Summers (1987). Feldstein (for example, 1987 and 1988) has been the most vocal proponent of this view. Examples focusing on the dollar-production linkage include Berry (1986), Deutsch (1988), Revzin (1988) and Hickok, Bell and Ceglowski (1988).

According to Murray (1988), former Federal Reserve Board Chairman Paul Volcker has endorsed the conventional view stating: "We had a great consumer boom in imports that left manufacturing undernourished. Now manufacturing can carry us for the next four years."

Chart 1 Index of the Nominal and Real Trade-Weighted Dollar Exchange Rate



SOURCE: FEDERAL RESERVE BOARD

NOTE: The Real Exchange Rate Measure uses Trade-Weighted Consumer Price Indices. 1988 Data based on average of six months data.

ciated with the growing trade deficit during the period of the rising dollar also exhibited declining output and, in turn, whether their output has been boosted by the general decline in the dollar's value since then.

THE EXCHANGE RATE, PRODUCTION AND TRADE

The dollar's value rose sharply from 1980 to 1985 and subsequently declined; chart 1 shows this movement for measures of both the nominal and real exchange value of the dollar. The real exchange rate is the nominal exchange rate (E) multiplied by the ratio of the U.S. price level (P_{US}) to the foreign price level (P_F).² This rate differs from the nominal exchange rate in that it excludes movements that are attributable to changes in domestic price levels like P_{US} or P_F . For example, suppose that U.S. prices rise X percent while prices abroad

are unchanged. The nominal exchange value of the dollar would have to fall X percent for the dollar prices of both U.S. and foreign goods to rise by X percent and for the foreign prices of both U.S. and foreign goods to be unchanged. When price levels and exchange rates change for such purely monetary reasons, the real exchange rate and decisions about production, consumption and trade are unaffected. Both measures in chart 1 rose sharply from 1980 to 1985, then declined roughly as much as they had risen, however. (References to exchange rate changes below are to both nominal and real changes unless indicated otherwise.)

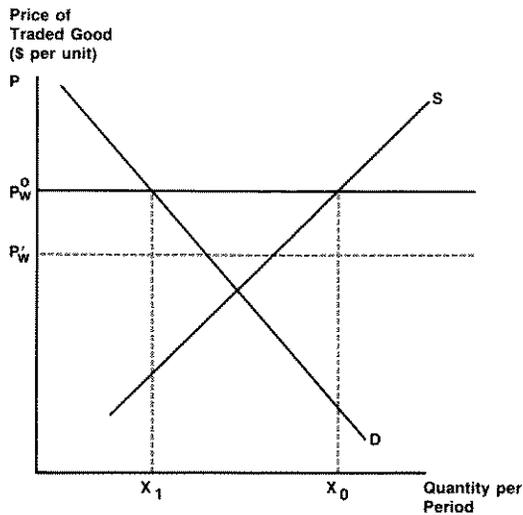
The Conventional Analysis of the Effects of an Exchange Rate Change

A conventional analysis of the effects of a change in the dollar's value on domestic production and trade is shown in figure 1. The supply

²The Federal Reserve Board measures presented in chart 1 use a weighted-average of foreign exchange rates and price levels to construct E and P_F , respectively; the weights are based on shares of trade with the United States. A host of different

measures have been developed with differing weights, baskets of currencies and price indexes, but none shows a different pattern for our purposes.

Figure 1
A Rise in the Value of the Dollar
Reduces Domestic Output



curve (S) shows that the domestic quantity supplied of product (X) will increase if the domestic price of the product rises, given the other factors influencing the position of the curve. The demand curve (D) indicates the quantity demanded domestically at various domestic prices, given the other factors that influence its position. The world price (P_w) and the domestic price are equal when measured in dollars per unit of the product; the world price equals the price in a foreign country measured in its currency units (P^*) divided by the foreign currency price of the dollar (E). The difference between the quantities supplied and demanded domestically is the quantity either exported (when the quantity supplied exceeds that demanded) or imported (when the quantity demanded exceeds that supplied). As drawn in figure 1, the U.S. exports product X at the initial price P_w^0 .

If the value of the dollar (E) rises and the foreign price of the good remains the same, the world price expressed in dollars (P^*/E) is reduced; in figure 1, the price falls to P_w^1 . As a result, the domestic quantity supplied would fall and the domestic quantity demanded would rise, reducing the quantity of X exported. For an imported good, the analysis is the same: when the dollar price falls, U.S. consumption rises, U.S. production falls

and the difference — the quantity imported — increases. Conversely, a fall in the value of the dollar is expected to raise the dollar prices of goods that are traded internationally, providing an incentive to raise domestic production and reduce domestic purchases; in this case, the quantity of traded goods exported will rise and the quantity imported will fall.

From the foreign perspective, the figure and results are the reverse. Thus, when the value of the dollar rises, the world price measured in foreign currency rises, inducing foreigners to produce more traded goods but consume less of them. Thus, a rise in the value of the dollar is expected to redistribute the production of internationally traded goods from the United States to foreign producers. Conversely, when the value of the dollar falls, the U.S. output of these goods is boosted, while foreign output declines.

An Alternative View of Recent Exchange Rate Movements

While there is nothing inherently wrong with the conventional analysis above, its relevance to observed exchange rate movements is questionable. In the analysis in figure 1, the change in the value of the dollar is "exogenous," or external to the domestic factors that influence the supply and demand curves. The dollar's value, however, is determined in currency markets in which the demand for dollars in foreign exchange is motivated by factors influencing foreign demand for U.S. exports and assets, while the supply of dollars in foreign exchange is motivated by U.S. decisions to purchase foreign goods or assets. If changes in incentives in asset markets raise (lower) the relative attractiveness of investment in the United States and raise (lower) the external value of the dollar, the exchange rate change can only be exogenous to a U.S. market for a good if the domestic supply and demand for that product are unaffected.³

A shift in the relative attractiveness of U.S. vs. foreign investment that directly affects asset markets but not goods markets is impossible. After all, the opportunity cost of employing capital in production is influenced by expected rates of return both at home and abroad. The typical rationale for

³Factors reflecting overall price levels both in the United States and abroad are held constant in figure 1. A given supply curve for X assumes that the dollar factor cost of resources used to produce product X are fixed, suggesting that the U.S. general level of prices is held constant; the local currency price of the

product abroad also is held constant, suggesting that the price level abroad is unchanged. Thus, the change in the external value of the dollar represents a "real" exchange rate change.

ignoring these related effects in the goods market is that, in the short run at least, changes in the capital stock (plant and equipment) are small relative to the existing stock of such goods. Thus, the short-run output and productivity effects are also presumed to be relatively small. This simplification is most questionable when the very purpose of policy actions that give rise to such a shift in investment incentives is to raise productivity and output.

In the early 1980s, the real rate of return on investment in the United States was raised by tax policy actions, especially those that extended the investment tax credit and accelerated depreciation allowances. In effect, these changes lowered the cost of capital to U.S. firms and raised the real rates of return that these firms were willing to bid to maintain and acquire new equity and debt financing. While tax changes provided a positive incentive for firms to expand capacity and output domestically, the higher rates of return generally discouraged output and investment in activities without these new tax breaks, especially such activities abroad.⁴

Proponents of the conventional view described above neglect these tax-policy-induced changes; indeed, they focus only on the supposed budget-deficit-driven rise in (real) interest rates and its consequent effects on investment and the value of the dollar. From an alternative supply-side view,

however, the rise in the dollar's value was produced by the same policy actions that also produced an increase in the supply of domestic output.⁵

Similarly, economic policy changes that reverse investment incentives and have adverse output supply effects will both lower the value of the dollar and reduce the supply of domestic output. From the outset of the discussion of tax reform in late 1985, it was clear that earlier incentives to invest, notably the investment tax credit (ITC) and accelerated depreciation for structures, would soon end. These changes were incorporated in the Tax Reform Act of 1986 (and made retroactive to the beginning of 1986 in the case of the ITC). In response, domestic investment plummeted from late-1985 to mid-1987.⁶ These tax changes should be expected to reduce both the supply of domestic output and the exchange rate.⁷

Output and The Exchange Rate When Domestic Supply Shifts

Figure 2 shows a shift in the domestic supply of product X from S to S'; such a shift can arise because of a reduction in factor costs. For large countries like the United States, the increase in domestic supply will have an appreciable effect on the world supply as well: the price of product X will fall as domestic output (X_d) and total world output rise.

⁴The hypothesis described is elaborated more fully in Tatom (1985) and (1986a). This hypothesis is not widely endorsed. Recent papers by Mutti and Grubert (1988) and, especially, Sinn (1988) address the influence of tax policy changes on international capital and trade flows and the value of the dollar; see also the comments by Gravelle (1988) and Patrick (1988). Ott (1984) and Fazzari (1987) also describe the 1981 and 1986 tax law changes for capital income and their effects. Ohmae (1988) argues that the link between the value of the dollar and U.S. competitiveness has been the opposite of that typically put forward in the popular and academic press. Boskin and Gale (1986) provide evidence on firm mobility that is consistent with Ohmae's view. Poole (1988) indicates that the 1981 tax act was the primary real disturbance in this decade and that it raised the real after-tax rate of return on investment. He also indicates the minority status of this view, however. Stockman and Svensson (1987) provide a formal model in which changes in wealth and its distribution can give rise to capital flows, current account movements and exchange rate changes that simultaneously match those described here.

⁵Krugman and Baldwin (1987) emphasize the importance of relative productivity developments as the factor accounting for the dollar's decline and the growth in the trade deficit after early 1985, but do not address the possible connections of the exchange rate, trade and relative productivity developments in the 1980-85 period.

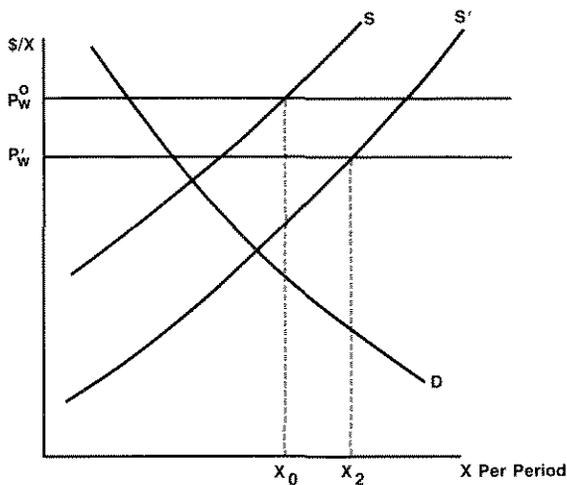
⁶The maximum marginal tax rate on personal and corporate income declined only slightly, from 60.8 percent in 1985 for

corporate income (taxed at 51 percent) realized through retained earnings and capital gains (taxed at 20 percent) to 59.1 percent in 1988 for corporate income (taxed at 39 percent) realized through capital gains or dividend income (taxed at 33 percent). This 1988 tax rate change *excludes* the end of the ITC and reductions in service lives for depreciation that further raised effective marginal tax rates, but includes a 5 percentage-point surcharge for individuals and corporations that phases out at sufficiently high incomes.

From 1985 to 1987, corporate tax accruals (excluding the Federal Reserve) rose from \$58.5 billion to \$88.1 billion, a 50.6 percent increase. As a result, real nonresidential fixed investment fell from a peak of 12.6 percent of real GNP at the end of 1985 to 11.1 percent in 1/1987. This decline as a share of real GNP is the equivalent of about a \$56.7 billion reduction, or 13.6 percent of investment spending, in 1/1987 alone. Canto (1988) also emphasizes the strong connection between changes in the exchange rate and tax rates, but only for personal tax rates! His explanation relies on an almost inconsequential reduction in personal tax rates in 1981 and has difficulty accounting for post-1984 exchange rate and investment developments.

⁷There are likely other factors that could account for the decline in the dollar's value, but the hypothesis here, explained in Tatom (1987), is that post-1984 policy developments reflect a reversal of earlier policies.

Figure 2
An Increase in Supply Raises
The Quantity Produced



When the supply of product X increases, its price will tend to fall in both domestic and foreign (P^*) currency units to induce domestic and foreign purchasers to buy more of it. Thus, given the value of the dollar (E), the world price falls to P_w' and purchases of product X rise, both in the United States and abroad. Production rises only in the United States, however. Foreign production of product X falls because its price declines and the foreign supply curve remains unchanged. Foreigners would also consume more of product X, so they would increase their imports from the United States.⁸

Similarly, for a good that the United States imports, an increase in the U.S. supply of an import-competing good will raise its world supply and reduce its price. Just as for goods that the United States exports, the price decline will raise purchases at home and abroad. The domestic supply increase ensures that domestic output rises, while

the price reduction abroad will ensure that production abroad declines.⁹

When the supply of all products in a country changes, the analysis is more complex. For example, the monetary approach to the balance of payments indicates that a general rise in U.S. output will lower the U.S. price level and raise the nominal exchange value of the dollar. In this approach, the real exchange rate need not change, despite the increase in domestic production.¹⁰ This approach typically does not take into account international capital mobility; thus, it does not emphasize the importance of capital flows between countries as the principal factor influencing recent exchange rate movements.

In addition, real incomes will not remain constant for such generalized output changes. The ensuing rise in U.S. income will also raise U.S. demand for goods and services. The U.S. demand curve D in figure 2 will shift to the right, mitigating but normally not offsetting part of the rise in the excess supply shown there. More importantly, however, the supply and demand for product X, or products generally, will tend to fall abroad. U.S. policy actions that raise the real after-tax rate of return and shift domestic supply rightward from S to S', also raise the cost of capital abroad and shift the foreign supply curve for output leftward, reducing foreign output, income and demand. A decline in foreign income reduces foreign demand for goods and services, including those imported from the United States.

The effects on trade flows are ambiguous when both supply and demand change. As long as the dominant domestic effect of policies that raise (lower) the after-tax rate of return in the United States is to raise (lower) the U.S. supply of traded goods output and lower (raise) foreign demand for traded goods, the trade flows predicted in the conventional analysis also are predicted in the supply-side analysis. That is, a rise (fall) in the

⁸The productivity increase also explains why employment can decline despite the boost to output. Fieleke (1985) makes a similar argument about the relationship of net imports of an industry's product and employment in that industry. He provides evidence showing that net import movements were uncorrelated with industry employment, which is consistent with the argument below. McKenzie (1988) has shown that productivity advances, not imports, have been the major factor behind employment losses in the textile industry. This view is explained more generally in Tatom (1986b).

⁹Alternatively, given P^* in the analysis above, a decline in P due to an increase in domestic supply requires that E rise. Of course, the rise in the world supply of traded goods will reduce the world price of such a good measured in any currency, so

that P^* must decline as well. Thus, the share of domestic producers in world production will rise because of increased domestic production and reduced foreign production.

¹⁰A second approach based on the flow supply and demand for dollars, emphasizes the fall in import prices and quantities as a source of a reduced supply of dollars in international exchange and, under standard assumptions, a rise in nominal exports as a source of a rise in the demand for dollars in international exchange. The value of the dollar would rise for both reasons, although the major factor affecting the exchange rate in either view is international capital flows.

value of the dollar will be associated with a rise (fall) in the quantity of imports and a fall (rise) in the quantity of exports. The central difference, and the focus here, is on whether the rise of U.S. imports and the fall of exports were indicators of a "deindustrializing" economy or "hollowed" corporations, or instead were a symptom of a redistribution of capital, productivity and income toward the United States.

In the supply-side view, U.S. goods that formerly would have been exported are purchased at home and not abroad where income reductions have reduced demand; goods that formerly would have been produced and consumed abroad face a larger demand in the United States and a smaller demand abroad.¹¹ While these outcomes are not inevitable for every traded commodity, the analysis suggests that the conventional result — that domestic production of exported and imported goods varies inversely with the value of the dollar — is a partial analysis less likely to hold if exchange rate movements arise from forces that also change domestic supply.

Figure 2 illustrates how domestic output increases can accompany an exchange rate appreciation. Increases in the supply of U.S. output generally will raise domestic output, reduce the U.S. price level and raise the nominal exchange rate. The result is a *positive* relationship between the exchange rate and output, contrary to the conventional relationship. Figure 2 also challenges the notion that a rise in the value of the dollar necessarily redistributes production, including that of U.S. export and import-competing goods, away from the United States and toward our foreign competitors. These implications are examined below.¹²

U.S. MANUFACTURING OUTPUT: A REVIEW OF SOME AGGREGATE EVIDENCE

The key difference between the hypotheses above concerns the relationship between the exchange rate and domestic output. In the conventional view, this relationship is negative; a supply-side perspective emphasizes that it can be positive. The difference centers on whether exchange rate changes are exogenous or whether they reflect changes in domestic productivity and output. One source of evidence on this issue is the share of domestic manufacturing output in U.S. real GNP. Additional evidence is the experience abroad. Under the conventional view, when the value of the dollar rose, U.S. producers should have lost market share to foreign producers as output of U.S. manufactured goods fell and foreign output rose. If, instead, the rise in the value of the dollar reflected a decline in domestic production cost in the United States and a rise abroad — as the supply side view suggests — precisely the opposite should occur.¹³ Thus, examining the performances of U.S. manufacturing output relative to other major industrial countries is also relevant for distinguishing between these two explanations.

The Manufacturing Share of U.S. Output

The actual and cyclically adjusted shares of manufacturing output in real GNP are shown in chart 2 for the period I/1948 to II/1988. The actual manufacturing share is an important, but easily misinterpreted, source of evidence bearing on the

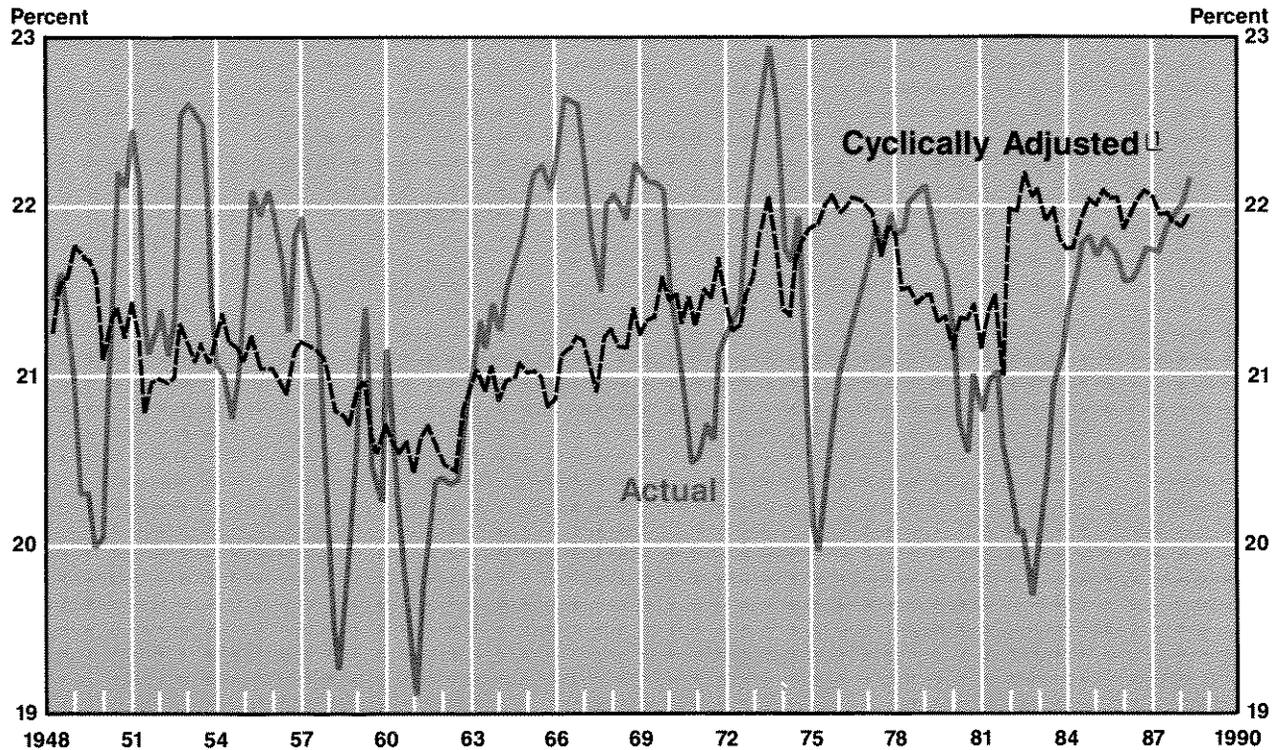
¹¹Krugman and Obstfeld (1988) explain how a transfer of income from the rest of the world to the United States causes the changes in demand and trade described here. They also explain that such a transfer raises the demand for U.S. goods relative to those produced abroad so that the terms of trade, the price of exports relative to imports, will rise. They apply their analysis to the recent flow of financial capital, instead of an increase in current and future U.S. income.

¹²The two theoretical approaches to exchange rate changes touch on a multitude of economic factors besides production, both at home and abroad, including purchases, relative prices, price levels, nominal and real trade flows. The qualitative predictions of the two theoretical analyses are the same for most of these factors under fairly standard assumptions. The critical difference involves production, and that is the focus here.

¹³Tatom (1986a and 1987) shows that changes in the exchange rate occur two quarters earlier than their positively related changes in domestic manufacturing output. Exchange markets

anticipate productivity improvements that follow decisions to change investment and capacity. Tatom (1986a) also provides evidence on the reallocation of investment and productivity growth toward the United States in 1980–85.

Chart 2 U.S. Manufacturing Output as a Percent of Real GNP



□ Based on a constant 81.9 percent capacity utilization rate in manufacturing.

competing hypotheses here. Since 1983, this share has been above the 1948–79 average of 21 percent, providing no evidence that manufacturing output had weakened when compared to its previous history, despite the rise in the value of the dollar from 1980 to 1985.¹⁴ The manufacturing share also rose moderately since the value of the dollar began falling in 1985. The share does not take a noticeable jump up because of this decline, however, just as it does not appear to have been depressed earlier when the value of the dollar rose.

The potential misinterpretation of the behavior of the actual share arises from the above-average level since 1983, which suggests that its performance in the 1980s has not been unusual. In fact, for most of this decade, the actual share was signi-

ficantly stronger than would have been expected based on the 1948–79 record. The actual share varies cyclically because the demand for such output is strongly cyclical; for example, periodic sharp declines in the share coincide with U.S. recessions. Transitory or cyclical income losses in the 1980–85 period (as indicated by a relatively low capacity utilization rate or high unemployment rate for labor) were relatively large, so that the actual share would have been expected to be lower than it actually was.

The cyclically adjusted share accounts for these cyclical variations; it surged upward to a record level in mid-1981 (after the 1981 tax act was passed) and generally remained at a historically

¹⁴Glick and Hutchison (1988) point to the actual share of manufacturing in output as evidence against the deindustrialization hypothesis, but express agreement with the existence of an inverse relationship between the dollar's value and domestic output.

high level until 1985–86, when it began to decline.¹⁵ Relative to its past, the adjusted share appears unusually strong in 1981–85, when the dollar was rising. Moreover, it has not surged upward since the dollar began to fall in 1985; instead, it has weakened, especially in 1987. The decline in the adjusted share in 1987 indicates that the rise in the actual share was largely due to cyclical income changes, not the belated effect of the fall in the value of the dollar. The pattern shown by the adjusted share is strongly at odds with the mainstream view, but is consistent with the supply-side story.

U.S. vs. Foreign Manufacturing Output

Did the U.S. share of the world's manufacturing output rise or fall from 1980 to 1985? The Organization of Economic Cooperation and Development (OECD) prepares indexes for the manufacturing output of its 24 member countries, a group that includes Europe, the United Kingdom, Canada, Japan, Australia and New Zealand. These indexes can be used to compute an index of manufacturing output for the other 23 OECD nations.

Chart 3 shows this index and the index for the United States since 1960. The gap between the indexes that opens up in the 1980s indicates the unusual strength of U.S. manufacturing in this decade. According to the OECD, the growth rate of U.S. manufacturing output, which constituted 31.7 percent of total OECD output in 1980, grew at a 3.2 percent rate from 1980 to 1985 while the value of the dollar was rising. This growth was well above the 1.5 percent rate for the rest of the OECD over the same period. Moreover, the U.S. growth rate in 1980–85 was up sharply from a 2 percent rate in 1973–80, while production growth in the remainder of OECD hardly rose at all from the dismal 1.3 percent rate registered in 1973–80. From 1960 to

1973, manufacturing production in the rest of the OECD countries had grown at a 6.4 percent rate, outstripping the 5.3 percent rate in the United States. Thus, the share of U.S. manufacturing in the total OECD output rose markedly while the dollar rose from 1980 to 1985 — from 31.7 percent in 1980 to about 33.5 percent in 1985 — contrary to the conventional wisdom.

From 1985 to 1987, the relatively faster growth in the United States eroded, despite the overall U.S. cyclical expansion. The growth of U.S. manufacturing output, according to the OECD, remained at a 3.2 percent rate, while the growth of industrial output in the other 23 countries *accelerated* to a 2 percent rate. Since U.S. growth still exceeded that abroad, the U.S. share of OECD manufacturing output continued to rise slightly, but much more slowly; it reached about 34 percent in 1986 and 1987. Thus, the comparison of U.S. and foreign output generally supports the supply-side view that the competitive position of U.S. manufacturers was boosted by economic policy changes in the early 1980s, which subsequently were reversed. Thus, an inverse relationship of production and the value of the currency does not hold for the United States or the rest of the OECD.

DISAGGREGATED EVIDENCE ON PRODUCTION AND TRADE

If U.S. manufacturing production was not depressed by the rise in the value of the dollar, why did the trade deficit balloon from 1980 to 1985? The conventional explanation emphasizes that the rise in the value of the dollar reduced domestic output, especially the output of exported and import-competing goods.¹⁶ The supply-side view, on the other hand, indicates that an expanded trade deficit can accompany relatively strong domestic output growth if domestic productivity, output and income rise.¹⁷ Thus, a detailed exami-

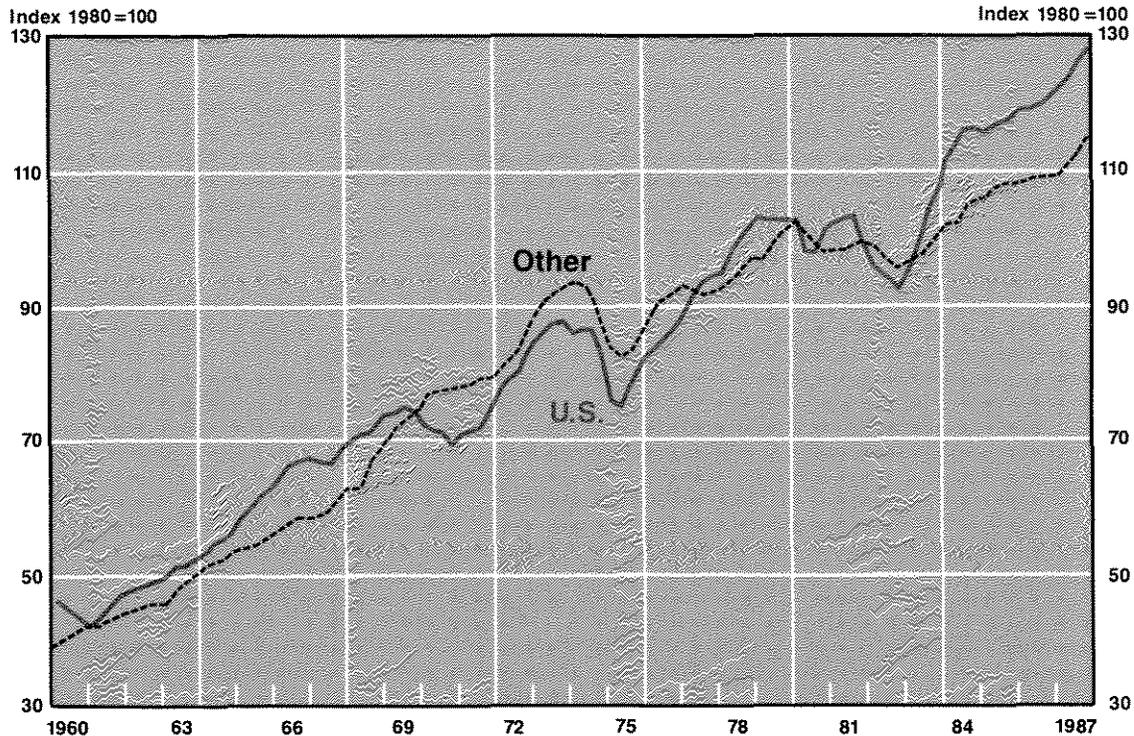
¹⁵The adjusted share is computed using the departure of the capacity utilization rate in manufacturing (which captures movements in manufacturing output common to all sectors and hence is a representative business cycle measure) from the 1948–88 average of 81.9 percent. A regression of the growth rate (change in the natural logarithm) of the share on a constant, lagged share and current and several lagged changes in the logarithm of the capacity utilization rate indicates that the lagged share and lags on the capacity utilization rate are not statistically significant at a conventional (5 percent) significance level. The equation estimated from III/1948 to I/1988 has an insignificant intercept 0.02 percent ($t = 0.37$) and a coefficient of 0.61676 ($t = 27.69$) for the current change in the capacity utilization rate; the adjusted R^2 is 0.80 the standard error is 0.83 percent, and the Durbin-Watson statistic is 2.02. The estimate includes a significant first-order autocorrelation adjustment with p equal to 0.21 ($t = 2.66$). Other methods that

use changes in the unemployment rate or real GNP growth result in the same pattern for the adjusted share.

¹⁶There are microeconomic arguments that emphasize other sources of reduced domestic output of imported and exported goods. See Arndt (1989), Arndt and Bouton (1987) and Hooper and Mann (1989), for example.

¹⁷Wharton (1986) provides evidence supporting this view. Krugman and Baldwin (1987), however, dismiss the importance of relative income growth in accounting for the emergence or elimination of the trade deficit. Their argument focuses on an asserted difficulty of raising U.S. export volumes. It ignores the associated and currently more relevant problem (in the sense that export volume was restored to its 1980 record level as a share of real GNP in late 1987). This problem is the failure of U.S. export and import prices to rise relative to the prices of non-traded goods and services.

Chart 3 Manufacturing Production in the U.S. and Other OECD Countries



SOURCE: Organization for Economic Cooperation and Development (OECD).

nation of the industries most closely associated with the record trade deficit will allow us to assess whether their experience provides support for the mainstream view, despite its failure to explain overall manufacturing performance.

Identifying the Deficit Industries

As the value of the dollar rose from 1980 to 1985, the U.S. merchandise trade deficit also rose, climbing from \$24.2 billion to \$132.5 billion¹⁸. This rise was concentrated in manufacturing, where an initial trade surplus of \$20.7 billion fell to a \$104.3 billion deficit. Table 1 shows the latter change and a breakdown for the two-digit standard industrial classification of 20 industries that make up the manufacturing sector. The changes from 1980–85 and 1985–87 are indicated for each industry. The

three largest changes in trade deficits from 1980 to 1985 are in transportation equipment, non-electric machinery and electrical equipment. These account for more than half of the total and include the largest net exporting sector in 1980, the non-electrical machinery industry. The next largest swings are in apparel products and primary metal products. These five industries account for two-thirds of the swing in the manufacturing deficit, and they are the five principal deficit-related industries. The changes in these industries are followed by relatively small swings toward deficit in 14 of the remaining 15 industries. Only the tobacco industry moved toward a greater surplus (or a smaller deficit) over the period.

The table also shows that the fall in the dollar's value from 1985 to 1987 was not accompanied by a

¹⁸Nominal trade data are used here because it is precisely the nominal deficit that is the trade-area focus of popular and macroeconomic policy discussions. Real trade data by industry are unavailable, but the output measure relevant to the hypotheses in the text is domestic output, where data are available. The domestic industry deflators indicate that nominal prices for the deficit-related industries below have barely changed over

the seven years; for the five-industry aggregate, nominal prices rose about 2 percent from 1980 to 1985 and fell 4.2 percent from 1985 to 1987. Changes in the real trade deficits in manufacturing and in this group, computed using domestic prices, are nearly identical to those for the nominal trade deficit.

Table 1
U.S. Trade Surplus in Selected Industries: 1980, 1985, 1987
(billions of dollars)

Industry	1980	1985	Change 1980-85	1987	Change 1985-87
Agriculture	\$19.6	\$ 7.3	\$- 12.3	\$ 3.3	\$- 4.0
Mining	- 62.4	- 32.6	29.8	- 28.6	4.0
Manufacturing	20.7	-104.3	-125.0	-132.7	-28.4
Food and kindred products	1.7	- 2.5	- 4.2	- 0.9	1.6
Tobacco manufactures	1.0	1.2	0.2	2.2	1.0
Textile mill products	0.5	- 2.2	- 2.7	- 2.8	- 0.6
Apparel products	- 4.9	-14.7	- 9.8	-20.0	- 5.3
Lumber and wood products	0.1	- 2.4	- 2.5	- 2.0	0.4
Furniture and fixtures	- 0.6	- 2.7	- 2.1	- 4.0	- 1.3
Paper and allied products	- 0.7	- 3.6	- 2.9	- 3.8	- 0.2
Printing and publishing	0.5	0.1	- 0.4	- 0.1	- 0.2
Chemical products	14.1	9.0	- 5.1	11.7	2.7
Petroleum and coal products	-10.6	-12.8	- 2.2	- 8.6	4.2
Rubber and plastic products	- 0.1	- 2.0	- 1.9	- 2.6	- 0.6
Leather products	- 2.9	- 7.2	- 4.3	- 9.2	- 2.0
Stone, clay and glass	- 0.3	- 2.5	- 2.2	- 3.5	- 1.0
Primary metal products	- 6.5	-15.7	- 9.2	-13.4	2.3
Fabricated metal products	2.5	- 2.0	- 4.5	- 3.4	- 1.4
Machinery, except electrical	23.9	6.2	-17.7	- 3.8	-10.0
Electrical equipment	0.9	-19.0	-19.9	-22.2	- 3.2
Transportation equipment	- 0.7	-27.9	-27.2	-42.0	-14.1
Instruments	3.0	0.2	- 3.2	- 1.4	- 1.2
Miscellaneous	- 2.5	- 9.4	- 6.9	-11.9	- 2.5

NOTE: Deficits are negative entries.

SOURCES: Data for 1980 and 1985 are from Arndt (1989) and Bureau of the Census, U.S. Department of Commerce, *Statistical Abstract of the United States, 1988*; 1987 data are in Bureau of the Census, Foreign Trade Division, *Highlights of U.S. Export and Import Trade, FT 990*, December 1987.

decline in the trade deficit, the deficit in manufacturing, or the deficit for the five deficit-related industries. A decline in the deficit in mining was offset by a decline in the surplus for agriculture. The manufacturing trade deficit grew by \$28.4 billion over the period. Only six industries showed positive movements in their trade surplus, and this group included only one of the deficit-related industries, primary metals. Positive changes also were recorded for chemicals, tobacco, food, lumber and petroleum. For the other four major deficit industries, the total deficit rose \$32.6 billion; when primary metals are included, the trade deficit of the five principal deficit-related industries rose \$30.3 billion, slightly *more* than the \$28.4 billion increase in the total manufacturing deficit. Thus, these five industries account for all of the 1985-87 rise in the manufacturing trade deficit.

Comparative Output Performance for the Deficit-Related Industries

The top panel of table 2 shows the growth rates in manufacturing output for the five deficit-related industries and the other 15 industries for the period of the rising value of the dollar, the period of the falling value of the dollar, and the earlier seven-year period that is roughly a comparable cycle-peak-to-cycle-peak period for the United States. Over this earlier period, the value of the dollar declined somewhat (chart 1). The data in the table show that the five deficit-related industries boomed during the period of the rising dollar; indeed, they were the sectors that pushed the overall manufacturing growth rate up to a 3.4 percent rate. The other 15 industries, as a group, showed much less acceleration in output growth

Table 2
U.S. Output and Productivity
Growth Rates (compounded annual
rates of change)

	1973-80	1980-85	1985-87
Output Growth Rates			
Manufacturing	1.0%	3.4%	3.3%
Five deficit-related industries ¹	1.0	4.9	3.6
Other 15 manufacturing industries	1.0	2.2	3.1
Real GNP	2.2	2.6	3.1
Productivity Growth Rates²			
Manufacturing	0.9	4.4	3.8
Five deficit-related industries	0.7	6.3	5.3
Other 15 manufacturing industries	1.1	2.9	2.7
Real GNP	0.0	1.1	0.7

¹Includes primary metals, nonelectric machinery, electric equipment, transportation equipment, and apparel and other textile products.

²The output growth rate minus the employment growth rate; civilian employment is used for the real GNP productivity measure.

SOURCE: National Income and Product Accounts, Table 6.2, U.S. Department of Commerce.

in 1980-85, compared with the 1973-80 period. The five-industry group includes the steel and automobile industries which are often viewed as mature or declining, but it also includes the computer industry where rapid growth has led the expansion of the non-electric machinery industry and of overall manufacturing in this decade. The comparisons made here using the data in table 2 are not reversed by omitting non-electric machinery from the measures, however.

The top panel of table 2 also shows that the pattern of production changed in 1985-87 as the

value of the dollar declined, but in a direction opposite to that predicted by the mainstream view. The further increase in the trade deficit was associated with a switch to slower domestic production growth, both overall and in the five principal industries.¹⁹ Manufacturing output growth slowed slightly, led by a substantial slowing in output growth in the five deficit-related industries.²⁰ This reduction in output growth of the five deficit-related industries, both absolutely and relative to the other 15 industries, is inconsistent with the conventional view, but is consistent with the view that earlier incentives for domestic productivity growth had been reduced.

The bottom panel of table 2 shows labor productivity growth, measured by the difference between output and employment growth rates, for the five industries and other manufacturing firms. The sharp acceleration in productivity in manufacturing in 1980-85, led by the five deficit-related industries, clearly stands out, as does the relative decline for these same industries since 1985.

The evidence in table 2 confirms and strengthens the aggregate evidence. The aggregate data are not obscuring a negative relationship between the value of the dollar and output in the deficit-related industries. In fact, the positive relationship is even more apparent for the five industries.²¹ The results are strongly at odds with the view that the expansion in the trade deficit in 1980-85 came at the expense of domestic production. Instead, declining net exports reflected increased domestic purchases that outstripped the relatively rapid growth of domestic production.²²

Moreover, as developments since 1985 suggest, the declining dollar and the nascent reversal in

¹⁹The decline in output growth is much more pronounced when non-electric machinery is omitted from the five-industry and manufacturing measures. The growth rate for the four-industry total slowed from 2.6 percent in 1980-85 to zero in 1985-87, leading the decline in the growth rate of manufacturing which fell from a 2.3 percent to a 2.0 percent rate for the same periods. In 1973-80, the four-industry growth rate was 0.2 percent, and manufacturing less non-electric machinery grew at a 0.7 percent rate.

²⁰The cyclically adjusted output growth rate for the five deficit-related industries rose 2.5 percentage points from 1973-80 to 1980-85; this increase is statistically significant, $t = 2.47$, according to a pooled t-test. The adjusted growth rate fell by a statistically significant 2.9 percentage points in 1985-87 from its 1980-85 rate ($t = -5.50$). The cyclically adjusted growth rate is found using the regression of the actual growth rate of the five industries' output for the period 1967-80 on the real GNP growth rate. When the rate of change of the real exchange rate is regressed on the cyclically adjusted growth rate for 1967 to 1987, its coefficient is positive, 0.088, but not significantly so at conventional levels, $t = 1.49$.

²¹The 1981 tax act generally provided a subsidy to structures and to equipment that increased with its durability; these subsidies were reversed in the Tax Reform Act of 1986. If the five deficit-related industries are relatively more equipment-intensive in production, then their supply is relatively more affected by the changed taxation of capital income. Also, the rise in the real after-tax rate of return domestically will raise the cost of capital abroad, changing investment patterns so as to reduce foreign productivity growth relative to what it would otherwise have been, reinforcing the positive relationships abroad.

²²When domestic industry price deflators are used to adjust nominal trade deficits, the resulting real net imports can be added to real output to obtain real domestic purchases. This procedure indicates a 9.4 percent annual rate of growth of real purchases in the five deficit-related industries from 1980 to 1985 and a slowing to a 6.7 percent rate from 1985 to 1987. Comparable figures for real manufacturing purchases are 6.8 percent and 4.4 percent, respectively. For the other 15 industries, the figures are a 4.6 percent rate in 1980-85 and a 2.2 percent rate in 1985-87.

Table 3
U.S. Manufacturing Capacity Growth and
Deficit-Related Industries

Industry ¹	1973-80	1980-85	Change	1985-87	Change
Manufacturing	3.4%	2.9%	-0.5%	2.6%	-0.3%
3-industry	4.2	4.4	0.2	2.4	-2.0
4-industry	3.6	3.6	0.0	1.8	-1.8
5-industry	3.3	3.6	0.3	2.3	-1.3

¹The three-industry group includes electrical equipment, nonelectrical machinery and transportation equipment; the four-industry group adds the primary metals industry; the five-industry group adds other nondurables. Other nondurables includes apparel and other textile products, tobacco products, printing and publishing, and leather products.

SOURCE: Computed from data published by the Federal Reserve Board.

the trade deficit look to be the results of policy actions that have reversed the earlier productivity boom in these key industries. Thus, by reducing their competitiveness internationally, these policy actions have allowed weaker sectors in the United States and abroad to expand. On net, these changes will reallocate world consumption and production away from the United States.

Were Current Production Changes at Odds with Longer-Term Output Plans?

As noted earlier, manufacturing output is strongly influenced by cyclical factors. One way to avoid the influence of such temporary factors at the industry level is to examine capacity output measures. The long-run choices of capacity and its optimal output are based on expected prices and costs. The capacity choice is more forward-looking and is based on more permanent considerations than the current output choice. If a rise in the value of the dollar will reduce the optimal domestic output of an industry, then, regardless of current output developments, firms will cut back on the growth of capacity.²³

Table 3 shows the growth rates for manufacturing capacity and several industry groupings of the principal deficit-related industries over the same periods as in table 2. While the growth of manu-

facturing capacity slowed in 1980-85, then slowed further in 1985-87, two of the three measures of capacity growth in deficit-related industries accelerated in 1980-85, then slowed in 1985-87.²⁴ This is precisely the same pattern followed by actual output in table 2. The exception is the four-industry measure, where the decline in primary metals capacity growth held the group's rate to the same pace in 1980-85 as in 1973-80.

When the dollar was rising, capacity growth in the deficit-related industries, by all three measures, exceeded the overall average for manufacturing capacity growth and accelerated relative to the average for manufacturing. Thus, the share of manufacturing capacity in these industries was expanding and expanding faster than it had earlier. For the five-industry measure, capacity growth was slightly below the overall manufacturing growth rate in 1973-80, but it jumped to about a 24 percent faster growth rate than in manufacturing in 1980-85.

When the dollar fell from 1985-87, these developments were reversed. The capacity growth rates in the deficit-related industries declined and were slower than for manufacturing as a whole. The share of capacity in the deficit-related industries began to decline slightly. This result is inconsistent with the view that international competitiveness in these industries had improved since 1985.

²³The Federal Reserve Board compiles data on industrial capacity for the sectors in table 1, except that apparel products are lumped into "other nondurable manufacturing" which also includes tobacco products, printing and publishing, and leather and products.

²⁴Manufacturing employment expanded at a 0.1 percent rate in 1973-80, then declined at a 1.0 percent rate in 1980-85 and at

a 0.5 percent rate in 1985-87. The growth rate of manufacturing capacity per worker, measured by the difference in the growth rate of capacity and employment, accelerated from 3.3 percent in 1973-80 to 3.9 percent in 1980-85, then declined to 3.1 percent in 1985-87.

CONCLUSION

The mainstream view that the dollar's decline has improved U.S. competitiveness is based on a partial and misleading economic analysis. This view mistakenly focuses on the effects of exogenous exchange rate movements on trade and output. In a broader analysis, the exchange rate is determined precisely by those factors that drive economic competitiveness. Thus, a rise in the value of the dollar can reflect an improvement in competitiveness, rather than a cause of its decline. Similarly, a fall in the dollar's value can reflect a decline in competitiveness; it is not necessarily a factor that will improve it. While there are firms and even industries within the groups examined here — for example, the primary metals sector — in which relative productivity changes have not been significant so that an inverse relationship between the dollar exchange rate and production and employment is observed, they are not typical. For the U.S. manufacturing sector as a whole and the industries most closely connected to the U.S. trade deficit, the relationship between movements in the value of the dollar and output growth during this decade has been a positive one.

In the early 1980s, U.S. manufacturing output, especially when adjusted for the effect of the U.S. business cycle, was unusually strong relative to both its own past experience and output growth abroad. The industries most closely related to a \$125 billion surge in the manufacturing trade deficit were the leading sectors in this strong growth; these industries showed a sharp acceleration in capacity growth over the same period that reinforced their growing dominance in economic performance.

From 1985 to 1987, these trends, like the value of the dollar, reversed. Only the trade deficit continued its previous pattern, growing somewhat larger over the period, and this increase was fully accounted for by the same key industries. Over the period, the share of manufacturing output in U.S. production, on a cyclically-adjusted basis, did not increase. Meanwhile, actual manufacturing output growth abroad accelerated both absolutely and relative to its counterpart in the United States. In the United States, at least, this pattern was dominated by the slowing of output growth in the key deficit-related industries. From 1985 to 1987, capacity growth slowed in the deficit-related industries to a pace below that for manufacturing.

A central lesson of this evidence is that the effects of changes in the dollar exchange rate on

domestic production, at least during the 1980s, are dominated by the effects of the economic policy changes that also have produced the exchange rate movements. The evidence suggests that the increased U.S. manufacturing competitiveness produced by economic policy changes in the early 1980s has been reduced by reversals of some of these policies in the mid-1980s.

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