



Job Creation in the Manufacturing Revival

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Summary

The health of the U.S. manufacturing sector is of intense interest to Congress. Hundreds of bills aimed at promoting manufacturing are under consideration in the 112th Congress, often with the stated goal of creating jobs. Implicit in many of these bills is the assumption that the manufacturing sector is uniquely able to provide well-paid employment for workers who have not pursued advanced education.

U.S. manufacturing output has risen significantly over the past two years as the economy has recovered from recession. This upswing in manufacturing activity, however, has resulted in negligible employment growth. Although a variety of forces, including higher labor costs in the emerging economies of Asia, higher freight transportation costs, and increased concern about supply-chain disruptions seem likely to support further growth in domestic manufacturing output over the next few years, evidence suggests that that such a resurgence would lead to relatively small job gains within the manufacturing sector. For more on supply-chain risk, see CRS Report R40167, *Globalized Supply Chains and U.S. Policy*, by Dick K. Nanto, and CRS Report R41831, *The Motor Vehicle Supply Chain: Effects of the Japanese Earthquake and Tsunami*, by Bill Canis.

The past few years have seen important changes in the nature of manufacturing work. A steadily smaller proportion of manufacturing workers is involved in physical production processes, while larger shares are engaged in managerial and professional work. These changes are reflected in increasing skill requirements for manufacturing workers and severely diminished opportunities for workers without education beyond high school. Even if increased manufacturing output leads to additional employment in the manufacturing sector, it is likely to generate little of the routine production work historically performed by workers with low education levels.

As manufacturing processes have changed, factories with large numbers of workers have become much less common than they once were. This suggests that promotion of manufacturing as a tool to stimulate local economies is likely to meet with limited success; even if newly established factories prosper, few are likely to require large amounts of labor.

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Introduction

After a prolonged slump, the U.S. manufacturing sector is showing notable signs of revival. In part, the upturn in manufacturing output is cyclical, as global economic growth recovers following the downturn in 2008-09.¹ At the same time, however, there are indications that other forces may be at work, as a variety of factors – higher labor costs in the emerging economies of Asia, higher freight transportation costs, increased concern about supply-chain disruptions – increase the relative attractiveness of the United States as a location for factory production.

The strengthening of U.S. manufacturing is a subject of intense interest in Congress. Hundreds of bills introduced in the 112th Congress would support domestic manufacturing activity in various ways, from providing government loans to improving vocational training in manufacturing skills to promoting research and development to mandating that airport security screeners' uniforms be made in the United States.

In public discourse, the revival of manufacturing is often associated with a variety of policy objectives, particularly with respect to employment. Most notably, proponents of support for the manufacturing sector often associate increased manufacturing activity with the creation of jobs for workers without higher education. Evidence suggests, however, that even strong growth in manufacturing output could well have only modest impact on job creation, and is unlikely to reverse the declining demand for workers with low levels of education.

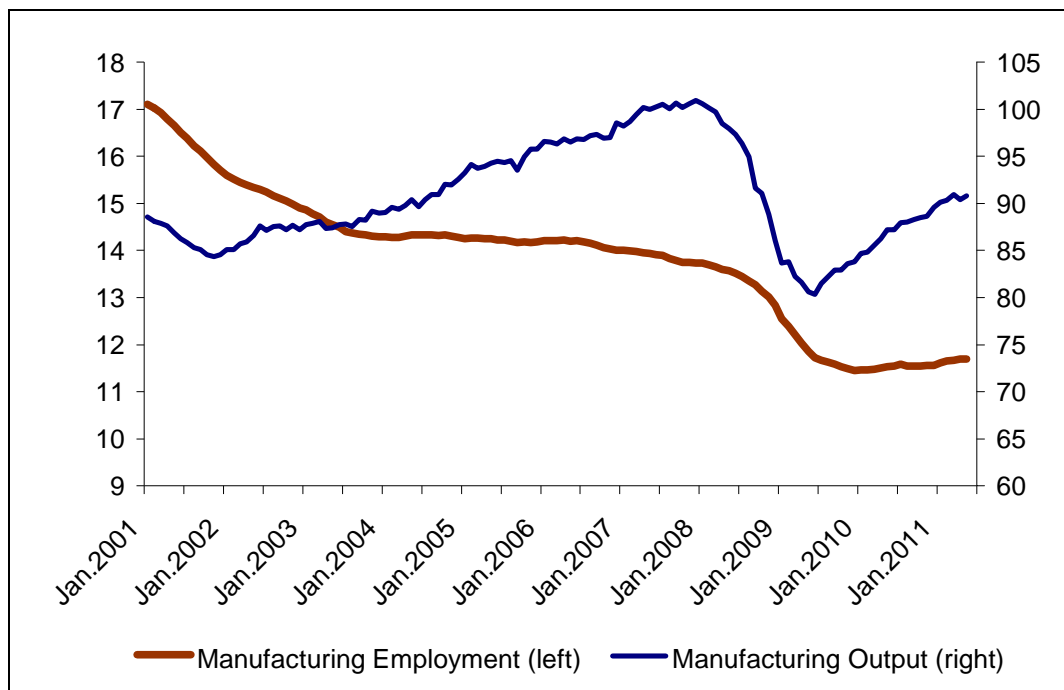
Employment in the Manufacturing Sector

At the start of the twenty-first century, 17.1 million Americans worked in the manufacturing sector. This number declined during the recession that began in March 2001, in line with the historic pattern. In a departure from past patterns, however, manufacturing employment failed to recover after that recession ended in November 2001 (see **Figure 1**), even though U.S. manufacturing output increased over the next seven years. By the time the most recent recession began, in December 2007, the number of manufacturing jobs in the United States had fallen to 13.7 million. Currently, 11.7 million workers are employed in the manufacturing sector.

¹ See CRS Report R41434, *Job Growth During the Recovery*, by Linda Levine.

Figure I. Manufacturing Output and Employment

Employment in millions; output indexed, 2007=100



Source: Bureau of Labor Statistics, Current Employment Survey, and Federal Reserve Board, Industrial Production Index.

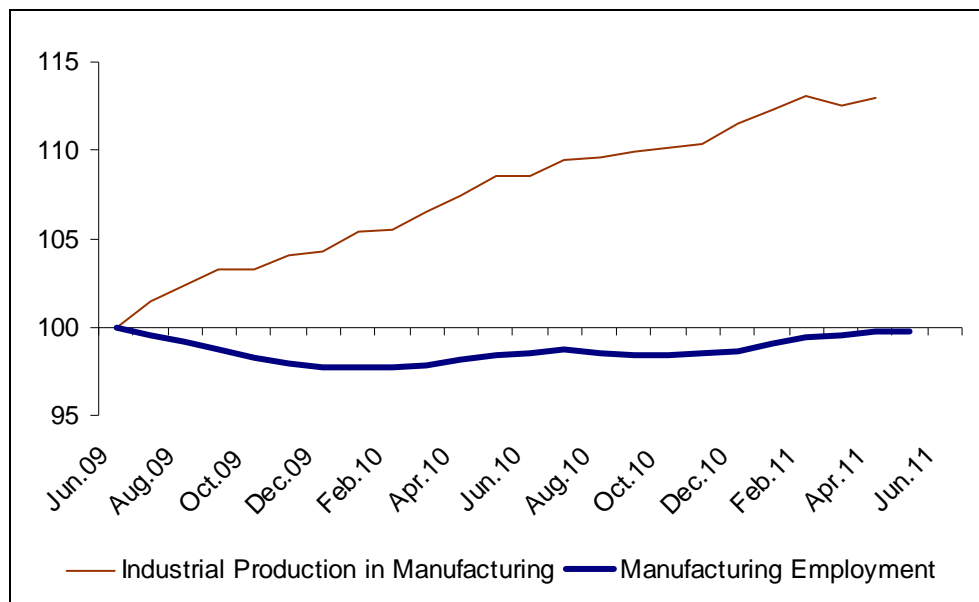
Notes: Data are seasonally adjusted.

The output of U.S. manufacturers hit a cyclical bottom in June 2009. Since that time, a 13% increase in manufacturing output has been accompanied by negligible change in manufacturing employment (see **Figure 2**). The low point in manufacturing employment was reached in December 2009, but since that time the manufacturing job count has risen only 2%.² The employment recovery in manufacturing lags far behind the cyclical norm following past recessions.

² Manufacturing output, as discussed in this section, is derived from the Federal Reserve Board Industrial Production Indexes for manufacturing and for various manufacturing industries, seasonally adjusted, <http://www.federalreserve.gov/releases/g17/Current/default.htm>. Employment figures used in this section are from the Bureau of Labor Statistics' monthly Current Employment Statistics database, <http://www.bls.gov/data/>, and are based on seasonally adjusted data.

Figure 2. Growth in Manufacturing since Cyclical Trough

Index, June 2009=100, SA



Source: Federal Reserve Board (Industrial Production), Bureau of Labor Statistics (employment).

There is no single cause of the weakness in manufacturing employment. A sharp increase in the bilateral U.S. trade deficit with China following that country's accession to the World Trade Organization in 2001 contributed importantly to manufacturing job loss in the first half of the last decade, but the stabilization of the bilateral trade balance since 2006 has not resulted in greater hiring of factory workers in the United States.³ Cyclical forces aside, there are at least three distinct factors that limit the prospects for job creation in the manufacturing sector, even if domestic production gains market share from imports.

- Some manufacturing industries, notably apparel and footwear, are tied to labor-intensive production methods that have proven difficult to automate. With labor costs accounting for a much higher share of value than in manufacturing as a whole, declining import barriers allowed imports from low-wage countries to displace domestic production. From 1.3 million workers as recently as 1980, U.S. employment in apparel manufacturing has fallen below 156,000. Shoe manufacturing has seen an even steeper employment decline. Over the same period, U.S. output of apparel and footwear fell by almost 80%.
- In other industries, technological improvements have led to large increases in labor productivity that have reduced the need for workers. Steelmaking offers

³ On the impact of China on manufacturing employment, see David H. Autor, David Dorn, and Gordon H. Hanson, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," working paper, June 22, 2011, <http://econ-www.mit.edu/files/6613>. On U.S.-China trade more generally, see CRS Report RL33536, *China-U.S. Trade Issues*, by Wayne M. Morrison, and CRS Report RL33577, *U.S. International Trade: Trends and Forecasts*, by Dick K. Nanto and J. Michael Donnelly.

such an example: the 88,000 people working in the industry today produce roughly as much steel as nearly 400,000 workers did in 1980.⁴

- Secular shifts in demand have dimmed employment prospects in some industries despite the general recovery in manufacturing output. Paper consumption, for example, was once closely associated with economic growth, but no longer; as electronic communication supplants print in many uses, paper output is down about 20% over the past decade, contributing to a lower industry employment. As cigarette consumption has waned, output in tobacco products manufacturing is off almost by half since 2001, and employment has fallen at a similar rate.

These changes have resulted in a significant shift in the composition of manufacturing employment as well as in the level of employment. Food manufacturing, which two decades ago accounted for one in eleven manufacturing jobs, now accounts for one in eight. The fabricated metal products sector has also become a much more important part of the manufacturing sector, as has miscellaneous manufacturing, a category that includes medical equipment and instruments – although these sectors have not been immune from the decline in employment. On the other hand, apparel, textiles, and computers and electronic products now account for substantially smaller shares of manufacturing employment than was formerly the case (see **Table 1**).

⁴ In 1980, an average of 398,829 employees produced 83.9 million tons of steel; see American Iron and Steel Institute, *Annual Statistical Report 1980* (Washington, DC, 1981), pgs. 8, 21. U.S. steel shipments in 2010 were 83.4 million tons, according to the Institute; see <http://www.steel.org/en/sitecore/content/Global/Document%20Types/News/2011/December%20Steel%20Shipments%20Up%208%20point%206%20Percent%20From%20November.aspx>. BLS gives average steel-industry employment in 2010 as 85,400.

Table I. Manufacturing Employment by Industry, 2001-2011

Shares of total manufacturing employment and thousands of workers

Industry	2001 Share	2001 Employment	2011 Share	2011 Employment
Food	9.08%	1,554	12.45%	1,447
Transportation Equipment	11.64%	1,992	11.64%	1,352
Fabricated Metal Products	10.28%	1,759	11.39%	1,323
Computers and Electronic Products	10.93%	1,871	9.60%	1,115
Machinery	8.49%	1,453	8.76%	1,018
Chemicals	5.71%	977	6.66%	774
Plastics and Rubber	5.45%	932	5.42%	630
Miscellaneous Manufacturing	4.25%	728	4.94%	574
Printing	4.66%	798	4.10%	476
Paper	3.50%	599	3.42%	397
Nonmetallic Mineral Products	3.25%	556	3.18%	370
Primary Metals	3.55%	608	3.18%	369
Furniture	3.96%	677	3.03%	352
Apparel	2.67%	457	1.36%	158
Textiles	2.13%	364	1.03%	120

Source: Current Employment Statistics survey, Bureau of Labor Statistics.

Note: Not all manufacturing industries are included.

The Changing Character of Manufacturing Work

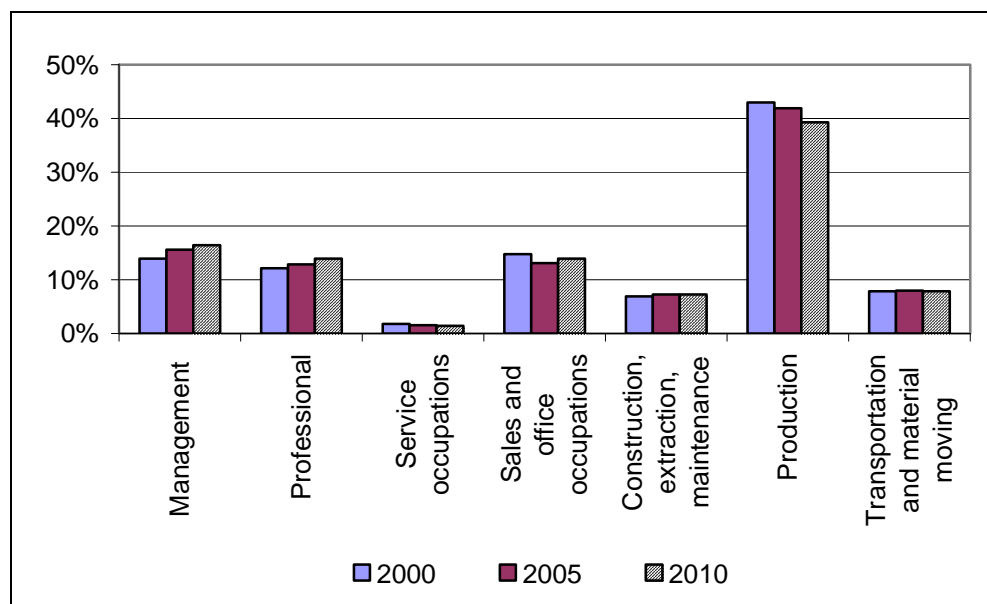
In the public mind, the word “factory” is associated with the concept of mass production, in which large numbers of workers perform repetitive tasks. While mass production is still an important aspect of manufacturing, routine production functions, from welding joints in truck bodies to removing plastic parts from a molding machine, have proven susceptible to automation. This has had important consequences for the nature of work in manufacturing establishments and for the skill requirements of manufacturing workers.⁵

Goods production is no longer the principal occupation of workers in the manufacturing sector. Fewer than 40% of manufacturing employees are directly involved in making things, and that proportion fell by nearly four percentage points between 2000 and 2010 (see **Figure 3**). Some 30% of all manufacturing workers now occupy management and professional jobs.

⁵ On the changing sources of value in U.S. manufacturing, CRS Report R41712, “*Hollowing Out*” in U.S. Manufacturing: Analysis and Issues for Congress, by Marc Levinson.

Figure 3. Employment by Occupation within Manufacturing, 2000-2010

Percentage of total manufacturing employment



Source: Bureau of Labor Statistics, unpublished data from Current Population Survey.

In many manufacturing sectors, the shift to higher skill requirements is even more pronounced. Total employment in the U.S. computer and electronic equipment manufacturing sector has declined due to automation, sharp falls in demand for certain products once produced in the United States (notably television tubes and audio equipment), and changed production economies that cause manufacturers to concentrate worldwide production in a small number of locations. Of the 1.1 million people employed in this sector in 2010, only 29% were engaged in production work, for which a high school education may be sufficient;⁶ 21% of the industry's workers were in architecture and engineering occupations and another 12% in computer and mathematical occupations, for which much higher education levels are required. Similarly, some 28% of the workers in the pharmaceutical manufacturing subsector are involved with production. Many of the rest have scientific skills associated with higher education levels.⁷

The increasing demand for skills in manufacturing is most visible in the diminished use of “team assemblers” – essentially, line workers in factories and warehouses. In 2000, 1.3 million people were employed as team assemblers. By 2010, employment in this occupation, which typically requires little training and no academic qualifications, had fallen to 900,000. Of those, 693,000 worked in manufacturing, representing 6% of manufacturing jobs. This type of job, once the core of manufacturing, has become so unimportant to many manufacturers and warehouse operators that one-seventh of all team assemblers work for employment agencies, which furnish workers to other companies on an as-needed basis.⁸

⁶ For example, Texas Instruments, a semiconductor manufacturer, requires a completed high school education or equivalent for “manufacturing specialists.” See <http://www.ti.com/careers/manufacturing/specialist.shtml>.

⁷ Data from Bureau of Labor Statistics Occupational Employment Statistics database, <http://data.bls.gov/oes/occupation.do>.

⁸ *Ibid.*

There are also far fewer manufacturing workers performing individual tasks on a piecework basis. Piecework compensation used to be the norm in industries such as apparel and shoe manufacturing, as each worker was responsible for a specific step in the production process and was paid according to the number of units he or she processed. In recent years, however, many of the surviving U.S. apparel plants have reorganized production workers into groups that are collectively responsible for multiple aspects of production. According to the Bureau of Labor Statistics (BLS), “Many companies are changing to incentive systems based on group performance that considers both the quantity and quality of the goods produced.”⁹ A similar change appears to be occurring in other sectors, as firms seek to move away from pay systems that reward workers simply for the quantity of goods produced rather than for quality and problem-solving.¹⁰

The changing occupational mix within the manufacturing sector is mirrored by changing educational requirements. In 2000, 53% of all workers in manufacturing had no education beyond high school. Between 2000 and 2010, that share dropped by five percentage points, even as the proportion of manufacturing workers with college or graduate degrees rose by six percentage points. Given that college-educated workers generally command significantly higher pay in the labor market than high-school drop-outs and high-school graduates, it is unlikely that manufacturers would willingly hire more educated workers unless there were a payoff in terms of greater productivity.

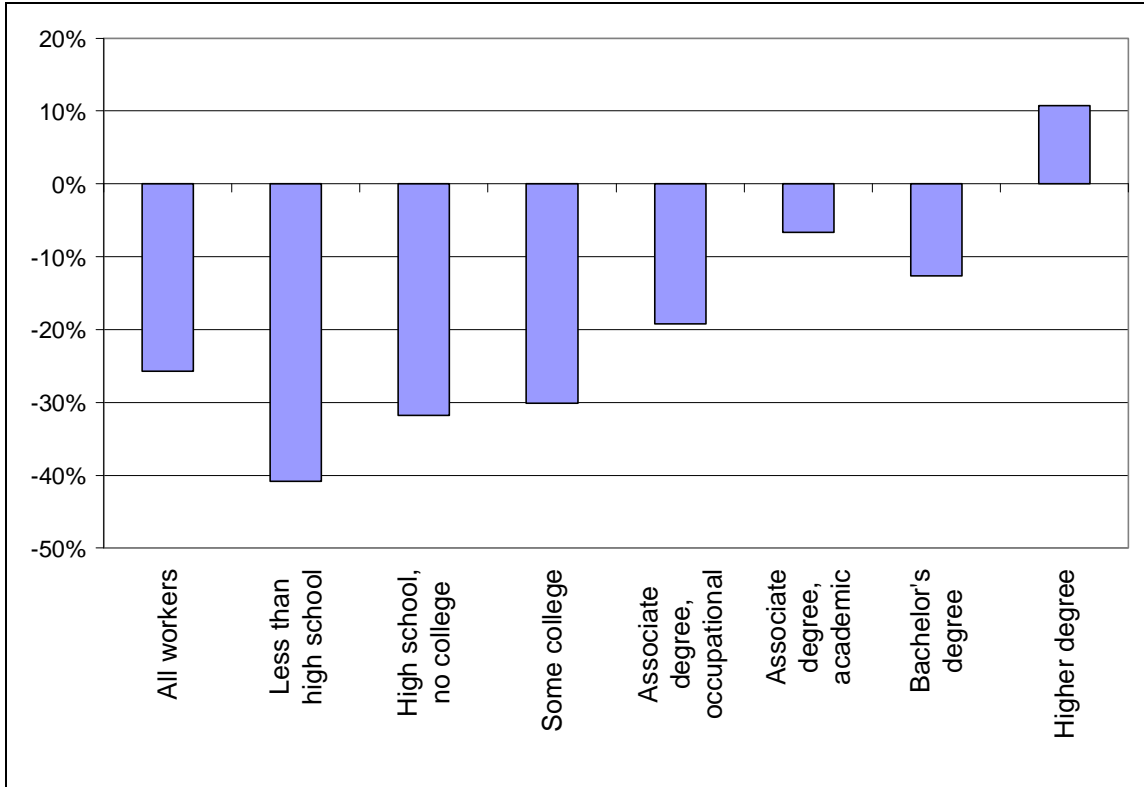
It is noteworthy that, despite the loss of 4.5 million manufacturing jobs over the decade, the number of manufacturing workers with graduate degrees increased by 10% (see **Figure 4**). Demand for workers with associate (community college) degrees in academic fields, which qualify the recipient to pursue education to the bachelor’s degree level, was not as weak as demand for workers without degrees beyond high school. Workers with associate degrees in occupational fields, which prepare students for immediate workforce entry into specific careers, fared more poorly than those with vocational degrees.¹¹

⁹ Bureau of Labor Statistics, “Textile, Textile Product, and Apparel Manufacturing,” *Career Guide to Industries*, 2010-11 edition, <http://www.bls.gov/oco/cg/cgs015.htm>.

¹⁰ Susan Helper, Morris M. Kleiner, and Yingchun Wang, “Analyzing Compensation Methods in Manufacturing: Piece Rates, Time Rates, or Gain-Sharing?” National Bureau of Economic Research working paper 16540, November 2010, <http://www.nber.org/papers/w16540>.

¹¹ Unpublished data from Bureau of Labor Statistics, Current Population Survey, “Employed Persons by Intermediate Industry, education, sex, race, and Hispanic or Latino ethnicity (25 years and over),” 2010 and prior years. It is unclear whether the higher demand for workers with academic associate degrees reflects higher skill levels among those workers or is a result of individuals with greater ability enrolling in the academic rather than occupational programs at community colleges.

Figure 4. Manufacturing Employment by Worker Education
 Percentage change, 2000-2010

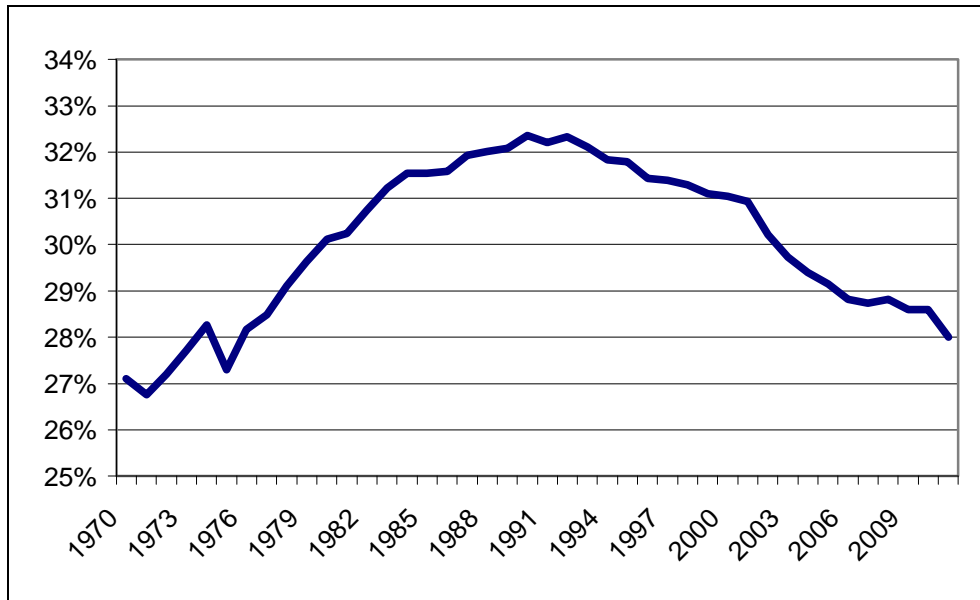


Source: Bureau of Labor Statistics, unpublished data from Current Population Survey.

Women now account for 28% of manufacturing workers, the smallest share since 1975 (see **Figure 5**). Women have long accounted for an unusually large share of employment in some of the industries that have experienced the steepest drops in employment, notably apparel, textiles, and electrical manufacturing. That workforce was significantly less educated than the male workforce in manufacturing: in 2000, 41% of female manufacturing workers had any education beyond high school, compared with 61% of their male counterparts.

This gender gap in education has closed over the past decade, due largely to the departure of these less educated women from the manufacturing workforce. The number of female manufacturing workers with no education beyond high school fell 47% from 2000 to 2010. As a result, the number of years of schooling of female manufacturing workers is now very similar to that of males in manufacturing. Some 27% of women workers in manufacturing hold college degrees, whereas 12% have failed to complete high school.

Figure 5. Manufacturing Employment by Gender
 Percent of manufacturing workforce that is female



Source: Bureau of Labor Statistics, Current Employment Statistics.

Notes: Data are for January of each year and are not seasonally adjusted.

The Disappearance of the Large Factory

The stereotypic manufacturing plant has thousands of employees filling a cavernous factory hall. This stereotype, however, is outdated. The United States now has very few large factories: of more than 330,000 manufacturing establishments¹² counted in the 2007 Economic Census, 192 employed more than 2,500 workers, and 1,014 employed more than 1,000 (see **Table 2**). As the number of large factories has plummeted, the number of small factories, those with fewer than 100 workers, has declined only modestly. Most of the plants in the latter category are extremely small, with average employment of 15 workers.¹³

¹² The Economic Census collects data by establishment, which is defined as “a single physical location where business is conducted or where services or industrial operations are performed.” In the manufacturing sector, an establishment is analogous to a factory, and the terms are used interchangeably in this section.

¹³ U.S. Economic Census 2007, “Sector 31: Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007.”

Table 2. The Size Distribution of Factories

Number of establishments by number of employees

	99 or less	100-249	250-499	500-999	1,000-2,499	Over 2,500
1997	327,907	22,286	7,854	3,279	1,187	316
2002	319,643	20,346	6,853	2,720	1,025	241
2007	303,624	19,334	6,154	2,410	822	192
Change, 1997-2007	-7.41%	-13.25%	-21.65%	-26.50%	-30.75%	-39.24%

Source: U.S. Economic Censuses, 1997, 2002, and 2007, "Industry Statistics for Subsectors and Industries by Employment Size."

Most of the decline in the number of factories with 2,500 or more workers has occurred in two industries, transportation equipment manufacturing and computer and electronics manufacturing. The relevant data are collected every five years in the Census Bureau's Economic Census.¹⁴ It is important to note that the employment data pertain to March of each Economic Census year, so that the data for 2007 reflect conditions before the economy entered recession in December 2007. For this reason, the loss of large manufacturing establishments over the 1997-2007 period likely has less to do with the cyclical downturn than with secular causes.

The recent economic literature on the causes of changes in factory size is scant, but evidence suggests two principal causes. One is automation: as firms substitute capital for labor, fewer workers are required to produce a given quantity of output. The other is the increase in what economists refer to as "vertical specialization," with individual plants making a narrow range of the components required for a finished product, and those partially finished goods, known as "intermediate products," being shipped from one location to another along a sometimes lengthy supply chain before the final good is manufactured.¹⁵ Much of the growth in international trade in recent years has involved intermediate products in international supply chains, and one logical – although undocumented – corollary of that growth would be that large factories reduce the scope of their activities and shed workers who formerly made inputs that are now obtained elsewhere.

Among the large factories that remain in business, average employment size has not changed significantly. In aggregate, however, large factories account for a diminishing share of manufacturing employment (see **Table 3**). In 2007, one in 14 manufacturing workers was

¹⁴ Recent research conducted by the Census Bureau points to problems with plant-level data from the Economic Census due to the methods used to impute response values for establishments that have not responded to all questions. This shortcoming is said to bias estimates of productivity change within small subsectors (those classified at the level of six-digit codes) within manufacturing. However, it is not clear that these problems affect data estimates for the manufacturing sector as a whole or for large industrial sectors within manufacturing. See T. Kirk White, Jerome P. Reiter, and Amil Petril, "Plant-level Productivity and the Imputation of Missing Data in the Census of Manufactures," U.S. Census Bureau, January 10, 2011, http://www.census.gov/ces/researchprograms/seminars.php?down_key=322.

¹⁵ For a survey of the evidence on vertical specialization, see Gary Herrigel, *Manufacturing Possibilities: Creative Action and Industrial Recomposition in the United States, Germany, and Japan* (New York: Oxford University Press, 2010), ch. 4-6. The literature on the implications of vertical specialization for international trade flows, which stems from the observation that trade in manufactured goods has grown far more rapidly than global output of manufactured goods, is now quite large, but economists have paid much less attention to the implications of vertical specialization for the structure of the manufacturing sector. On "outsourcing" of work in manufacturing and other sectors, see CRS Report RL32292, *Offshoring (or Offshore Outsourcing) and Job Loss Among U.S. Workers*, by Linda Levine.

employed in a plant with more than 2,500 workers, and one in six worked in a plant with more than 1,000 workers.

Table 3. Manufacturing Employment by Establishment Size
Percent of manufacturing employment in employment size category in given year

	99 or less	100-249	250-499	500-999	1000-2499	Over 2,500
1997	30.90%	20.44%	16.17%	13.25%	10.23%	9.02%
2002	32.29%	21.32%	16.04%	12.49%	10.17%	7.70%
2007	34.17%	22.15%	15.73%	12.19%	8.91%	6.86%

Source: U.S. Economic Census, 1997, 2002, and 2007, "Industry Statistics for Subsectors and Industries by Employment Size."

Start-ups and shutdowns

The employment dynamics of the factory sector differ importantly from those in the rest of the economy. In other economic sectors, notably services, business start-ups and shutdowns account for a large proportion of job creation and job destruction. In manufacturing, by contrast, employment change appears to be driven largely by the expansion and contraction of existing firms, and entrepreneurship and failure play lesser roles. This may be due to obvious financial factors: the large amounts of capital needed for manufacturing equipment may serve as a deterrent to opening a factory, and the highly specialized nature of manufacturing capital may make it difficult for owners to recover their investment if an establishment shuts down entirely rather than reducing the scope of its production activities.

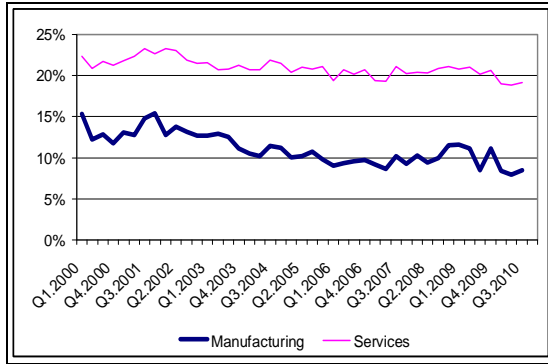
The dynamics of employment change in manufacturing can be seen in two different government databases. The Bureau of Labor Statistics Business Employment Dynamics database, which is based on firms' unemployment insurance filings, offers a quarterly estimate of gross employment gains attributable to the opening of new establishments and to the expansion of existing ones, and of the gross job losses attributable to the contraction or closure of establishments.¹⁶ In manufacturing, BLS finds, less than 10% of gross job creation since 2005 is attributable to new establishments, and more than 90% to the expansion of existing establishments. This is quite a different picture than that offered by the service sector, in which openings routinely account for more than 20% of all new jobs (see **Figure 6**).

Similarly, while plant closings are frequently in the headlines, closings are responsible for less than 12% of the manufacturing jobs lost since 2005, according to BLS data. The vast bulk of manufacturing job losses occur at establishments that remain in operation. Closure is far less likely to be the cause of job loss in the manufacturing sector than in the service sector.¹⁷

¹⁶ "Gross" job gains and losses refer to the number of positions created and eliminated, respectively; the net change in employment can be calculated by subtracting gross job losses from gross job gains. For technical details on this database, see <http://www.bls.gov/news.release/cewbd.tn.htm>.

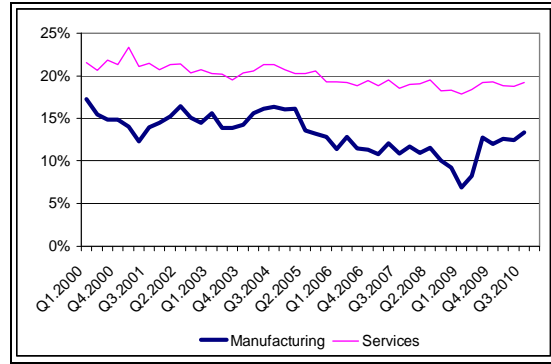
¹⁷ Data derived from Bureau of Labor Statistics Business Employment Dynamics database, <http://www.bls.gov/bdm/>.

Figure 6. Jobs Created by Establishment Openings
Percent of New Jobs



Source: Bureau of Labor Statistics.

Figure 7. Jobs Lost Due to Establishment Closings
Percent of Jobs Lost



Source: Bureau of Labor Statistics.

The other source of data on the connection between new factories and manufacturing job creation is the longitudinal business database maintained by the Census Bureau’s Center for Economic Studies. This database, which contains data since 1976, covers some establishments (notably certain public sector employers) not included in the BLS database and links individual firms’ records from year to year in an attempt to filter out spurious firm openings and closings.¹⁸ The Census database has different figures than the BLS database, but identifies similar trends, in particular that establishments are born and die at far lower rates in the manufacturing sector than in other sectors of the economy.

The Census Bureau data make clear that the rate at which new business establishments of all sorts were created fell significantly during the recession.¹⁹ Yet they also show that, within the manufacturing sector, the decline in the rate at which new factories are opened has persisted for at least three decades.

The new manufacturing establishments that have been created in recent years have accounted for relatively few jobs, the Census data suggest. On average, 28% of the manufacturing jobs created in recent years have occurred at newly opened factories, whereas 37% of all jobs created across the economy have been in new establishments. The average new manufacturing establishment provides 17 jobs during its first year in operation.²⁰ The Census data also indicate that approximately 29% of the job loss in manufacturing, on average, is related to the closure of a plant, slightly less than the 33% of job loss that is related to establishment closure across the entire economy.

These two data sources on business dynamics thus support similar conclusions about the role of plant openings and closings in manufacturing employment. Only a small share of the jobs that are

¹⁸ For information about this database, see http://www.ces.census.gov/index.php/ces/researchdata?detail_key=10.

¹⁹ John Haltiwanger, Ron Jarmin, and Javier Miranda, “Historically Large Decline in Job Creation from Startup and Existing Firms in the 2008-09 Recession,” March 2011, http://www.ces.census.gov/docs/bds/plugin-BDS%20March%202011%20single_0322_FINAL.pdf.

²⁰ Census Bureau, Longitudinal Business Database, http://www.ces.census.gov/index.php/bds/bds_database_list.

created in the manufacturing sector come from new factories, and a minority of the jobs lost come from the closure of existing factories. These facts indicate that marginal employment change in manufacturing depends more heavily on staffing decisions at existing factories than on the creation of new ones.

Selected Policy Issues for Congress

The 112th Congress is considering a large amount of legislation intended to revive the manufacturing sector. The pending bills take extremely diverse approaches, ranging from establishing tax-exempt manufacturing reinvestment accounts (H.R. 110, Manufacturing Reinvestment Account Act of 2011) to encouraging “repatriation” of manufacturing (H.R. 516, Bring Jobs Back to America Act) to creating an Innovation Technology Loan Guarantee Program (S. 239, Innovate America Act) to increasing domestic content requirements for federally supported transportation projects (H.R. 613, Airports, Highways, High-Speed Rails and Transit: Make it in America Act) to creating a federal registry of skill credentials for manufacturing occupations (H.R. 1325, The America Works Act).

These proposals, and many others, are typically advanced with the stated goal of job creation, and often with the subsidiary goals of improving employment opportunities for less educated workers or reversing employment decline in communities particularly affected by the loss of manufacturing jobs. The available data suggest, however, that these goals may be difficult to achieve. In particular:

- Even large increases in manufacturing activity are likely to translate into only modest gains in manufacturing employment due to firms’ preference to use U.S. facilities for highly capital-intensive production. Examples of this heavy use of capital can be seen in two recent announcements by automotive manufacturers: General Motors stated in May that it would invest \$2 billion in 17 U.S. facilities, thereby creating or preserving 4,000 jobs – an investment of \$500,000 per job – and Hyundai said it would add 214 positions after spending \$173 million to expand engine production, an investment of over \$800,000 per job.²¹
- Increases in manufacturing employment are unlikely to result in significant employment opportunities for workers who have not continued their educations beyond high school, as the sorts of tasks performed by manufacturing workers increasingly require higher levels of education and training. At the same time, manufacturers report shortages of certain manufacturing skills. For example, Pennsylvania training officials predict openings for precision machining and skilled industrial workers over the next few years even though they expect total employment in related industries to decline.²² This suggests that training efforts

²¹ General Motors Co., “GM to Invest \$2 Billion in U.S. Plants, Adding 4,000 Job,” press release, May 11, 2011, http://media.gm.com/content/media/us/en/gm/news.detail.html/content/Pages/news/us/en/2011/May/0510_bigbang; Office of the Governor, State of Alabama, “Hyundai Motor Manufacturing Alabama Expands Engine Plant,” press release, May 16, 2011, http://www.governor.alabama.gov/news/news_detail.aspx?ID=5080.

²² Pennsylvania Center for Advanced Manufacturing Careers, “Critical Shortages of Precision Machining and Industrial Maintenance Occupations in Pennsylvania’s Manufacturing Sector,” December 2010, http://www.paworkforce.state.pa.us/portal/server.pt/community/pa_center_for_advanced_manufacturing_careers/1890.

may be helpful in preparing individuals for manufacturing work even if they do not lead to an increase in total manufacturing employment.

- To the extent that federal policies lead to the establishment of new manufacturing facilities in the United States, those facilities are likely to provide only limited employment opportunities in the locations where they are built, as plants with more than 1,000 workers are now rare. This suggests that there will be relatively few instances in which the siting of a new plant, by itself, will suffice to revitalize a community with a struggling economy.
- Policies that promote construction of new facilities for manufacturing may be less effective ways of preserving or creating jobs than policies aimed at existing facilities, as new establishments are relatively unimportant as drivers of employment in manufacturing.

It is important to note that increased manufacturing activity may lead to job creation in economic sectors other than manufacturing, such as transportation and business services. To the extent that increased domestic production of manufactured goods supplants imports, however, any increases in ancillary employment related to domestic manufacturing may be counterbalanced by reduced employment related to the transportation and processing of imported goods, leaving the net employment effect uncertain.

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