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The Impact of Trade on US Job Loss, 2000–03

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After growing strongly in the 1990s, the US economy entered a period of weakness after 2000. Economic growth and employment growth started to fall off during 2000, and then slower growth became recession. The National Bureau of Economic Research dates the business-cycle peak in March 2001. Total private payroll employment peaked in December 2000 and fell by 3.4 million between then and August of 2003. The employment decline was heavily concentrated in the manufacturing sector, where job loss started as early as October 1998 and continued through January 2004. Job loss is frequently very costly for workers and their families, often involving a spell of unemployment and income loss, and requiring relocation to find a new job. Job losses of the magnitude experienced after 2003 imposed substantial costs on large numbers of Americans.

What caused this job loss? There are two main explanations of the weakness in employment during this period. The first looks at domestic factors, such as the overall business cycle, including the technology, capital investment, and inventory components of that cycle. In addition, there was unusually strong growth of productivity, so that growth in GDP did not translate into growth in employment to the degree that is typical of US recoveries.

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The second explanation is that the decline of US employment reflected a loss of jobs to overseas competitors. The United States ran large trade deficits in the 1980s, and these returned in the 1990s, particularly after 1995 as the dollar strengthened and the US economy grew relatively much faster than the rest of the world. In current-dollar terms, the trade and current account deficits continued to widen even after 2000.

In the minds of many, the reason job losses have been so great is that the United States simply cannot compete against low-wage countries that can gain access to the latest production technology. Some even argue that because China has emerged as a manufacturing power, selling large amounts to the United States, and because India has become an attractive location for service-sector offshoring, virtually all US jobs are now "threatened."

To most economists, this fear is misplaced. Chronic US trade deficits are a macroeconomic issue—inadequate national saving—and are not an inevitable consequence of trade itself. The general view among both economists and policymakers is that trade benefits the United States, although there may well be negative effects on groups of workers who are displaced by imports.

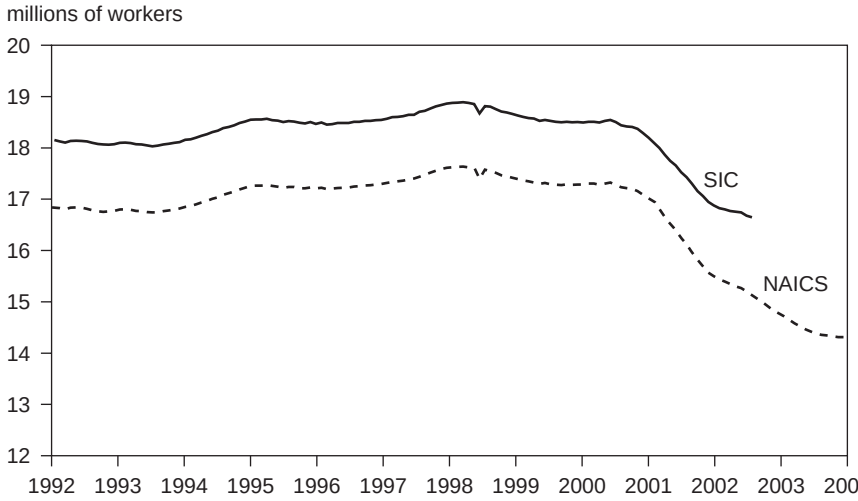
This chapter does not tackle the full complexity of the impact of trade on the economy. Rather, we tackle a much simpler issue: Using simple but reasonable approximations, we estimate two numbers. First, we estimate the extent to which changes in imports and exports during the period 2000 to 2003 could have contributed to the loss of US manufacturing employment. And second, we look at the magnitude of service-sector offshoring to India, both in software and in business processes (business process offshoring includes such activities as call centers and "back office" processing for financial services companies).[1]

A clear conclusion from this analysis is that trade does not account for the bulk of US manufacturing job loss during the period 2000 to 2003. This conclusion emerges even when the assumptions made to make the estimate tend to exaggerate the impact of trade on the number of US jobs. An equally important conclusion is that to the extent that trade has contributed to the decline in the number of manufacturing jobs over this period, this has come entirely from the weakness in US exports. The fact that imports grew rather slowly during the period actually cushioned the extent of job loss.

As for the movement of jobs to India, we understand that it is unsettling for groups of workers who were previously not subject to international competition. This has contributed to the rise of political concern about the issue. However, we find that in practice the magnitude of the loss of US service jobs resulting from offshoring to India is very small compared with the typical growth in overall service-sector employment. In sum, these two pieces of analysis indicate that the view that the decline in employment

1. We have benefited from the work of Jacob F. Kirkegaard (2004) and Catherine Mann (2003) in the area of offshoring. We have also benefited from the offshoring study by the McKinsey Global Institute (MGI 2003).

Figure 6.1 US SIC manufacturing employment compared with NAICS manufacturing employment, 1992–2004
(millions of workers, seasonally adjusted)



SIC = Standard Industrial Classification System
NAICS = North American Industry Classification System
Source: Bureau of Labor Statistics.

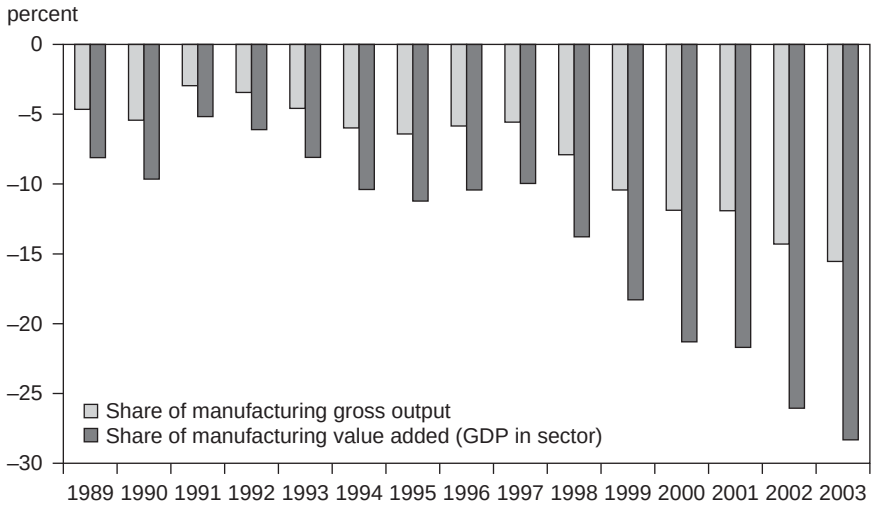
from 2000 to 2003 occurred because US jobs were shipped overseas en masse and replaced by imports is simply not true.

The Decline in Employment in Manufacturing

As a share of total US employment, the number of jobs in the manufacturing sector has been declining for at least half a century. This is not unique to the United States; rather it is typical of developed economies and even of many developing economies. The basic reason is that while the demand for the output of the manufacturing sector is growing, it does not grow fast enough to offset productivity growth in the sector, and so the demand for labor declines. Agriculture is another sector with a similar pattern.

In terms of the absolute level of manufacturing employment, the picture is less severe. As figure 6.1 illustrates, employment in manufacturing remained fairly stable in the 1990s, through 2000. Indeed, the level of employment in manufacturing has been roughly constant since the early 1970s, except for cyclical ups and downs. Figure 6.1 includes two lines showing manufacturing employment based on the Standard Industrial Classification (SIC) definition and the newer North American Industry

Figure 6.2 US manufacturing trade deficit as a share of manufacturing value added and as a share of gross output, 1989–2003



Sources: US International Trade Commission, Bureau of Economic Analysis, Bureau of Labor Statistics.

Classification System (NAICS). The old SIC figures showed a substantially higher level of employment in the sector because they included many workers who were not engaged in actual manufacturing activities. About 1½ million such workers have been excluded from the NAICS figures, which have become the new official numbers. Fortunately, the two series move very closely together over the period for which they overlap, so the extent of job loss for our focal period, 2000 to 2003, is very similar in both data series. Using annual data from the NAICS estimates, the US manufacturing sector lost 2.74 million jobs during this period.

The Trade Deficit in Relation to Manufacturing Output: Gross Output or Value Added?

One reason people point to the role of international trade in the jobs picture is that the United States has run an increasing deficit in its manufacturing trade since 1992 and the magnitudes of the deficits have been large relative to the size of the sector. Figure 6.2 illustrates this point by showing the trade deficit expressed as a percentage of manufacturing output. However, output is measured in two different ways. The first measure is value added in the industry—the GDP that originates in the sector. On this basis, the trade

deficit had grown to 28.3 percent of manufacturing output in 2003, up from 21.3 percent in 2000.

The second measure shown in figure 6.2 is the gross output of the sector—how much manufacturing sells outside the sector—whether to US buyers or overseas. This measure is estimated at the Bureau of Labor Statistics (BLS) by adding up the output of all manufacturing establishments and then estimating what fraction of that output consists of sales to other parts of the same sector. These intramanufacturing sales are then netted out, and the remaining output consists of the gross output of the sector. On this basis, the trade deficit does not look like quite such a large factor in the manufacturing picture. The deficit equaled 15.6 percent of gross output in 2003, up from 11.9 percent in 2000.

Together, these measures provide a useful perspective on the likely size of the trade effects on the sector. Those who want to emphasize that trade is hurting the US sector generally focus on the larger number. We argue here that the use of the value-added or sector-GDP measure will result in an overstatement of the impact of trade on manufacturing employment, whereas the use of gross output will likely understate the impact of trade. Hence, we do the calculation of the impact of trade on jobs twice, using both output measures, to give the range of possible outcomes.

Estimating the Employment Impact of the Changes in Manufactured Exports and Imports

A fully rigorous analysis of the impact of trade on manufacturing employment would take a range of factors into account in a full general equilibrium context. This chapter's approach is to make a first-round, partial equilibrium estimate. We ask what was the impact on employment of falling exports and rising imports after 2000, assuming a direct link between employment in the sector and output—a link based on average output per employee. In addition, the appropriate way to measure how trade affects jobs is to estimate separately how many jobs are generated by exports and then how many are displaced by imports.

The specific method used is as follows. In any given year, there was a certain volume of exports. There was employment associated with that volume of exports that is calculated from the level of output per employee in the sector *during the same year*. That calculation is made for 2000 and then again for 2003, taking into account the change in output per employee in manufacturing over the three-year period. Because exports are expressed in current-year dollars, the calculation of output per employee should be made based on how current-dollar output per employee evolved over time.

A similar calculation is then made for imports, with the assumption that if this value of imports had been produced in the United States, then

output per employee would have been the same as the average for the manufacturing output that actually was produced in the United States.[2]

There are two main sensitivities to this calculation. The first goes back to the discussion above and is about whether output per employee is taken to be value added per employee in the sector or gross output per employee in the sector. A simple case to analyze occurs if there are no imports of components into the United States. Consider the impact of $1 million in exports under this assumption. Each million dollars in exports generates employment in manufacturing by an amount that depends upon gross output per employee. In addition, there would be employment generated in the nonmanufacturing industries in the United States that supply manufacturing.

The same logic applies to imports. By assumption, these displace US manufacturing production dollar-for-dollar and displace US employment by an amount that depends upon gross output per employee. If the assumption of no imported components were correct, then using value added per employee for these calculations would substantially overstate the number of jobs generated by exports and displaced by imports, and would then overstate the estimate of the manufacturing job loss that resulted from trade over the period.

The other simple case is when the US manufacturing sector buys nothing from other US industries and, instead, the difference between value added and gross output consists of the amount of imported components. In this case, imports and exports displace or generate US employment to the extent reflected in value added per employee. Using gross output per employee would understate the employment effect of trade.

Getting the job loss calculation exactly correct requires a detailed knowledge of the import content of US production, and in future work we plan to make that calculation, drawing on input-output tables. For the present, doing the calculation both ways provides the range of values that should bracket the actual number.

The calculation's second sensitivity comes from making an estimate of current dollar productivity in 2003, because there is no actual number available—the latest figure being for 2001. Beyond 2001, the published real manufacturing output figures are based on the Federal Reserve's industrial production index. To estimate real output per employee in 2003, we used actual real output per employee for 2001 and extended that to 2003 using the productivity growth estimates for the sector for 2002 and 2003 reported by BLS. To get the current dollar values of output per employee in 2003, we extrapolated the trend rate of price change based on the experience for 1995 to 2001. Both the value added and the gross output deflators declined over that period, with the value-added deflator declining

2. This is one way in which our estimates may understate the job impact of trade. Output per employee would be lower in import-competing industries than in export industries.

Table 6.1 US job loss due to trade based on gross output, 2000 and 2003

Aspect	2000	2003	Change
Exports (billions of dollars)	692	626	–66
Employment generated by exports (thousands)	4,693	3,797	**–896**
Imports (billions of dollars)	1,013	1,027	+14
Employment if produced in the United States (thousands)	6,870	6,230	**+640**
Trade effect on jobs (thousands)			**–256 net**

Sources: US International Trade Commission, Bureau of Labor Statistics, Bureau of Economic Analysis, authors' calculations.

more slowly, reflecting an increase in the relative price of purchased input prices over the period, particularly energy prices.

Table 6.1 shows the results of our estimates of job loss using gross output per employee. We see that in 2000 $692 billion in US exports generated 4.693 million jobs, under that assumption. By 2003, exports had fallen to $626 billion and output per employee had risen, so that only 3.797 million jobs had been created through exports. There was a loss of nearly 900,000 jobs as a result.

On the import side, $1,013 billion in imports in 2000 would have required 6.87 million workers if the imports had been produced in the United States at the average US productivity level. In 2003, imports had risen slightly, to $1,027 billion, but the increase in productivity meant that to produce this much output in the United States would have required only 6.230 million workers. So the job displacement due to imports actually fell by 640,000 over this period. The net effect on manufacturing employment of trade was therefore a net job loss of about 260,000.

If the same calculations are made using value added per employee, the jobs due to imports are much higher in each year and the job loss is greater (table 6.2). The cushioning effect of the slow growth of imports is also greater, but the net job loss figure is substantially higher at nearly 600,000 workers.

To summarize our calculations: *The loss of manufacturing jobs between 2000 and 2003 that can be attributed to trade is between 260,000 and 600,000, representing between 9 percent and 22 percent of the total decline. Even with the high estimate, therefore, only a moderate fraction of the job loss was trade related.*

Table 6.2 US job loss due to trade based on value added per employee, 2000 and 2003

Aspect	2000	2003	Change
Exports (billions of dollars)	692	626	–66
Employment generated by exports (thousands)	8,424	7,023	**–1,401**
Imports (billions of dollars)	1,013	1,027	+14
Employment if produced in the United States (thousands)	12,332	11,521	**+811**
Trade effect on jobs (thousands)			**–590 net**

Sources: US International Trade Commission, Bureau of Labor Statistics, Bureau of Economic Analysis, authors' calculations.

Moreover, the job losses came entirely from the export side and not from a surge in imports. Job loss from any source is costly, but it is a mistake to scapegoat trade, because it was not the main reason for the overall manufacturing job decline.

Two Other Indicators of the Impact of Offshoring on Manufacturing Employment

There are two other indicators of the impact of offshoring on manufacturing employment. *First, the value-added share of production has remained stable.* There are many examples of US manufacturing companies that have retained parts of their value chain in the United States but have moved other portions either to foreign affiliate companies or to subcontractors overseas. These examples have led people to believe that the whole US manufacturing sector has been hollowed out.

If this were the case, we would expect to see a decline over time in the ratio of value added in manufacturing to the gross output of the sector. But in fact this is not the case, according to Bureau of Economic Analysis (BEA) and BLS data. Figure 6.3 shows that value added and gross output moved pretty much in line over the period 1987 to 2001 (the data for 2002 and 2003 are extrapolations)—the ratio of value added to gross output has remained roughly constant. It must have been the case that the offshoring of parts of the manufacturing value chain that took place was offset by the development of new products generating additional value added in the United States.

Figure 6.3 The share of US manufactured output produced within the sector has remained the same, 1987–2003
(index: 1987 = 100)

a. Gross output excluding intrasector transactions.

Note: Manufacturing equals SIC 20–39, real indexes.

Sources: Bureau of Economic Analysis and Bureau of Labor Statistics.

Second, manufacturing companies report that only a small fraction of mass layoffs is due to overseas relocation. BLS has been collecting information on mass layoffs for many years. A "mass layoff" occurs when 50 or more applications for unemployment insurance benefits are received from former employees of a given establishment over any five-week period. A sample of such establishments is then surveyed and asked for data on the number of layoffs occurring and the reasons for the mass layoff. These survey figures specifically for the manufacturing sector are not published by BLS, but they are available on request.

Table 6.3 shows data on mass layoffs in manufacturing for the five years 1996 to 2000 and the three years 2001 to 2003. The annual average number of workers subject to mass layoffs is shown for the two periods. It is a rather high number both in good times (1996–2000) and in times of labor market weakness (2001–03)—somewhat higher in the latter period, as would be expected. The annual average decline in manufacturing jobs over the corresponding periods is also shown in the table, and it is vastly different between the two periods. Clearly, during the period of job loss in manufacturing, the problem was a lack of job creation much more than the increase in mass layoffs.

Table 6.3 US mass layoffs in manufacturing, selected periods

	Number of workers subject to mass layoffs	Layoffs due to import competition (percent)	Layoffs due to overseas relocation (percent)
Annual averages (percentages of total shown in brackets)			
1996–2000	373,113	15,131 (4.1)	7,036 (1.9)
2001–03	483,236	20,960 (4.3)	14,575 (3.0)
Annual average decline in manufacturing jobs			
January 1996–January 2001		22,600	
January 2001–January 2004		742,500	

Note: Reasons for the extended mass layoffs are reported by the establishments. The sample is drawn from establishments generating 50 or more unemployment claims in any 5-week period. Workers must be separated from their jobs for at least 31 days. Based on NAICS scheme.

Source: Bureau of Labor Statistics.

Also shown in table 6.3 are two of the reasons given for mass layoffs—the two associated with trade and offshoring. Only a little over 4 percent of the mass layoffs resulted from import competition, and 2 to 3 percent were due to overseas relocation. Overseas relocation did become more important in the latter period. In summary: While responses to this BLS survey may not always be accurate, these results do show that employers do not report that either trade or offshoring are major reasons for mass layoffs, either before or after 2000.[3]

The Offshoring of Service Jobs to India

According to data from BEA, the United States runs a service trade surplus with India, and there is no record of substantial increases in service imports from India in recent years—indeed, the level of imports is very small indeed. Thus if one were to rely on this standard US data source, the phenomenon of service-sector offshoring would be seen as virtually nonexistent. Data from India suggest otherwise. Nasscom, an Indian trade association, reports large exports of services to the United States both in the software category and in business processes.

There are several reasons why the discrepancy in data sources may occur. BEA admits that its company surveys may miss a lot of the recent offshoring, because it may be destined to sectors not traditionally cov-

3. Bureau of Labor Statistics, "Extended Mass Layoffs Associated with Domestic and Overseas Relocations, First Quarter 2004 Summary," June 2004, also points to the limited extent of overseas relocation of US workers.

Table 6.4 US software jobs lost to India, fiscal 2000–01 to 2003–04

	Number
Increase in software employment in India	200,000
Involved in exports to the United States	134,000
US employment loss, assuming one-for-one job transfer	**134,000**

Source: Nasscom (an Indian trade association), authors' calculations.

ered in detail.[4] It may also classify some service imports as goods imports (e.g., if the software is to be used in a packaged software product).[5] There may be reasons that the data from Nasscom exaggerate India's exports—for example, programmers on assignment to and located in the United States may be counted as Indian exports if they are working under a contract to a company based in India. On balance, therefore, the numbers from Nasscom on the offshoring of services from the United States probably provide an upper bound on the actual value of US service imports.

Nasscom reports its data on a fiscal-year basis, ending in the first quarter of the year. Table 6.4 shows that over the period from fiscal 2000–01 to fiscal 2003–04 (ending, respectively, in the first quarters of 2001 and 2004), there was an increase in software employment in India of 200,000. Of this total, 134,000 employees were involved in activities whose end products or services were exported to the United States. On the assumption that this work would have required the same number of employees in the United States—that is, that the productivity levels of the US and Indian industries are the same for these activities—then this involves a loss of 134,000 US jobs.

Table 6.5 shows a comparable computation for business process offshoring. There was an increase in India of 175,500 jobs, and 140,400 of these were in activities whose products or services were exported to the United States. With the same assumption of one-for-one job transfer, this means that there was a loss of 140,400 US jobs in this service activity.

The assumption of comparable productivity is a strong one. On the basis of the evidence of persons who have studied and visited the industry, the productivity differences are mixed. For instance, there is some evidence that call centers are more productive in India because they can attract higher-quality employees (college graduates in India vs. high school graduates in

4. Inherently, it is easier for Indian statisticians to cover a limited number of information technology service exporters via surveys than it is for BEA to cover the entire spectrum of potential information technology service importers in the US economy, especially at a time when such imports may be going to new sectors.

5. This problem is not large, however, as the US imports less than $10 million worth of "Records, Tapes and Discs SITC End-Use Category 41220" a year.

Table 6.5 The impact of business process offshoring of US jobs to India, fiscal 2000–01 to 2003–04

	Number
Increase in business process offshoring employment in India	175,500
Involved in exports to the United States	140,400
US employment loss, assuming one-for-one job transfer	**140,400**

Sources: Nasscom (an Indian trade association), authors' calculations.

the United States). Also, these jobs are not well liked by US workers, and turnover is very high in call centers (e.g., see case study of offshoring in MGI 2003). On balance, however, it is likely that productivity would be higher in the United States for the same activity, especially for higher-end programming that needs intensive research and development. Thus the job loss estimates are probably above the actual job losses experienced.

This conclusion is reinforced by two additional and related factors. First, some of the tasks that were moved to India would have been performed by automated information technology hardware in the United States and not by workers—for example, voice response units replacing call center workers. Second, because the services being provided from India are cheaper than they would be when provided by the United States, it is likely that the amount of services purchased by US customers is greater than if Indian offshoring were not available.

Table 6.6 assesses the overall magnitude of service-sector offshoring to India in relation to overall US service-sector employment. Adding the software and business process employment together suggests that at most about 274,000 jobs moved to India over the three-year period fiscal 2000–01 to 2003–04. This equals an annual average change of about 91,500. For the workers who were displaced, the costs of this increase in trade were substantial. But a job shift of this size is very small compared with the typical 2.1 million service jobs created every year during the 1990s and is even small compared with the net annual job increase of about 327,000 from 2000 to 2003.

Implications of the Analysis

Cyclical recovery is the main cure for US job loss. To the extent that trade adversely affected manufacturing jobs after 2000, it did so because of weakness on the export side. The best bet for increasing US exports in the future is for the economic recovery to continue and become stronger in the rest of the world—something that is amenable to demand management policies by foreign governments. In addition, US exports would be helped by a further decline in the dollar. The value of the dollar is not under the direct control

Table 6.6 Offshoring to India in relation to total US service-sector employment

	Number
Total service-sector jobs offshored to India, fiscal 2001/02–2003/04	274,400
Average annual change	**91,467**
Average annual change in US service-sector employment	
1990–2000	**2,137,200**
2000–03	**327,100**

Sources: Previous calculations; Bureau of Labor Statistics.

of policymakers here and abroad, but there are policies that can facilitate a dollar decline, including a gradual reduction of the US fiscal deficit, as well as greater exchange rate flexibility in Asia.

A factor that is not directly in the control of policymakers is the magnitude of private capital flows to the United States. These flows triggered the rise of the dollar after 1995 but have since fallen off. The pattern of future flows is hard to predict, but most likely foreign residents will not be willing to finance a US current account deficit of 5 percent of GDP (and growing) indefinitely. That means that the prospects for a lower dollar and stronger US exports are good—albeit with a cost to the United States from the resulting adverse terms of trade movement.

Good policies here and abroad will contribute to economic growth and job growth. But policymakers should not exaggerate the impact of trade on US employment and resort to trade protectionism. Today, the US economy is growing fast enough to create jobs again, even in manufacturing. Both the number of manufacturing and service-sector jobs created in the United States and the nature of those jobs are determined primarily by domestic US forces, including technology, productivity, and the strength of overall US domestic demand.

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