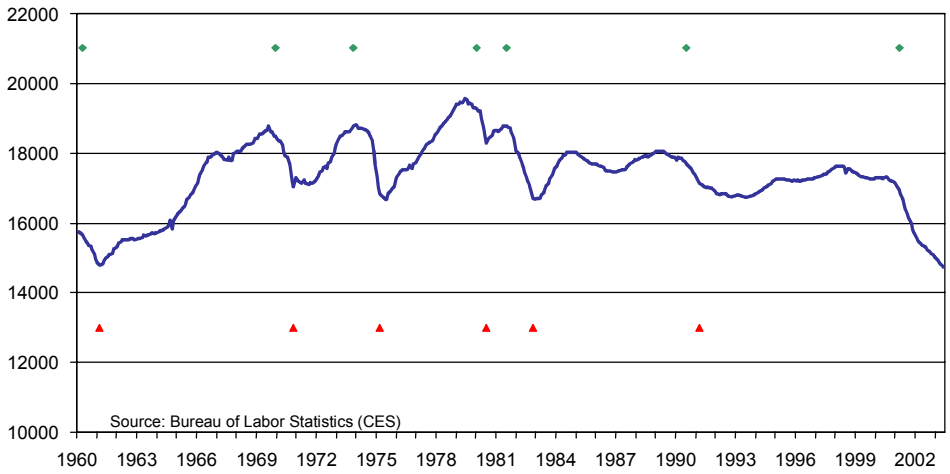
Testimony Before the Senate Committee on Finance
July 8, 2003

Good morning, my name is Kathryn Kobe and I am the Chief Economist of Joel Popkin and Company. We are economic consultants based here is Washington, DC. Joel Popkin and Company recently completed a white paper on the importance of manufacturing to the U.S. economy for the Council of Manufacturing Associations. This testimony is drawn from the research JPC conducted for that paper. The executive summary of the paper is appended.[1]

I have been asked to outline the current state of manufacturing in the U.S. The basic data on job losses in manufacturing paint a stark picture of a sector that is struggling for survival. In March 2001, the U.S. reached the official end of the economic expansion that began in March 1991 and entered its first recession in over a decade. Since the beginning of the recession, the number of manufacturing jobs has plummeted, declining by 2.2 million jobs between March 2001 and June 2003. That is over 70 percent of the 3.1 million jobs lost in the private sector during that time period. However, the manufacturing sector was losing jobs well before the official start date of the

Chart 1:The Number of Manufacturing Jobs in the U.S.
(in thousands)



[1] The full paper is available for download from the JPC website, www.jpcecon.com.

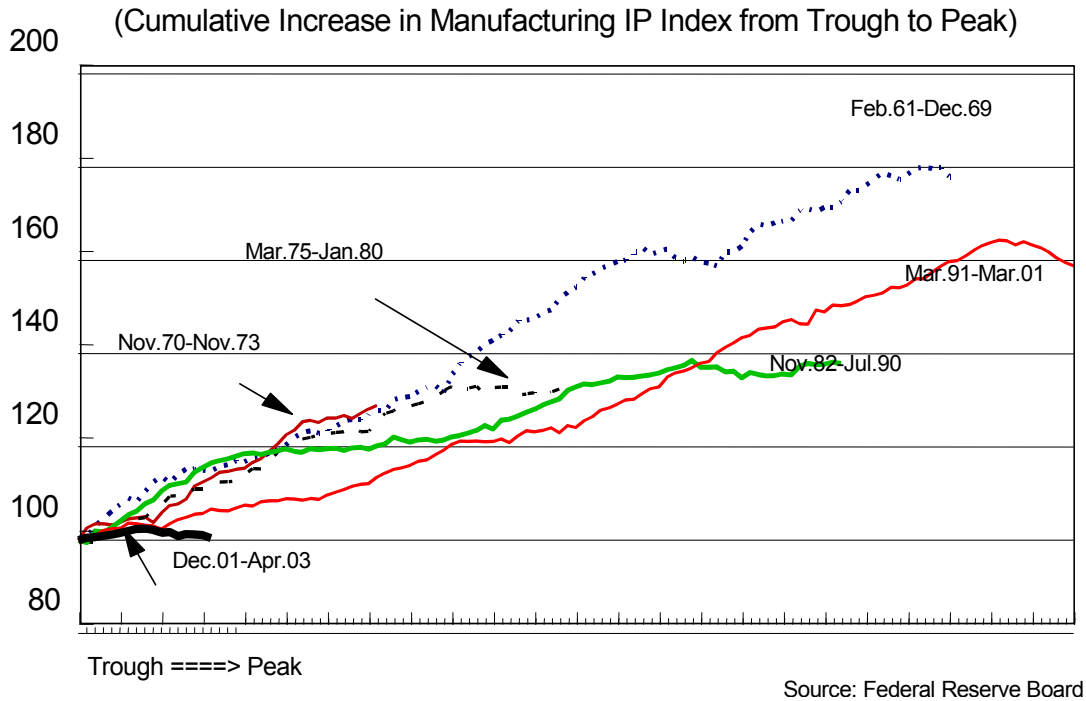
downturn. The sector lost almost a half million jobs between 1998 (when the number of manufacturing jobs peaked for this expansion) and early 2001.[2]

How unusual is this job loss during a recession? The chart above tracks the number of manufacturing jobs in the U.S. between January 1960 and June 2003. Along with the number of jobs the chart shows the peaks and troughs of the business cycle (peaks are marked by the diamonds at the top of the chart and troughs by the triangles at the bottom of the chart). It is clear, that manufacturing employment in the past has shown steep declines during the periods of recession and tended to recover relatively quickly once the trough of the recession had passed. However, beginning in the 1980s, the number of jobs gained during the recovery period has been noticeably smaller. During the most recent expansion manufacturing jobs showed few gains, in March 1991 there were 17.1 million manufacturing jobs and by March 1998 (the high point for manufacturing jobs during the expansion) the total was only 17.6 million. The number of jobs lost during the most recent recession has not been matched since the early 1980s; and the current level of manufacturing jobs is lower than it was at the trough of the 1961 recession.

Manufacturing has been a significant success story in the area of labor productivity. Consequently, a stable level of manufacturing jobs or even a reduction in manufacturing jobs might reflect growth in productivity without a decline in manufacturing output. However, manufacturing's share of GDP has also fallen over this time period. In 1991, the manufacturing sector produced 17.4 percent of U.S. GDP. Manufacturing had already faced a significant amount of competition and restructuring during the decade of the 1980s and had seen its share of GDP slip from 20 percent in 1982. However, the sector's share of GDP did stabilize during the early 1990s, fluctuating in a relatively narrow range. In 1995 the manufacturing sector was still producing 17.4 percent of a growing nominal dollar GDP. Since 1995, manufacturing's share of GDP has shown sharp declines and by 2001 (the latest information available) its share was only 14.1 percent. While the 2002-2003 estimates will not be available until next spring, other measures of the manufacturing sector would indicate that its share may have declined further since then.

[2] The data on the number of jobs in manufacturing was revised on June 6, 2003 when the BLS changed to using the North American Industrial Classification System (NAICS) for its Current Employment Survey Statistics. The chart and the numbers in the text are based on a consistent definition of manufacturing based on NAICS. Under the old definition, manufacturing has a larger number of jobs, primarily because publishing was a part of manufacturing under the old definition. However, the size of the decline in the number of manufacturing jobs is similar regardless of which data are used.

Chart 2: Manufacturing Industrial Production Growth during Recent Expansions



Source: Federal Reserve Board

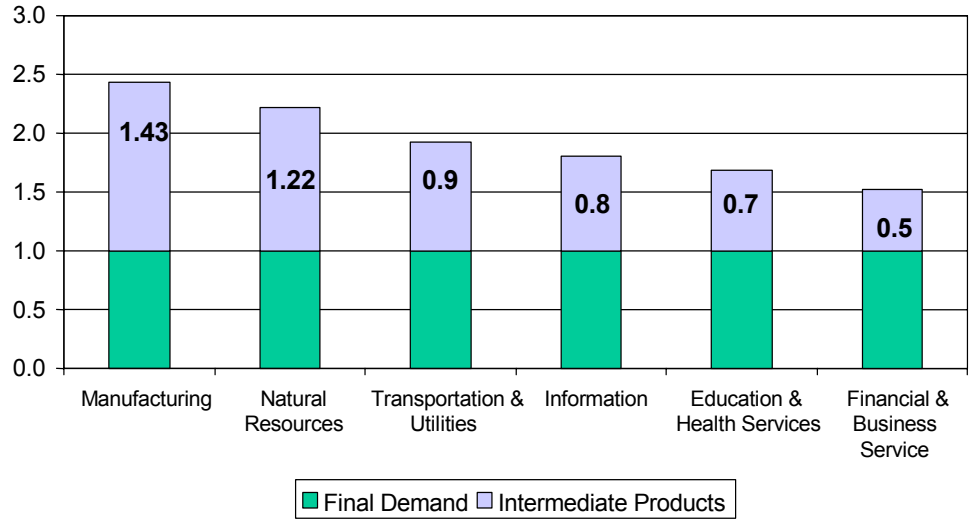
The NBER has not yet set a date for the trough of the recession that began in March 2001. However, if one assumes that the trough was at the end of 2001 and compares the growth in manufacturing output over the past year and a half with the growth in manufacturing output during the early part of other recent expansions, there is a noticeable difference in the pattern. Chart 2 compares manufacturing output of this expansion to those of the previous five expansions, using the industrial production index for manufacturing. The chart shows the growth in output from trough to peak of the respective economic expansions. [3] In the expansions during the 1960s, 1970s and 1980s, manufacturing output rose about 23 percent during the first 17 months of recovery. The recovery from the 1990-91 recession took twice as long to reach that point – over 30 months. That was one reason the early portion of that expansion is often referred to as the "jobless recovery." The recovery in manufacturing output during this expansion is lagging even the poor start of the 1991 recovery. Manufacturing output is up less than 1.0 percent over the past 17 months compared with about 7 percent the previous recovery. By all of these measures the sharp decline in manufacturing

[3] Peak and trough months are determined by the National Bureau of Economic Research's Business Cycle Dating Committee. That Committee has determined that the peak of the last expansion, and thus the start of the most current recession was in March 2001. It has not yet determined the date for the trough of the recession. For this analysis, December 2001 has been chosen as the most likely date for the trough month.

appears to be more than just part of the usual cyclical pattern of a downturn in the economy.

A dynamic economy is constantly undergoing changes and readjustments. What benefits has the manufacturing sector contributed to the U.S. economy that are potentially at risk as the sector downsizes? The first is manufacturing's many links to the rest of the economy. The manufacturing sector has the highest multiplier of any major sector in the economy. That means that for each dollar of final demand for manufactured products, an additional $1.43 worth of goods and services is needed to

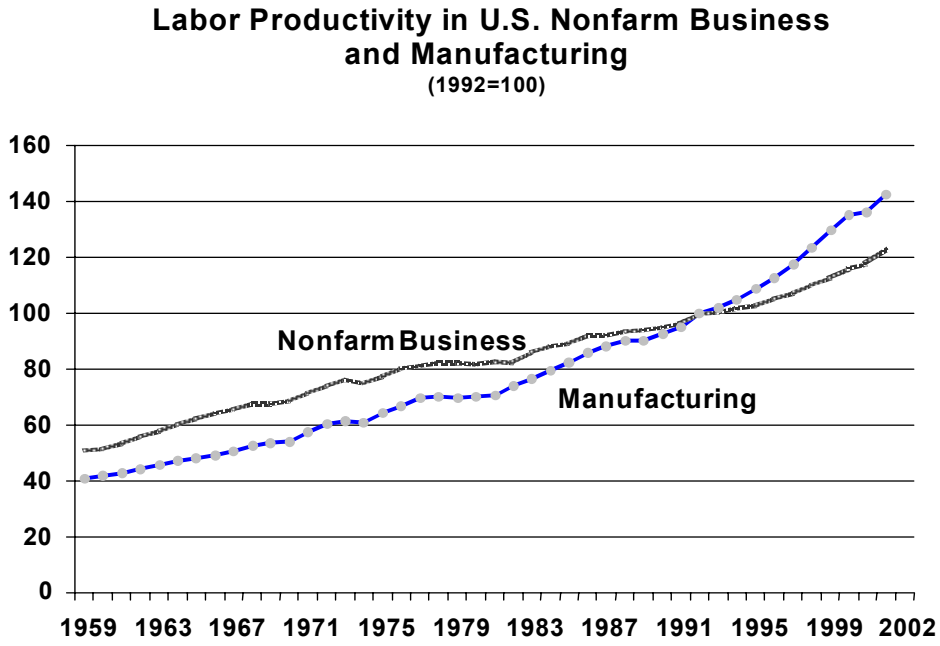
Chart 3: Multipliers for Selected Sectors of the Economy



Source: Bureau of Economic Analysis

produce that output. Those additional goods and services come from other manufacturers in the form of parts and supplies, and from sectors of the economy outside of manufacturing. The major service-producing sectors has significantly smaller multipliers. An increase of a dollar in the final demand for information services requires only $0.80 worth of additional output from other sectors of the economy, an increase in the demand for financial and business services requires even less additional output, $0.50 worth. Consequently, when the demand for manufacturing output grows it produces more secondary demand for other goods and services than does any other major sector and when manufacturing demand shrinks, so does the demand for the goods and services that are needed to support it.

Manufacturing has long led U.S. industries in productivity growth. Gains in productivity raise a country's standard of living. In the past fifteen years – which include both years of economic expansion and recession – output per hour in the U.S. private non-farm economy rose at an average annual rate of 1.9 percent. That productivity performance was substantially a result of gains in manufacturing labor productivity, which rose 3.1 percent per year.[4] In the same timeframe, total nonfarm multi-factor productivity – the productivity of labor and capital combined – advanced 0.9 percent annually. For the manufacturing sector the rise was 1.6 percent per year. Durable manufacturing turned in an exceptionally strong multi-factor productivity increase of over 2 percent per year, reflecting the technological breakthroughs in the manufacture of high-technology electronic goods.



Source: Bureau of Labor Statistics

Manufacturers are the major dynamo of R&D. Over the past 20 years, manufacturing has performed almost 60 percent of all R&D in the United States. The National Science Foundation estimates total U.S. R&D spending in 2002 at $291 billion.[5] Of that amount, R&D performed by private industry is estimated at $213 billion.

[4] Bureau of Labor Statistics, U.S. Department of Labor, Productivity and Costs
[5] "Slowing R&D Growth Expected in 2002," National Science Foundation *InfoBrief* (NSF 03-307), December 2002.

Detailed 2002 R&D totals by industry have not yet been published, but R&D performed by manufacturing industries is estimated at $127 billion, more than 60 percent of the total private R&D, and about 45 percent of all R&D performed in the United States.[6] In 2000, manufacturing industries financed (as well as performed) about 55 percent of all private R&D.[7]

The process through which R&D promotes economic prosperity is multi-faceted and complex. The first avenue is through direct benefits to firms from their R&D investments. Those direct benefits, or the potential benefits a rival might gain from R&D, are the primary driver of firm-financed R&D. Inventions being turned into innovations and those innovations producing an incentive for other innovations is what William Baumol, in his book *The Free-Market Innovation Machine*, refers to as the cumulative nature of innovation or as "innovation breeding." [8] However, not all the positive impacts of R&D accrue just to the firm that is financing it. The second path by which R&D makes an impact on the economy is through "spillovers" whereby R&D performed by one firm benefits other firms without direct compensation for the innovation. The third is the feedback from R&D and its spillovers to improve manufacturing products, processes, and distribution networks. The fourth is through the widely discussed multiplier – the effect of one industry's investment on other industries.

R&D spillovers are an important factor in this process. Spillovers come about when parties derive benefits from the R&D without having to fully compensate the company conducting the research. Spillovers are often characterized in one of three ways, but these pathways often interact and increase their combined effect.[9] One way is through "market spillovers," in which the marketing of a new product creates benefits to market participants other than the innovating firm. Often this is through a new technology that is embodied in products newly developed or improved by R&D. However, because producers fail to capture all of the improvements in the prices they charge for those new goods, cost-free benefits accrue to competitors and customers, or are handed back to suppliers. [10] A second kind is termed a "knowledge spillover." This is the transmission of knowledge from an R&D activity that can be used by other

[6] Estimates of manufacturing sector R&D are based on detailed 2000 distributions applied to 2002 industry totals.
[7] The remainder of the funding came primarily from the federal government; however, the federal government's financing of R&D performed by industry has been virtually unchanged in recent years.
[8] *The Free-Market Innovation Machine*, William J. Baumol, Princeton University Press, 2002.
[9] "The Importance of 'Spillovers' in the Policy Mission of the Advanced Technology Program," by Adam B. Jaffe, *Journal of Technology Transfer*, Vol. 23 (2), pp. 11-19.
[10] The potential for market spillovers of R&D has been quantified in a forthcoming NIST paper, "Inter-Industry Diffusion of Technology That Results From ATP Projects" (GCR # 03-848).

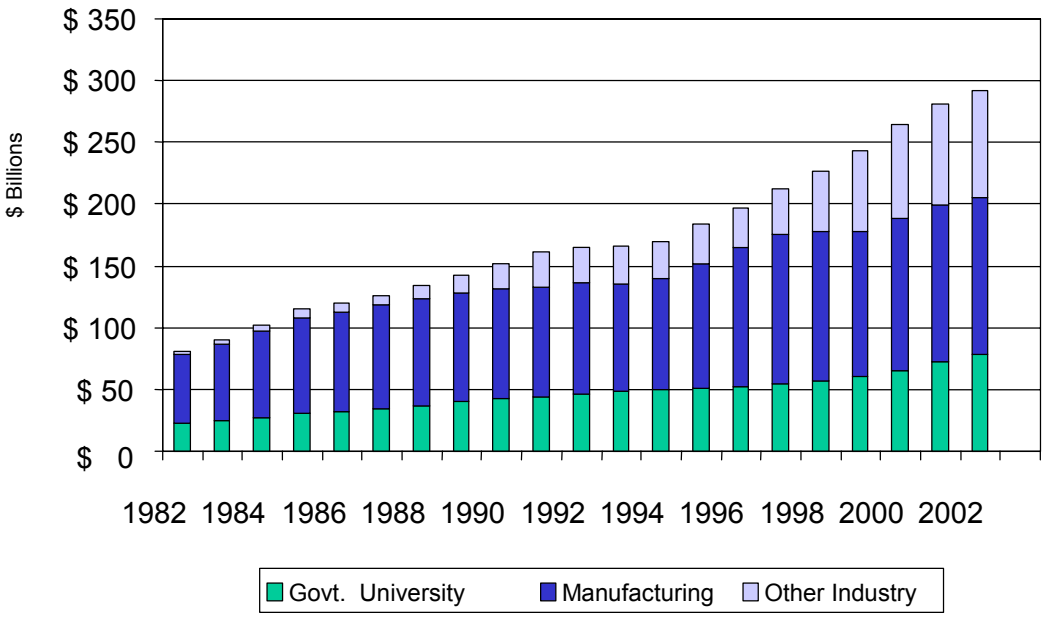
economic agents in a virtually cost free manner. A third kind is a "network spillover." It occurs when R&D benefits are enhanced in value by the development of a related set of technologies. Thus, extra benefits may accrue to an innovation if related technological innovations also take place. For example, the existence of a modem allows greater benefits to be derived from computers, and the more people one can communicate with in that network the greater those benefits.

It is widely recognized that spillover effects are magnified the more interdependent the parties are and the closer their geographic proximity. A recent paper by Michael Orlando discusses the importance of proximity, both technological and geographical, to the spillover process. He finds that spillovers within a manufacturer's own very narrow sector tend to be much less sensitive to distance than are those from outside that narrow sector, although a combination of geographic and technological nearness seems to be advantageous. However, the impact from spillovers originating outside the manufacturers' narrow sector tend to decrease rapidly with distance.[11] Therefore, firms are more likely to benefit from spillovers when R&D takes place geographically near to them than they are if it occurs on the other side of the world, especially with regard to the benefits from more generalized R&D.

But recent numbers show weakness in manufacturing's R&D efforts. Manufacturers accounted for 62 percent of private R&D in 2000 – $124 billion – and manufacturers financed 90 percent of that total themselves.[12] However, the $11 billion increase in R&D spending between 2000 and 2002 represents only half the recent pace of R&D spending. In real terms, spending on R&D by all of private industry barely changed in 2002. And the National Science Foundation reports that manufacturing R&D input has barely grown for the past decade, only 5.6 percent (0.5 percent per year) in the 1989-1999 period. So while at 62 percent the manufacturing share of industry R&D is still high, that is much weaker than past performance. Manufacturing's share was 80 percent just 10 years ago and 95 percent 20 years ago. At first glance, one could conclude this is a result of the rapid growth of the services sector, and as Chart 5 shows there is an increase in non-manufacturing R&D.[13] However, the slowdown in the real

[11] "On the Importance of Georgraphic and Technological Proximity for R&D Spillovers: an Empirical Investigation," by Michael J. Orlando, Federal Reserve Bank of Kansas City, July 2000.
[12] The remaining funds come from federal government sources. "U.S. Industrial R&D expenditures and R&D-to-Sales Ratio Reach Historical Highs in 2000," National Science Foundation *InfoBrief* (NSF03-306), December 2002.
[13] Detailed tables on nonmanufacturing R&D indicate a large proportion of the expenditures take place in the network industries, trade and information services.

Chart 5: R&D Expenditures by Performing Sector



Source: National Science Foundation

growth of total R&D and the slowdown in goods-related R&D will impact the beneficial effects of the externalities that accompany new innovations in manufacturing.

There are also indications that the U.S.' R&D expenditures as a share of the total R&D conducted by industrialized countries have begun to shrink. In 1984, the United States accounted for about 48 percent of total OECD R&D expenditures (in real terms) but by 1998 that share had fallen to less than 44 percent. And while the United States still spends more, by far, on R&D than any other OECD nation, it ranks only fifth in the world when ranked on R&D expenditures as a percent of GDP. [14]

If the U.S. manufacturing base shrinks too much this innovation process is put at risk. A very small and diffuse manufacturing sector does not promote the same level of R&D activity. As the U.S. manufacturing base downsizes it promotes a shift in R&D and investment to other global centers where the critical mass necessary to conduct it exists and is growing. If this happens, a decline in the U.S. long-term economic growth rate is all but assured. National Institute of Standards and Technology economist Gregory Tassey puts the importance of domestic R&D into a broader perspective:

> Changes in competitive dynamics are altering the reward/risk ratio for R&D investments within and between technology life cycles. As life cycles compress, R&D at the company level no longer can exist in isolation of a

[14] *Science and Engineering Indicators--2002*, National Science Foundation, Chapter 4.

> supporting network. Corporations increasingly require access to R&D conducted by other firms in their supply chains and to the broader technology infrastructure provided by a national innovation system. If domestic R&D resources are not available, U.S. companies do not hesitate to form research partnerships with foreign companies, outsource R&D overseas, or directly invest in foreign research facilities. These research relationships often lead to follow-on foreign manufacturing relationships. Thus, the maintenance of an effective domestic R&D network is essential for attracting domestic and foreign R&D funds and subsequent manufacturing, which increases domestic value added and hence economic growth.[15]

This importance of the role of R&D also is recognized by the U.S.' trading partners. As part of its proposed auto policy, China would require international auto makers to foster R&D facilities within China.[16]

The ability to fund new private R&D spending comes largely from the profits that a company can plow back into its business. Thus, the available cash flow of manufacturing firms is closely linked to their ability to perform R&D work as well as make new capital investments. One measure of the cash flow available for such investments is the depreciation charges of a company plus the profits it retains rather than distributes as dividends to its shareholders.[17] Between 1999 and 2001, this measure of manufacturing corporate cash flow fell by almost 20 percent, to 25 percent of total corporate cash flow in the United States. In the late 1980s manufacturing accounted for almost 40 percent of all corporate cash flow in the U.S. economy. This puts severe limitations on companies' abilities to make the necessary investments to spur future innovations and growth. Cash flow varies with the business cycle and thus the recession is one of the reasons for the recent slowdown in R&D. Although it is not the only reason.

One area in which innovations have helped the U.S. is in its manufactured exports. Manufacturing R&D is an important driver in spurring growth in U.S. exports. Exports of R&D-intensive goods are a growing share of overall goods exports by the United States. In 1980 exports of such goods accounted for about 19 percent of all manufactured exports in the United States; by the late 1990s that share had grown to

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[15] "R&D and Long-Term Competitiveness: Manufacturing's Central Role in a Knowledge-Based Economy," by Gregory Tassey, National Institute of Standards and Technology, February 2002, p. 9.
[16] "China's New Auto Policy Favors Local Companies," *Wall Street Journal*, June 3, 2003.
[17] In the early 1990s, manufacturing was paying out almost 30 percent of all corporate dividend payments to shareholders in addition to retaining enough earnings to fund its investment programs. Manufacturing's share of dividend payments declined to about 20 percent of the total corporate dividend payments in 2001. Bureau of Economic Analysis, U.S. Department of Commerce.

about 27 percent.[18] However, by definition goods high in R&D content are those embedding new and better ideas. The world buys U.S. exports because they are "the better mousetrap." To maintain the growth in such goods requires a sizable continuous stream of investment in R&D, and a sizable manufacturing sector to innovate, produce, and sell those goods abroad.

The United States is the world's largest exporter of manufactured goods. In 2001, it exported almost $600 billion worth of goods. U.S. manufactured exports have more than doubled since 1990, and manufactured goods account for 82 percent of the United States' total merchandise exports and three-quarters of all its exports. Through most of the past two decades U.S. manufactured exports as a share of world trade have remained relatively constant – 13 percent in 1980, 12.1 percent in 1990 and 13.5 percent in 2001. At the same time trade has become an increasingly important part of the economies of the United States and other nations around the world. [19] But despite the growth in goods exports, the merchandise trade deficit has been negative since 1976. Goods exports as a share of U.S. GDP peaked at about 8 percent in late 1997 but has retreated to about 6 percent since then. This reflects declining goods exports in 1998 (due to the Asian currency crisis), some recovery in growth in the 1999-2000 period, and then a sharp decline in goods exports in 2001 and 2002. This last decline partially reflects the impact of the recession on our trading partners and the terrorist attacks in the United States in September 2001; but that is not the only cause. While the decline in U.S. exports in 2001 corresponded to a decline in total world trade, the same cannot be said for 2002. World merchandise trade increased 4 percent last year, while U.S. merchandise exports continued to decline.[20] Consequently, after two decades of relative stability, the U.S. share of world manufactured exports declined to about 11 percent in 2002. That reflects a worsening of the U.S. position vis-à-vis other nations producing manufactured exports.

America's success as an exporter has prompted other countries to build their own base for manufacturing exports. As world trade burgeoned in the 1990s, increasing from $4.2 trillion to $7.9 trillion, manufactured goods as a share of total world exports also increased from about 70 percent of the world's merchandise trade to about 75

[18] R&D intensive goods as defined in this case are biotechnology, life science technologies, opto-electronics, information and communications, electronics, flexible manufacturing, advanced materials, aerospace, weapons, and nuclear technology.
[19] The U.S.'s manufactured imports share of world trade has grown tremendously during this time period increasing from 11.2 percent in 1980 to 15.4 percent in 1990 and was 19.4 percent in 2001. *International Trade Statistics, 2002*, World Trade Organization.
[20] "Trade Recovered in 2002, but Uncertainty Continues," WTO, April 2003.

percent. U.S. businesses and consumers have benefited from the availability of many foreign-manufactured products; thus, traded goods have become an increasingly large share of the American market. The sum of U.S. exports and imports of manufactured goods are now equal to 40 percent of U.S. domestic production of manufactured goods. In 1987 that share was 20 percent.[21]

Continued growth in U.S. exports is vital to enabling the United States to trade with the rest of the world. [22] Exports earn foreign currency, and foreign-currency earnings support jobs and allow the United States to purchase foreign-made imports. The International Trade Administration estimates that 1 in 5 manufacturing jobs is tied to exports of manufactured products, and for each of those manufacturing jobs there are 1.3 non-manufacturing jobs tied to manufactured exports.[23]

The strong U.S. dollar overseas is blamed for handicapping export growth and encouraging the growth of imports. The recent weakening of the dollar should be helpful to U.S. goods manufacturers. A rise in their exports should follow. But the balance of trade impact of the dollar's recent decline will probably not be as large as some have anticipated. That is because the decline is being driven by the 17 percent depreciation of the dollar against “major” currencies of the world – those that are traded on exchanges outside of their own countries. But those countries only account for 56 percent of U.S. trade. The other 44 percent reflects trade with countries, such as China, whose currencies are not defined as major currencies. If one looks at exchange rates applicable to the other 44 percent of U.S. trade, as shown in Chart 6, it is clear that the dollar has been increasing in value against them – 2 percent in the past year.[24] Imports from those countries account for 46.5 percent of U.S. imports, but only 40.7 percent of U.S. exports. The differential for China is even larger. China bought 3 percent of U.S. exports in 2002, but was the source of 11 percent of U.S. imports.[25] In the absence of the Chinese government's intervention in the value of its currency against the dollar, U.S. exports to China would presumably be higher and imports from China lower.

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[21] Based on U.S. Department of Commerce data on manufactured exports and imports and manufacturers' shipments.

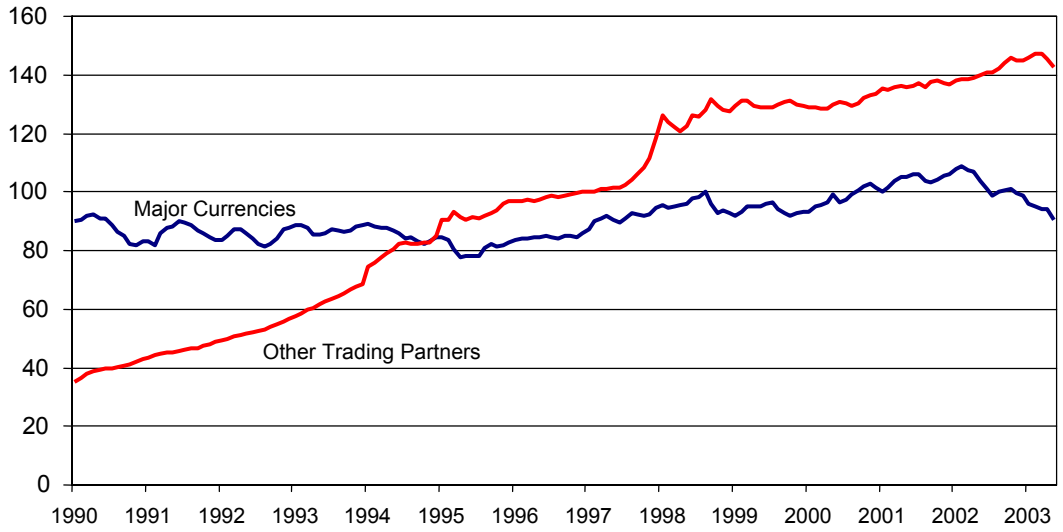
[22] The U.S.' large current account trade deficit is sustainable only as long as foreign investors are willing to continue to buy assets in the U.S. in the form of stocks and bonds. The U.S.' strong economic base and stable political situation have been the basis for attracting that investment in the past. However, there are never any guarantees that foreign investors will continue to accumulate dollar holdings in their foreign exchange reserves at the same rate they have in the past.

[23] "U.S. Jobs from Exports," International Trade Association, U.S. Department of Commerce, 2001.

[24] Many of the currencies in this index are pegged to the dollar and the exchange rate for those currencies show little month-to-month variation. The other currencies in the index tend to devalue against the dollar.

[25] In general China’s exports and imports boomed in 2002, each growing in excess of 20 percent overall. WTO figures show China was virtually tied with France for the spot of fourth largest exporter of merchandise in the world in 2002

Chart 6: Federal Reserve's Nominal Dollar Indexes



U.S. exports of services have grown significantly in recent years, but were still less than half the size of goods exports in 2002. Consequently, it is doubtful the United States can depend solely on trade in services to offset a serious decline in goods exports. In addition, U.S. providers of business services are facing increasingly strong competition as foreign producers of services begin to staff U.S. call centers and provide programming services to U.S. companies. These jobs represent U.S. service imports and offset U.S. service exports. Consequently, the solution to the trade deficit is unlikely to be found solely with service sector exports.

There are several other benefits that manufacturing provides the U.S. economy. A further discussion of those can be found in "Securing America's Future: The Case for a Strong Manufacturing Base" on JPC's website.

The final comment for this testimony returns to where it began. Jobs are lost when the manufacturing sector shrinks. What type of jobs are lost and what sorts of adjustments do those workers face? Manufacturing provides well-paying jobs with benefits to its workers. In 2001, salaries and benefits averaged about $54,000 in the manufacturing sector compared to an average of $45,600 for the private sector

overall.[26] Manufacturing offers job opportunities to workers across the educational spectrum – employing more than its relative share of the workforce with no more than a high school diploma, but also employing a large number of college-trained employees. In 2000, manufacturing had on its payrolls 16 percent of the workforce without a college degree, the second largest employer of that group in the country.[27] However, manufacturing also employed 12 percent of the workforce who had at least an associate's college degree, the second largest employer among the major industries of that group as well.[28]

Two factors have made the manufacturing sector attractive to workers with all levels of education. One is the pay and benefits, and the other the educational and training opportunities provided by employers. The latest Labor Department surveys on employer training were conducted during the early and mid-1990s. Those surveys indicated over half of manufacturing employees needed training to qualify for their jobs. About 13 percent of the workers received formal job training, 30 percent received informal job training, and 26 percent trained in a school environment.[29] About 38 percent of manufacturing workers also took skill-improvement training, the majority receiving their training through either formal or informal on-the-job-training. Manufacturing and infrastructure industries were leaders in the percentage of training time, about 40 percent of formal training time, that was devoted to production, communications and quality training.[30] However it is accomplished, training provides an important investment in human capital needed for future growth and productivity improvements. But as manufacturing downsizes, there is a growing scarcity of entry-level openings in manufacturing. While the average age of workers in manufacturing is only slightly higher than it is for the nonfarm economy as a whole – 41 years compared to 38 years – the distribution of workers is noticeably different. In 2000 (before the latest job losses), 19 percent of workers in manufacturing industries were below the age of 30, whereas for the economy as a whole, 28 percent of workers were younger than 30.[31]

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[26] Average compensation per full-time-equivalent employee. Bureau of Economic Analysis, U.S. Department of Commerce.

[27] Retail trade is the largest employer of workers without college degrees. BLS reports that in December 2002 wage levels in manufacturing were $17.33 per hour compared to $9.57 per hour in retail trade.

[28] The largest employer of people with less than a college degree is the retail services industry and the largest employer of people with at least an associate's degree is the educational services sector. *Current Population Survey* 2000.

[29] *How Workers Get Their Training: a 1991 Update*, Bureau of Labor Statistics, U.S. Department of Labor, August 1992. Some workers received more than one type of training.

[30] "1995 Survey of Employer Provided Training," Bureau of Labor Statistics, U.S. Department of Labor, Table 5.

[31] Calculations from the 2000 *Current Population Survey*

This reflects the lack of job growth in the manufacturing sector in recent years but also presages a potential skill shortage for the future. When the older manufacturing workers retire there may not be anyone to replace them since there has not been a steady stream of younger workers encouraged to enter the pipeline and gain the important job-specific skills.

The information available on the impacts on workers who have been displaced from their jobs comes from BLS' Displaced Workers Survey. Plant closures accounted for 50-60 percent of the job displacements in manufacturing for workers with three or more years of tenure during the period from January 1993 through December 2001.[32] That compared with 45-50 percent for the non-manufacturing sectors of the economy. On average each year from 1993 through 1998, 177,000 manufacturing workers with three years or more of tenure lost their jobs due to plant closures. From January 1999 through December 2001 that rate increased to 230,000 workers per year.[33] The rate of reemployment for long-tenured employees (three years or more at their jobs) in manufacturing is also relatively low. Less than half of those workers return to manufacturing jobs; the rate of re-employment in non-durable manufacturing is even lower, with only about a quarter of those losing jobs in non-durable manufacturing re-employed in non-durable manufacturing.[34] Long-tenured, full-time manufacturing employees who do find new full-time jobs, in any industry, tend to take a pay cut. The latest information on the impact on pay of a job loss has not yet been published, but in 1998, that loss of pay averaged about 10 percent, over twice as large as the average for re-employed workers overall.

Manufacturing provides a base for many important activities in the U.S. economy. While manufacturing will probably never disappear entirely, one can not determine how much of the sector can disappear before the critical mass that fuels the innovation process is lost. Under any circumstances, the loss of a large part of the manufacturing sector will be felt throughout the U.S. economy.

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[32] The reason for plant closures cannot be identified in these surveys. Consequently, all of these job displacements cannot be positively linked to outsourcing overseas. However, many of the industries with increasing import penetration shares are also industries in which a large percentage of the job losses are due to plant closures.

[33] *Displaced Workers Survey*, Bureau of Labor Statistics, U.S. Department of Labor.

[34] These rates cover workers who lost their jobs due to plant closures, lost shifts or slack work. Consequently, the rates of re-employment among workers whose jobs were lost due to plant closures is undoubtedly somewhat lower than these.