

Factors Underlying the Decline in Manufacturing Employment Since 2000

The manufacturing sector of the U.S. economy has experienced substantial job losses since 2000. During the recession of 2001 and its immediate aftermath, employment in the manufacturing sector fell by about 2.9 million jobs, or 17 percent. Even after overall employment began to improve in 2004, the decline in manufacturing employment persisted. By the end of 2007, with the slowing of economic growth, employment in the sector had edged down further, by half a million jobs. And, as of November 2008, employment in manufacturing had fallen yet again, by slightly more than 600,000 jobs (see Figure 1).¹ A significant number of additional losses is likely given the current weakness in the economy.

Although the decline in manufacturing employment in recent years is not a departure from long-standing trends—the sector’s share of total employment has been falling steadily for more than half a century—the recession of 2001 hit manufacturing particularly hard. And, in sharp contrast to the pattern observed during previous expansions, employment in manufacturing (as reflected in the total number of hours worked) did not recover as it usually does following a recession.²

The substantial decline in manufacturing employment that has occurred since 2000 has affected virtually all 21 industries that make up the sector (see Table 1).³ Although the rate of net job losses in specific industries varied between 2000 and early 2004, most experienced declines of at least 10 percent. Between early 2004 and 2007, many industries continued to record job losses, albeit at a slower pace than was seen earlier in the decade. The decline since mid-2006 can be attributed largely to a weakened demand for housing—and for the durable goods (such as wood products and furniture) associated with that industry—and to ongoing restructuring in the auto industry, which, in turn, has been affected by what, until quite recently, were high gasoline prices.⁴ Only two industries, fabricated metal products and machinery, showed signs of significant recovery through the end of 2007.

The steep decline in manufacturing employment since 2000 is associated with two interrelated developments: rapid gains in productivity (output per hour) in U.S. manufacturing and increased competition from foreign producers. Competition from overseas helped spur U.S. firms to boost productivity, but that competition has also dampened demand for goods produced in the United States, despite domestic manufacturers’ efforts to reduce costs through productivity enhancements.

Clearly, the decline in employment has caused a great deal of hardship for many workers in the manufacturing sector and for the communities that have been affected.

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1. Manufacturing employment had already fallen by 700,000 jobs by the time the 2001 recession started, after reaching a cyclical peak in 1998. Thus, this most recent decline in manufacturing employment is now a decade-long phenomenon. The figure reported for the number of jobs lost in 2008—slightly more than 600,000—is based on monthly data between December 2007 (the most recent business-cycle peak, as determined by the National Bureau of Economic Research) and November 2008. By contrast, the figures in the third column of Table 1 are based on quarterly data through the third quarter of 2008.
 2. Indeed, the Congressional Budget Office anticipated that at least some of the jobs lost in manufacturing between 2000 and 2003 would return as the expansion and recovery of overall employment took hold. See Congressional Budget Office, *What Accounts for the Decline in Manufacturing Employment*, Issue Brief (February 2004).

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3. As identified in the North American Industry Classification System (NAICS). The NAICS classifies all establishments on the basis of the production process they use, in contrast to the previous U.S. Standard Industrial Classification system, in which some establishments were classified using different criteria (such as the type of customer).
 4. See Congressional Budget Office, *Effects of Gasoline Prices on Driving Behavior and Vehicle Markets* (January 2008).

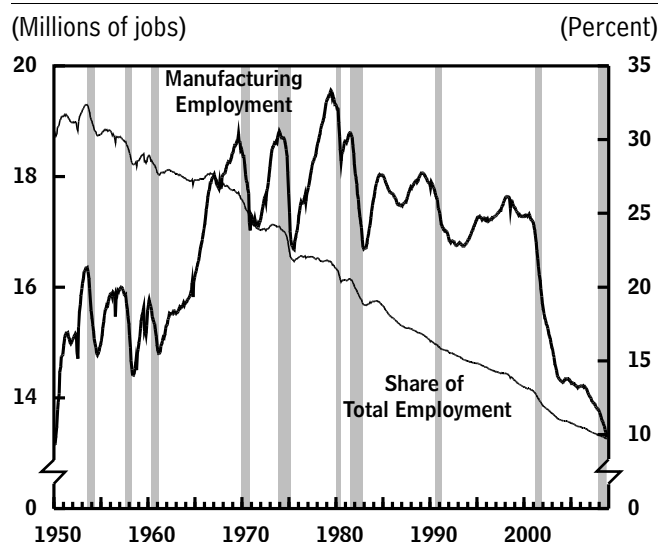
Table 1.**Changes in Manufacturing Employment by Specific Industry, 2000 to 2008**

	Change in Employment (Thousands of jobs)			Change in Employment (Percent)
	2000–2004 ^a	2004–2007 ^b	2007–2008 ^c	2000–2008 ^d
Manufacturing Sector				
Production workers	-2,314	-82	-304	-21.9
Nonproduction Workers	-599	-416	-60	-22.1
Total, manufacturing sector	-2,913	-498	-364	-22.0
Industry Classification				
Durable Goods	-2,002	-114	-269	-21.9
Wood products	-55	-33	-42	-21.7
Nonmetallic mineral products	-55	1	-25	-14.2
Primary metals	-151	-12	-8	-27.9
Fabricated metal products	-284	87	-35	-13.2
Machinery	-323	56	2	-18.2
Computer and electronic products	-541	-62	-12	-33.0
Electrical equipment and appliances	-141	-21	-6	-28.6
Transportation equipment	-263	-73	-96	-21.3
Motor vehicles and parts	-176	-146	-97	-32.4
Furniture and related products	-109	-47	-38	-28.3
Miscellaneous manufacturing	-81	-10	-10	-13.8
Nondurable Goods	-911	-384	-95	-22.0
Food manufacturing	-51	-18	-7	-4.9
Beverages and tobacco products	-15	0	-2	-8.0
Textile mills	-130	-77	-15	-59.6
Textile product mills	-44	-27	-8	-34.9
Apparel	-178	-80	-11	-58.0
Leather and allied products	-23	-9	1	-47.2
Paper and paper products	-101	-40	-7	-24.6
Printing and related support activities	-136	-46	-24	-25.6
Petroleum and coal products	-9	-1	2	-6.1
Chemicals	-87	-29	-6	-12.5
Plastics and rubber products	-138	-58	-19	-22.9
Memorandum:				
Private Employment (Excluding Manufacturing)	355	7,249	-548	7.5

Source: Department of Labor, Bureau of Labor Statistics.

Note: The manufacturing sector comprises 21 subsectors, as identified by the North American Industry Classification System.

- a. From the fourth quarter of 2000 through the first quarter of 2004.
- b. From the first quarter of 2004 through the fourth quarter of 2007.
- c. From the fourth quarter of 2007 through the third quarter of 2008.
- d. From the fourth quarter of 2000 through the third quarter of 2008.

Figure 1.**Manufacturing Employment**

Source: Congressional Budget Office based on data from Department of Labor, Bureau of Labor Statistics.

Note: Data are quarterly and plotted through the third quarter of 2008. The vertical bars indicate periods of recession, as determined by the National Bureau of Economic Research.

In fact, the pattern of job losses and gains across different industries within the sector and the nature of the hardship associated with losing a job in manufacturing appear to be somewhat different from those associated with earlier declines in manufacturing employment. A smaller percentage of the decline in manufacturing jobs stemmed from actual job losses (as opposed to a slower rate of new hires) than in the past. But those who did lose a job experienced longer spells of unemployment and a greater loss of income than did workers who lost a job during the previous decade.

Those same developments—foreign competition and the rapid growth in productivity both here and abroad—have also had some beneficial effects for many U.S. residents. They have kept the prices of manufactured goods lower than they would have been in the absence of those developments. Consequently, all households in the United States have benefited from the ability to buy goods at relatively low prices.

Moreover, even if the increase in the trade deficit has reduced employment in certain industries, that development represents a reallocation of jobs among industries rather than a decline in total employment in the United States. (The latter is essentially determined by the size of

the labor force and by overall macroeconomic conditions.) In fact, the U.S. economy created about 7.5 million net new jobs between early 2004 and the end of 2007.

Productivity and Output Growth

Both in the short term (since 2000) and over the longer run (since about 1950), the rapid growth of productivity in manufacturing has accounted for a substantial fraction of the decline in manufacturing employment and hours, a factor that appears to be common to all industries in the sector (see Figure 2). From 1973 to 1995, the average annual increase in productivity in manufacturing was 2.7 percent. During the late 1990s, productivity growth in the overall nonfarm business sector and in manufacturing accelerated, the latter averaging 4.1 percent annually over the 1995–2007 period. As a result, productivity in manufacturing has risen by about one-third since 2000. Productivity growth in manufacturing has consistently exceeded that of the overall nonfarm business sector—a differential that has widened since the mid-1990s.⁵

The most striking change in the manufacturing sector since 2000, however, has been a slower growth in output. During the roughly two-year period encompassing the 2001 recession and the recovery that followed, output fell more than usual, and it has not returned to its previous trend.

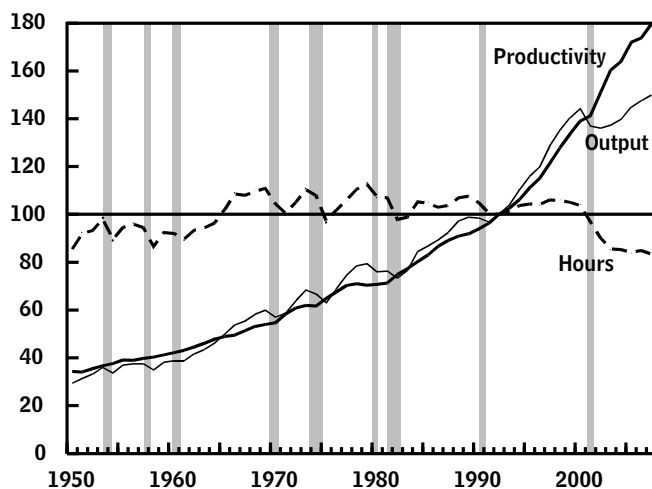
The Effect of Foreign Competition

In recent years, the amount of competition from manufactured imports—especially from emerging economies—has increased considerably. The increase is attributable not only to the low wages typically earned by workers in emerging economies but also to the rapid growth in productivity overseas. Although exports of manufactured goods from the United States rose by \$334 billion (58 percent) between 1999 and 2007, imports grew by \$692 billion (78 percent)—doubling the nominal trade deficit during that period. To the extent

5. See Jack E. Triplett and Barry P. Bosworth, *Productivity in the U.S. Services Sector* (Washington, D.C.: Brookings Institution Press, 2004). Triplett and Bosworth suggest that productivity growth in manufacturing between 1987 and 2001 may have been overstated, while productivity growth in the service sector over the same period was understated. Even so, according to their measure, productivity growth in manufacturing exceeded that recorded in the service sector over the same period.

Figure 2.**Manufacturing Productivity, Output, and Hours**

(Index, 1992 = 100)



Source: Congressional Budget Office based on data from Department of Labor, Bureau of Labor Statistics.

Notes: Data are annual and plotted through 2007. The vertical bars indicate periods of recession, as determined by the National Bureau of Economic Research.

Manufacturing hours are an index of total hours worked by workers in the manufacturing sector. Productivity describes output per hour worked. Output is the total value of all goods and services produced in manufacturing.

that those imports substitute for goods produced domestically, both manufacturing output and employment in the United States are lower than they otherwise would have been.⁶

Although the trade deficit in manufactured goods was much larger in 2007 than in 1999, it was slightly smaller in the first three quarters of 2008 than during the corresponding period in 2007. That recent improvement largely reflects the depreciation of the dollar in foreign exchange markets. The dollar fell by 22 percent on a real (inflation-adjusted) basis between early 2002 and the third quarter of 2008, according to a trade-weighted index calculated by the Federal Reserve (see Figure 3).⁷ A weaker dollar reduces the cost (in foreign purchasers' own

currencies) of goods produced in the United States and sold abroad. At the same time, it raises the price that U.S. consumers and businesses pay for imports, thereby boosting demand for domestically produced goods.

The effect of trade on employment in manufacturing is highlighted by examining employment patterns in each industry within the sector. Past studies have found that increases in imports are associated with reductions in employment in competing domestic industries, while both increased exports and a growing demand for domestic goods tend to increase employment.⁸ Although many factors other than trade affect manufacturing employment, in recent years, the pattern of decline in employment across industries has been correlated with the rate of increase of import penetration—the ratio of imports to domestic demand—in those industries' markets (see Figure 4). Conversely, downturns in employment have been smaller than average in several industries that are responsible for a significant share of the increase in U.S. manufacturing exports, including chemicals, machinery, and transportation equipment (excluding motor vehicles).

The apparel and textile industries constitute the clearest case in which declines in employment appear to be associated with the growth of imports. The import-penetration ratio in apparel, which was 50 percent in 1999, grew to 66 percent in 2003 and to 73 percent in 2007. For manufacturing as a whole, the ratio rose from 21 percent in 1999 to 24 percent in 2003 and to 28 percent in 2007. The import-penetration ratio in textiles, although not especially high, is also rising rapidly. Moreover, domestic demand for textiles is down because of the contraction of the U.S. apparel industry.

Among those industries in the manufacturing sector that produce nondurable goods, the apparel and textile industries together account for more than 40 percent of the employment reductions that have occurred since 2000. In fact, employment in those industries has been trending strongly downward since the mid-1970s, and the rate of decline accelerated sharply during the mid-1990s. That decline has persisted and shows no sign of slowing. In the

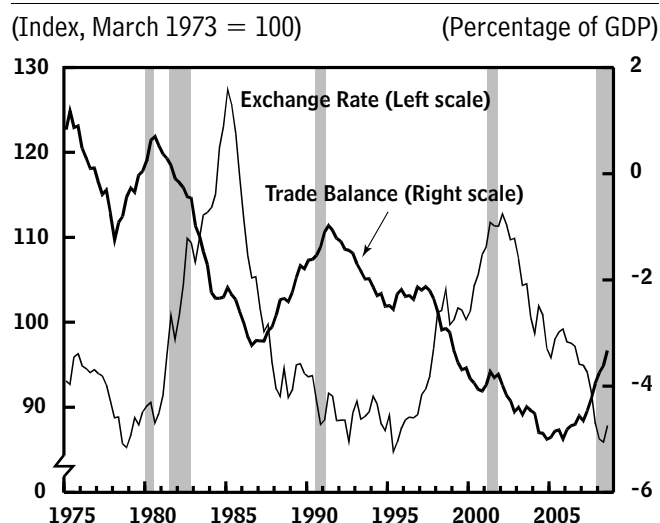
6. No official data exist on the real (inflation-adjusted) trade deficit for manufactured goods. However, the data for all goods, which consist mostly of manufactured goods, suggest that during this period the growth of imports, exports, and the trade balance was about 40 percent smaller in real terms when compared with nominal measures.

7. However, based on this measure, the dollar had appreciated by about 8 percent through November when compared with the third-quarter average.

8. See, for example, Lori G. Kletzer, *Imports, Exports, and Jobs* (Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research, 2002).

Figure 3.

The Manufacturing Trade Balance and the Exchange Rate



Source: Congressional Budget Office based on data from Department of Commerce, Bureau of Economic Analysis (manufacturing trade balance), and Board of Governors of the Federal Reserve System and Haver Analytics (exchange rate).

Notes: GDP = gross domestic product.

Data are quarterly and plotted through the third quarter of 2008. The vertical bars indicate periods of recession, as determined by the National Bureau of Economic Research.

As shown here, the manufacturing trade balance is estimated as exports of nonagricultural goods minus the import of goods, excluding petroleum.

The exchange rate is a weighted average against the currencies of a large number of the United States' trading partners with weights reflecting shares of U.S. exports and shares of U.S. and foreign imports. It is expressed in real (inflation-adjusted) terms.

third quarter of 2008, the apparel industry employed 195,000 people, down from 464,000 at the end of 2000. Over the same period, employment in textile mills fell from 371,000 to 150,000, and in textile-product mills it declined from 227,000 to 148,000.

Another industry that has experienced weak employment growth that may be related to the growth of imports, especially since 2003, is that devoted to the forging, smelting, or refining of primary metals (such as iron and

steel, aluminum, and copper). That industry experienced above-average losses in employment during the recession of 2001 and its immediate aftermath.

Those losses were similar in magnitude to losses experienced in previous recessions and reflected generally weak demand for steel and other primary metals; imports were flat during that period. But between 2003 and 2007, the import-penetration ratio in primary metals jumped from 22 percent to 31 percent, and employment declined by an additional 3 percent (see Table 1 on page 2). Had the rapid growth in imports not taken place, that industry probably would have seen a partial rebound in employment similar to that observed in other sectors, such as fabricated metal products and machinery, that are highly sensitive to cyclical fluctuations.

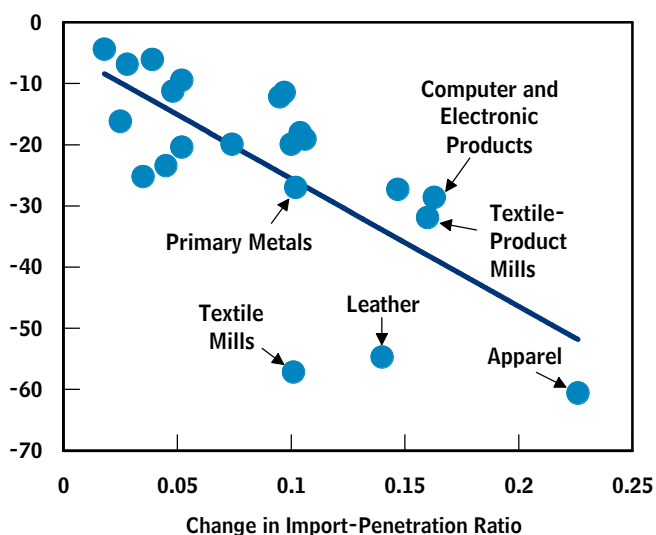
Domestic Demand for Manufactured Goods

While weaker demand in the United States for manufactured goods could, in principle, help explain the decline in manufacturing employment that has occurred since 2000, in practice it explains only a small portion. Nominal domestic demand (demand from U.S. residents) for manufactured goods—as estimated on the basis of the sum of “value added” (output minus the value of inputs) plus imports less exports—did indeed decline significantly during the 2001 recession and was slow to recover following that recession (see Figure 5). But through 2007, that measure nearly returned to the trend path it exhibited during the expansion of the 1990s. Some specific industries may have experienced a significant weakening in demand during that period; one such example is the computer-and-electronic-products industry, which experienced decreased demand in 2000 following the technology bubble that arose in the late 1990s. Some industries, including those that manufacture wood products and furniture, have recently faced weakening demand as a result of problems in the housing market, and the auto industry and its suppliers have come under pressure from rising gasoline prices. Nonetheless, it does not appear that a lack of domestic demand for manufactured goods is responsible for the broader long-term decline in manufacturing employment. Rather, the

Figure 4.

Changes in the Import-Penetration Ratio and Employment, by Manufacturing Subsector, 1999 to 2007

(Percentage change in employment)



Source: Congressional Budget Office based on data from Department of Labor, Bureau of Labor Statistics, and Department of Commerce, Census Bureau.

Notes: The manufacturing sector comprises 21 subsectors, as identified by the North American Industry Classification System. Key subsectors are highlighted here.

The import-penetration ratio is the ratio of imports to domestic demand.

decline stems from the combination of increased competition from abroad and significant productivity growth in U.S. manufacturing industries.

Fixed Costs

Some observers suggest that the rising cost of workers' benefits has made it more difficult for U.S. manufacturers to compete with overseas producers. In particular, there has been concern about the costs of health insurance and defined-benefit pensions for current workers and the so-called legacy costs incurred on behalf of retirees and their survivors. However, it is difficult to establish empirically that such costs have been an important factor explaining the decline in manufacturing employment.

For current workers, as long as increases in the cost of health insurance, pensions, and other benefits were relatively predictable, a firm could reduce the growth of wages and salaries to offset such costs. Overall labor costs to the firm would therefore not be affected, and one would expect to see little or no impact on employment. But if employers could not reduce direct wages to offset increases in benefits, the number and mix of part-time and full-time jobs might be affected. Indeed, in the short run, the offsetting reduction in wages or other benefits might not occur, given the institutional constraints (such as union contracts) that can prevent rapid adjustments.⁹

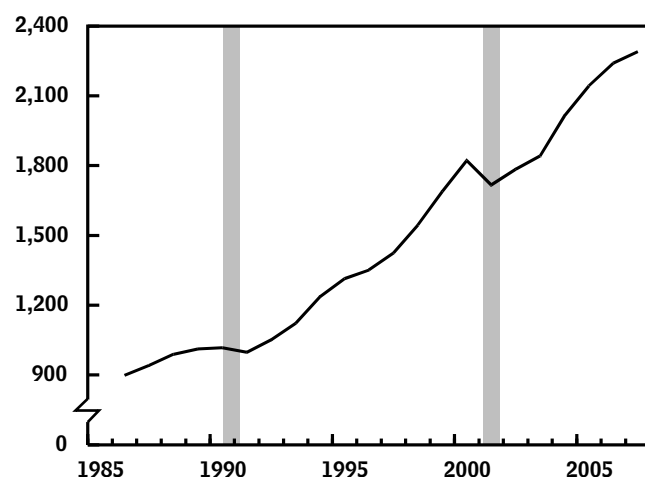
Two indications of how increases in the cost of benefits might affect employment are the use of overtime and the incidence of part-time work. Health insurance costs in any year are typically fixed for each covered worker, independent of the number of hours worked, provided that a minimum threshold—typically 20 hours per week—is attained. Consequently, possible adjustments to rising health insurance costs could include increased use of overtime relative to total employment (to avoid having to add workers) or the hiring of more part-time workers who are not eligible for coverage. The data suggest that such adjustments have not been widespread in manufacturing; overtime in 2007 averaged 4.2 hours per week, the same as in 2003 and well below its average during the previous expansion. In addition, part-time work does not appear to have grown in importance in manufacturing.

Legacy costs arising from obligations to fund retirement and health costs for retirees should, in principle, have no direct effect on the level of employment. That is because such costs are “sunk”—in other words, they reflect obligations incurred on the basis of past decisions. As a result, current decisions about production and employment should not be affected. However, such costs could affect employment to the extent that, by reducing profits, they reduce the supply of internal funds available for investment and could also increase the cost of external financing. Because internal funds tend to be the most affordable source of investment financing, such a reduction could

9. See Katherine Baicker and Amitabh Chandra, “The Labor Market Effects of Rising Health Insurance Premiums,” *Journal of Labor Economics*, vol. 24, no. 3 (2006), pp. 609–634. The authors find that the cost of rising health insurance premiums is borne primarily by workers in the form of lower wages, though under some circumstances there may be adverse effects on employment as well.

Figure 5.**Domestic Demand for Manufactured Goods**

(Billions of dollars)



Source: Congressional Budget Office based on data from Department of Labor, Bureau of Labor Statistics and Department of Commerce, Census Bureau.

Notes: Data are annual and plotted through 2007. The vertical bars indicate periods of recession, as determined by the National Bureau of Economic Research.

Domestic demand is the sum of "value added" (the value of manufactured output minus material inputs) plus imports minus exports.

inhibit investment in plants and equipment and thus slow the growth of the firm.

The Outsourcing of Noncore Functions

Structural changes affecting some types of employment in the manufacturing sector may have led to a slight overstatement of the weakness in manufacturing employment, but that is likely to be a minor factor. Between early 2004 and late 2007, employment declined only slightly among production workers but continued to fall for nonproduction workers (see Table 1 on page 2). At first glance, the disparity suggests that some portion of the ongoing weakness in manufacturing employment can be attributed to the outsourcing of noncore functions (such as payroll processing and janitorial services, which traditionally had been performed in-house and therefore had been counted as manufacturing jobs); to the use of temporary agencies (whose workers are considered employees of the agency); and possibly to a reduction in the layers of management or other overhead. But while production workers accounted for 72 percent of total

manufacturing employment at the end of 2007, up from 70 percent in 2003 and 2004, that figure is still below the 73 percent share recorded in the mid-1990s. (Production workers account for most of the decline in employment in 2008, and their share has begun to decline; this pattern is normal during a recession.) But even before the onset of the current recession, both the level of employment and the aggregate number of hours worked by production workers were still about 19 percent below levels recorded prior to the 2001 recession, so the reduction in the ratio of nonproduction to production workers could account for only a small portion of the continued decline in overall employment in manufacturing.

Slower Hiring Versus More Layoffs

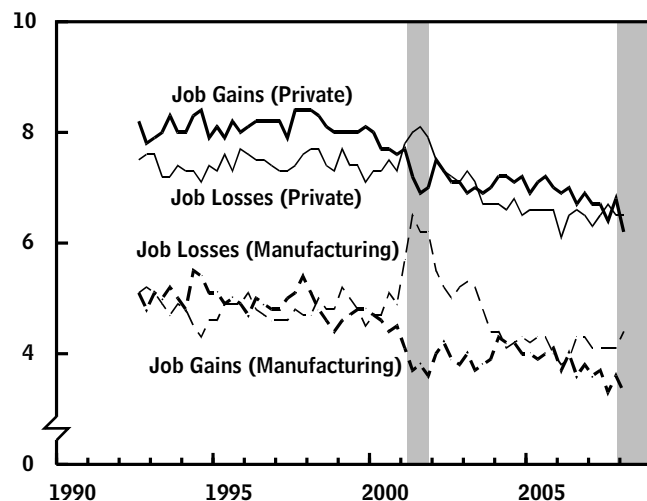
The decline in manufacturing employment between 2000 and 2007 stemmed as much from an absence of new hiring as it did from layoffs of individual workers and downsizing. Rates of both job losses and job gains have been lower since the 2001 recession than they were in the 1990s (see Figure 6). The rate of job losses spiked during the 2001 recession, but by the end of 2003 it had fallen well below levels seen in the late 1990s and has remained low subsequently. Meanwhile, late in the expansion of the 1990s, the rate of job creation began to fall; it plunged during the 2001 recession and has never recovered. The job-creation rate in manufacturing was below its historical norm during the 1990s as well.¹⁰ Rates of both job creation and job destruction are significantly lower in manufacturing than in the rest of the economy. That is also true on an individual level; the rate at which workers leave jobs—whether voluntarily or involuntarily—is also generally lower in manufacturing than in the rest of the economy (see [Web Table 1, "Hiring and Separation Rates, Selected Years,"](#) which is posted along with this report at www.cbo.gov). Even the rate of layoffs and discharges has been below the economywide average, except during the recession year 2001. But the hiring rate is also much lower in manufacturing than elsewhere in the economy.

Although the overall incidence of displacement from manufacturing employment was not especially high between 2000 and 2007, the consequences of displacement were more severe than in the past. The number

10. See R. Jason Faberman, *Job Flows and the Recent Business Cycle: Not All "Recoveries" Are Created Equal*, Working Paper No. 391 (Department of Labor, Bureau of Labor Statistics, Office of Employment and Unemployment Statistics, February 2006).

Figure 6.**Job Creation and Destruction**

(Percentage of employment)



Source: Congressional Budget Office based on data from Department of Labor, Bureau of Labor Statistics.

Notes: Data are quarterly and plotted through the first quarter of 2008. The vertical bars indicate periods of recession, as determined by the National Bureau of Economic Research.

Job creation refers to the net increase in jobs at establishments that opened or expanded over the course of a quarter, while job destruction refers to the net decrease in employment at establishments that closed or contracted during a given quarter.

The manufacturing sector comprises 21 subsectors, as identified by the North American Industry Classification System.

of workers displaced from a manufacturing job that they had held for three or more years was lower between 2005 and 2007 than it was during the boom of the late 1990s (see [Web Table 2, “Worker Displacement, 2000 and 2008”](#)).¹¹ Nonetheless, manufacturing workers were much more likely than other workers to have been displaced, and those who lost their jobs were both more likely than their counterparts from other industries to

have remained jobless and more likely to have experienced significant losses of earnings even if they were reemployed. The reemployment rate for displaced manufacturing workers (which includes reemployment in non-manufacturing jobs) appears to have deteriorated significantly since 2000—more so than for other displaced workers—and the incidence of earnings losses for those who were reemployed has also risen noticeably.

Other Impacts of Recent Trends

The developments in the manufacturing sector over the past 10 years—the growth of productivity, the increase in imports, and the decline in employment—have some positive implications for the economy as a whole. Clearly, some industries have experienced especially large employment reductions, some workers have experienced significant income losses, and some communities that depend heavily on manufacturing have faced difficult adjustments. However, more generally, consumers have benefited from the lower prices made possible by the productivity gains and the competition from imports that underlie the decline in manufacturing employment. Until recently, other sectors were more than compensating in terms of overall employment, as evidenced by the relatively low 4.5 percent unemployment rate that existed during the first half of 2007 and by the roughly 7.5 million net jobs created between early 2004 and the end of 2007.

This issue brief was prepared by David Brauer of the Congressional Budget Office’s Macroeconomic Analysis Division. Eric Miller provided research assistance. Related CBO publications include *Employment During the 2001–2003 Recovery*, Background Paper (August 2005); *What Accounts for the Decline in Manufacturing Employment?* Issue Brief (February 18, 2004); and *How Changes in the Value of the Chinese Currency Affect U.S. Imports* (July 2008). These publications are available at CBO’s Web site, www.cbo.gov.

Robert A. Sunshine
Acting Director

11. The true number of displaced workers might be greater than what is reported in the Displaced Worker Survey, if workers who had accepted buyouts or other incentives to separate from a contracting firm did not consider themselves as displaced when responding to the survey.