Exports Support American Jobs
Updated measure will quantify progress as global economy recovers.

by John Tschetter

In 2008, U.S. exports supported more than 10 million full- and part-time jobs during a historic time, when exports as a percentage of gross domestic product (GDP) reached the highest levels since 1916. The new record, 12.7 percent, shows that the upward growth of trade in an expanding global market holds great opportunities for U.S. businesses whose leaders are thinking strategically about the future growth of their companies. The importance of exports and trade in the U.S. economy was accelerating during the past 7 years, but was interrupted by the economic downturn that began in December 2007. Because of the weak global economy, exports and export-supported jobs dropped sharply through the first half of 2009; however, they began to recover in the second half. Government and private-sector economists expect that the recovery in exports will continue in 2010 and beyond, which will increase the opportunities for U.S. businesses to grow.

For government and business leaders to chart their way forward, they must measure the importance of exports in the national economy by using generally accepted tools. In an analysis by the Department of Commerce's Economics and Statistics Administration (ESA) and the International Trade Administration (ITA), this interagency white paper finds that the value of exports to support one job will increase

to as much as $185,000 in 2010. That figure was last officially estimated in 1996 at $92,000 per job and reflects the high and increasing productivity of the U.S. workforce in exported-related production.

This report represents the work of a panel of experts from several government agencies, led by the Working Group on Analysis and Data of the Trade Promotion Coordinating Committee (TPCC). This group included representatives of 20 federal agencies and was chaired by Mark Doms, chief economist of the Economics and Statistics Administration, and David Walker, chief economist in the Office of the U.S. Trade Representative. Among the other participating agencies were the Department of Agriculture's Economic Research Service and Foreign Agricultural Service, the Export–Import Bank of the United States, U.S. International Trade Commission, and the U.S. Small Business Administration.

This examination of the relationship between U.S. exports and the jobs they support covers 1993–2008, with preliminary estimates for 2009 and 2010. Table 1 shows the following information:

• Exports of goods and services supported 10.3 million jobs in 2008.

• Export-supported jobs accounted for 6.9 percent of total U.S. employment in 2008. The value of total

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Table 1. Jobs Supported by Exports

	Jobs supported by exports in 2008		Exports in 2008 (billions of dollars)	Value of exports per job	
	Number (thousands)	*Percent of employment*		*2008 ratio (hundreds of dollars)*	*Percent change, 2002–2008*
Total	10, 293	6.9	1,694	165	5.9
Goods	7,525	5.0	1,132	150	6.5
Services	2, 768	1.9	562	203	4.3

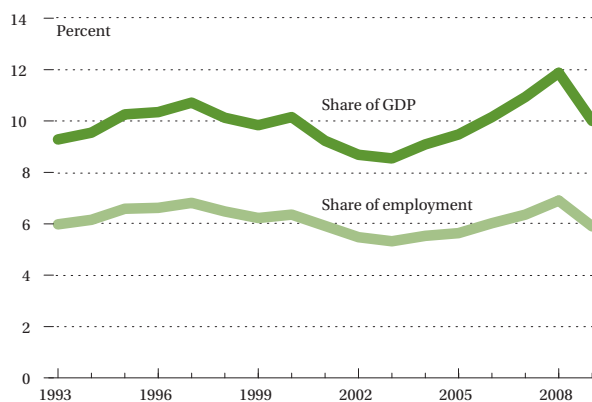Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Figure 1. Jobs Supported by Exports of Goods and Services, 1993–2009
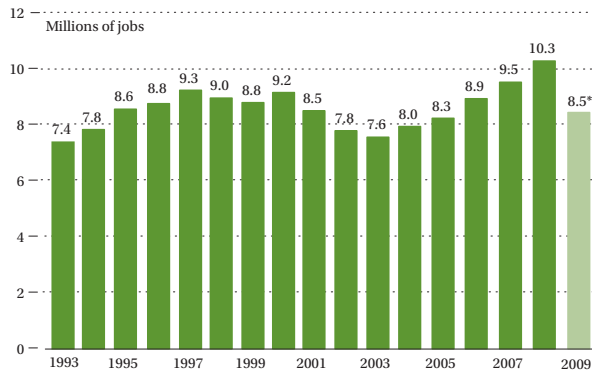
* Note: 2009 is a preliminary estimate.
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 2. Export Share of GDP and Employment, 1993–2008

Note: data for 2009 are preliminary estimates.
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

exports, as measured in this study, totaled nearly $1.7 trillion—or nearly $165,000 per export job in 2008.

• Additional analyses indicate that the number of jobs supported by exports declined sharply in 2009 from 2008. The drop reflected a large decrease in the nominal value of exports and a modest gain in the ratio of exports per job. The yearly movements in the ratio strongly correlate with that of nominal labor productivity (nominal output per hour) and with capacity utilization in the manufacturing sector.

• Further analyses indicate that the value of exports per job will increase from $175,000 to $185,000 in 2010. Regression analyses, combined with forecasts of nominal productivity and capacity utilization, yield the lower bound of the range. Extending trend growth of 5.9 percent per year suggests the upper bound.

Methodology and Caveats

Researchers have used widely different forms of economic analyses to demonstrate the relationship between exports and jobs. This study uses input–output (IO) analysis to measure the links for 1993–2008. IO analysis, sometimes referred to as *interindustry analysis*, is an economic tool that measures the relationships between various industries in the economy.[1] This research uses a time series of IO matrixes that provide detailed and consistent information on the flow of goods and services that make up the production processes of U.S. industries.[2] Findings reflect the number of jobs supported across the entire chain of export production, such as material and service inputs, final assembly, and transportation. The employment numbers are annual snapshots of the size of export contribution to overall employment. It is important to note the following:

• These snapshots reflect *average* (sometimes labeled *accounting*) *relationships*. In IO analyses, if 10 percent of an industry output is exported, then 10 percent of the industry's employment is attrib-

uted to exports. The averages tell us nothing about employment requirements for the first or last dollar of output.

- Averages derived from IO analysis should not be used as proxies for change. They should not be used to estimate the net change in employment that might be supported by increases or decreases in total exports, in the exports of selected products, or in the exports to selected countries or regions.

- The averages are not proxies because the number of jobs supported by exports usually does not change at the same rate as export value. The rate is not the same because other factors, such as prices, resource utilization, business practices, and productivity, do not usually change at the same rate. In addition, the material and service inputs and the labor and capital inputs differ significantly across types of exports. For example, the labor requirements for an exported aircraft are significantly different from those of an exported agricultural product or an educational service.

The findings shown in Table 1 take all those factors into account. The ratio of exports per job for total exports was $165,000 in 2008. This ratio varied from $150,000 for goods to $203,000 for services. The ratio for total exports grew 5.9 percent per year from 2002 to 2008, a period of strong export growth. The ratio for goods grew 6.5 percent per year during that period, which is faster than the 4.3 percent increase for services.

The ratios reflect the stages of the business cycle in which they occurred. They are directly affected by changes in aggregate output, including the output for exports, which influence the size of the overall workforce, employment, and unemployment. During periods of slack business activity, increased output, such as exports, would tend to increase employment, to lower unemployment, and to increase labor force participation. Conversely, during periods of high business activity, when industry operates at

Figure 3. Exports of Goods and Services as Percent of GNP or GDP, 1869–2009 (national income accounts basis)
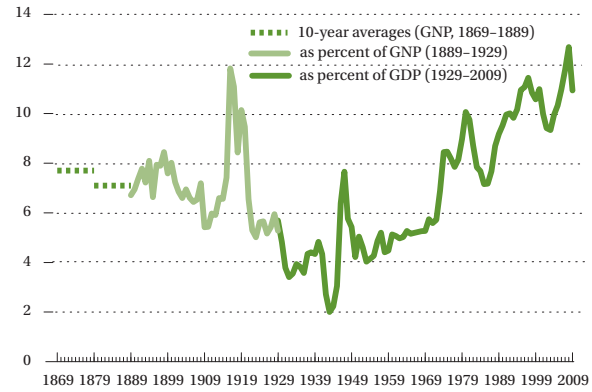
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.
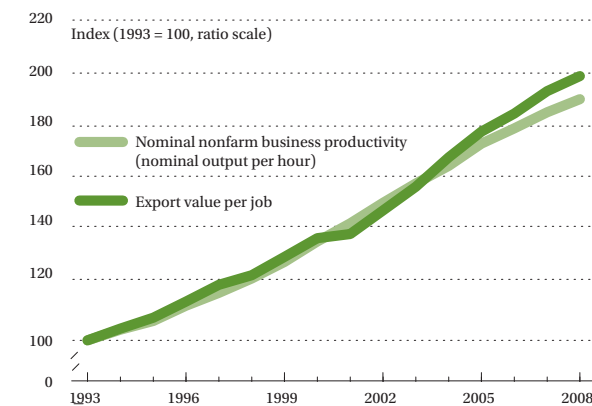
Figure 4. Value of Exports per Job, 1993–2010: Total Exports
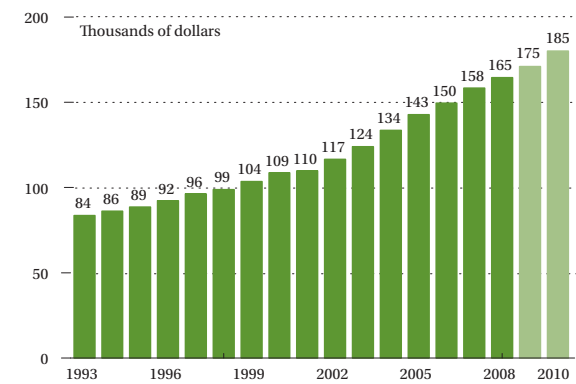
Note: Data for 2009 and 2010 are preliminary estimates.
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

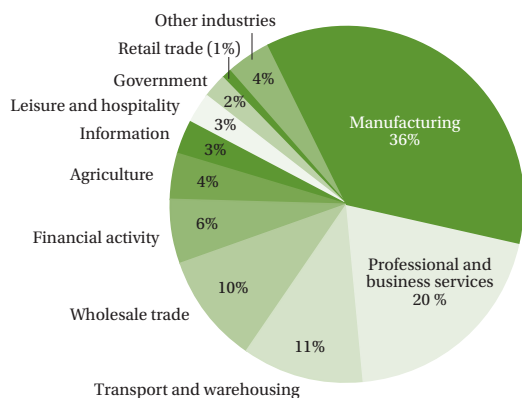**Figure 5.** Exports per Job and Nominal Productivity, 1993–2008

Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 6. Ratio of Exports per Job to Nominal Productivity and Capacity Utilization, 1993–2008
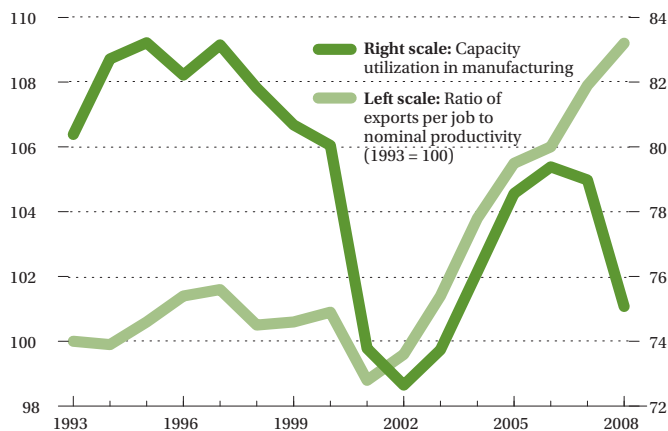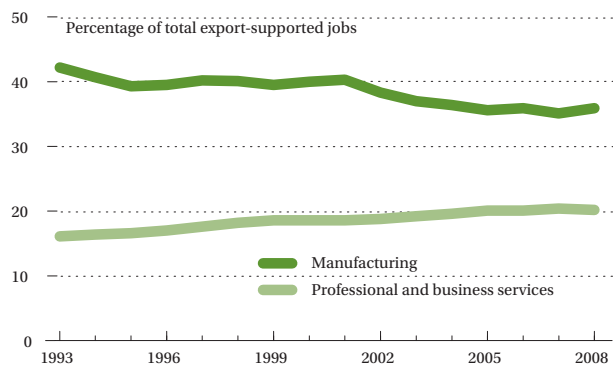

Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 7. Export-supported Jobs in 2008, by Major Industry

Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 8. Export-supported Jobs in Manufacturing and Professional and Business Services, 1993–2008

Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

or near full capacity and employment, increased output, including output for exports, tends to raise employment less—if at all—and instead mainly shifts employment to industries that pay higher wages.

The findings presented in this paper are only snapshots of the relationships between exports and employment. The figures do not illustrate other important dynamic links. The most important contribution of exports (and imports) to the U.S. economy is its role in increasing the industrial efficiency and standard of living of the United States. International trade encourages structural changes in domestic industries that, in turn, result in increased efficiencies, economies of scale, and more productive investments that enhance the competitiveness of foreign and U.S. producers alike.

Findings

Exports of goods and services supported a record 10.3 million jobs in 2008 (see Figure 1). The number of jobs supported by exports has been increasing since 2003, when exports supported 7.6 million jobs.

Preliminary estimates suggest, however, that export-supported employment fell sharply in 2009 to 8.5 million. The drop reflects a 15-percent decline in nominal value of exports and a 4.3 percent increase in nominal productivity (nominal output per hour) in the nonfarm business sector. However, 2009 included a shift in the growth of nominal exports from a decline during the first half to a gain in the second half. It is widely expected that the recovery will continue in 2010 and beyond.

Jobs supported by exports accounted for 6.9 percent of total employment in 2008. This share has fluctuated within a narrow range over time (see Figures 2 and 3).

The value of exports totaled nearly $1.7 trillion in 2008 (as measured in the IO framework, see appendix A for historical series) or 11.9 percent of GDP (see

Figure 2). Figure 3 (on page 3) shows that the export share of GDP in 2009 was a historical record dating back to the 1870s. Figure 3 also shows that the share generally went up during the past six decades, with some large swings in the middle.

The ratio of export-supported employment to total employment is smaller than the ratio of exports to GDP (Figure 3). The smaller employment ratio reflects that a significant portion of exports is produced in the manufacturing sector. Productivity levels in the manufacturing sector are well above the economy-wide average, and a significant share of the material and service inputs to manufacturing is imported. Both factors reduce the labor intensity of exports relative to labor intensity of other spending categories, such as consumer spending for services and residential construction.

Figure 4 shows that the value of exports per job was $165,000 in 2008. This ratio has trended steadily up since 2002, growing 5.9 percent per year from 2002 to 2008. The ratio began to accelerate in 2001.

Figure 5 shows that the ratio of exports per job (shown as an index) has gone up at about the same pace as nominal productivity in the nonfarm business sector. Nominal productivity is the ratio of nominal output to hours worked. The strong upward trends shown in Figure 5 are favorable long-term developments because they underlie the growth of the nation's living standards.

Figure 6 shows that medium-term variations in the two series reflect, in part, the movements in capacity use in the manufacturing sector.

Analyses by the Office of the Chief Economist suggest that the value of exports per job increased from $170,000 to $175,000 in 2009 and will increase to $185,000 in 2010 (see Figure 4).

Regression analyses that related the yearly movements in the ratio of exports per job to nominal

Figure 9. Shares of Industry Jobs Supported by Exports in 2008

Percentage of industry employment
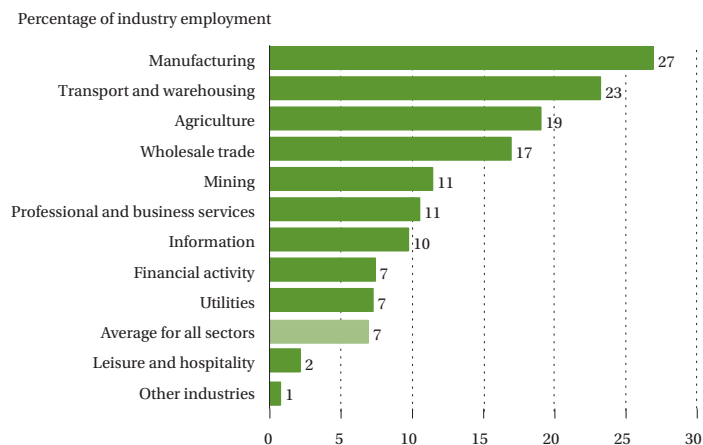
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 10. Export-supported Jobs in Manufacturing, 1993–2008
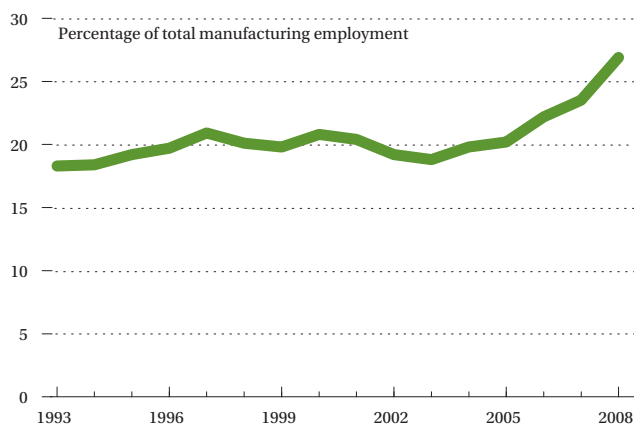
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 11. Jobs Supported by Exports of Goods, 1993–2009

* Note: 2009 is a preliminary estimate.
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 12. Jobs Supported by Exports of Goods in 2008, by Major Industry

Millions of jobs

Industry	Jobs
Manufacturing	3.5
Professional and business services	1.2
Wholesale trade	1.0
Transport and warehousing	0.5
Agriculture	0.4
Financial activity	0.2
Leisure and hospitality	0.2
Information	0.1
Other industries	0.5

Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.
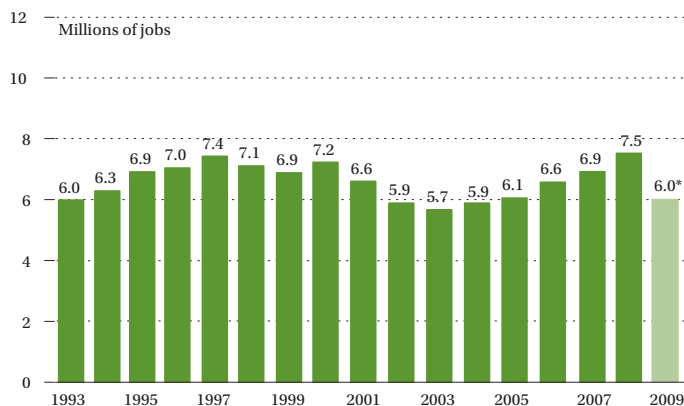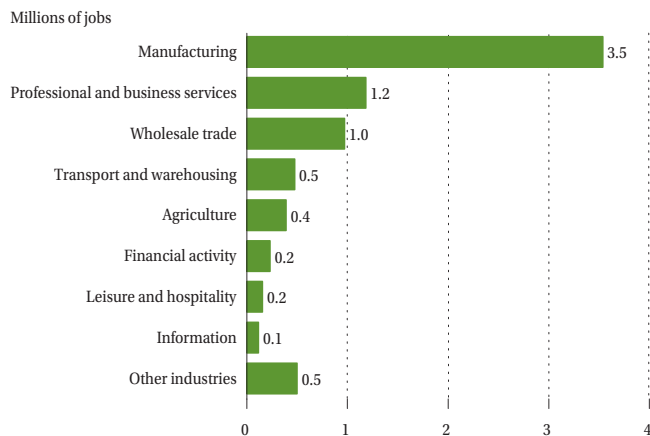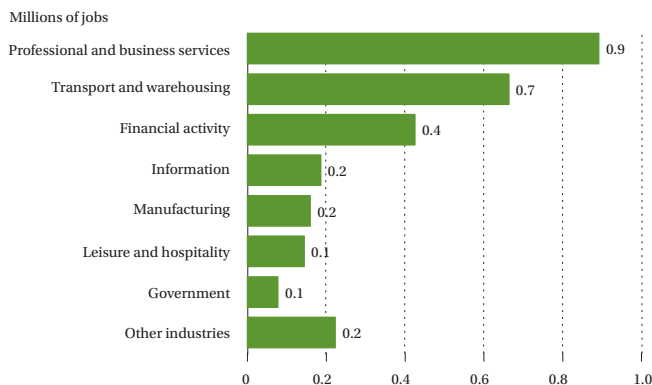
Figure 13. Jobs Supported by Exports of Services, 1993–2009

Millions of jobs

Year	Jobs
1993	1.4
	1.6
1995	1.7
	1.7
1997	1.8
	1.9
1999	1.9
	1.9
2001	1.9
	1.9
2003	1.9
	2.1
2005	2.2
	2.4
2007	2.6
	2.8
2009	2.5*

* Note: 2009 is a preliminary estimate.
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 14. Jobs Supported by Exports of Services in 2008, by Major Industry

Millions of jobs

Industry	Jobs
Professional and business services	0.9
Transport and warehousing	0.7
Financial activity	0.4
Information	0.2
Manufacturing	0.2
Leisure and hospitality	0.1
Government	0.1
Other industries	0.2

Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

productivity and capacity use in manufacturing, combined with forecasts of the productivity and use series,[3] yield the lower part of the range.

Export-Supported Jobs by Industry

More than half of the 10.3 million jobs supported by exports in 2008 occurred in two industries: (a) manufacturing and (b) professional or business services. Export-supported manufacturing jobs totaled nearly 3.7 million, or 36 percent of the total jobs supported by exports (see Figure 7). Export-supported jobs in professional and business services totaled nearly 2.1 million, or 20 percent of the total.

Manufacturing's share has gone modestly down since 1993, while the share of professional and business services has gone modestly up (see Figure 8). The nearly 3.7 million manufacturing jobs supported by exports in 2008 accounted for 27 percent of all jobs in the manufacturing sector (see Figure 9).

Exports also accounted for significant shares of employment within transport and warehousing (23 percent), agriculture (19 percent), and wholesale trade (17 percent).

The export-supported share of total manufacturing jobs rose to a record in 2008 from the 1993–2004 average of about 20 percent (see Figure 10). That share reflects jobs supported by total exports of goods and services, including manufactured goods. The increase occurred because of strong foreign demand for U.S. goods and sluggish domestic demand.

The export-supported share likely fell in 2009 because exports fell 19 percent while manufacturing shipments excluding exports dropped by 15 percent. However, the share started to recover as the year progressed. Exports of manufactured goods increased 19 percent from their low in April 2009, while shipments excluding exports rose by a much smaller 4 percent.

Jobs Supported by Exports of Goods

In 2008, exported goods (including manufactured goods) supported 7.5 million, or 73 percent, of the 10.3 million jobs supported by total exports (see Figure 11).

The number of jobs supported by exports of goods has been increasing since 2003. But again, available data, including a 20 percent drop in nominal exports of goods, suggest that the number fell sharply in 2009 from the 2008 level.

Of the 7.5 million jobs supported by exports of goods in 2008, 3.5 million (or 47 percent) occurred in manufacturing (see Figure 12). Goods exported include agricultural products, raw materials, and manufactured goods.

The export of goods also supported 1.2 million jobs in professional and business services and 1 million jobs in wholesale trade.

Jobs Supported by the Exports of Services

Exported services supported 2.8 million jobs, or 27 percent, of all jobs supported by exports (see Figure 13).

The number of jobs supported by service exports has been increasing since 1993 (the starting point for these estimates). But again, available data, including a 7 percent drop in the nominal exports of services, suggest that the number fell in 2009.

Of the 2.8 million jobs, 0.9 million, or 32 percent, were in professional and business services (see Figure 14).

A Comparison: Goods Exports per Job and Service Exports per Job
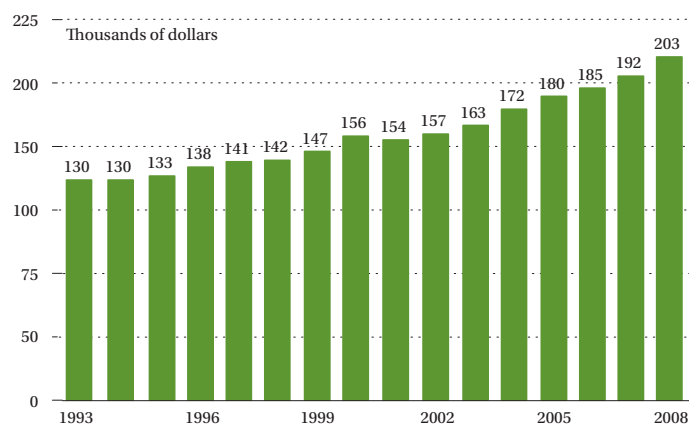
The value of goods exports per job was nearly $150,000 in 2008 (Figure 15). The ratio of service

Figure 15. Value of Exports per Job for Goods, 1993–2008
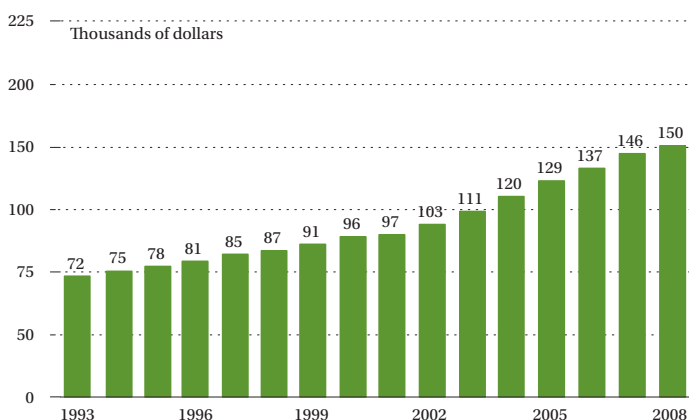
Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

Figure 16. Value of Exports per Job for Services, 1993–2008

Estimates compiled by U.S. Department of Commerce, Office of the Chief Economist.

exports per job was much higher at $203,000 (Figure 16).

The ratio for service exports is boosted significantly by services such as professional and business services, which include the leasing of nonfinancial intangible assets; the management of companies; and architectural, engineering, and related services.

The ratio for goods exports per job grew 6.5 percent per year from 2002 to 2008, which is faster than the 4.3-percent growth for service exports per job. The growth in the ratio for goods exports was boosted by the productivity gains posted within the manufacturing sector and by the expanding—and important—role played by imports in manufactured goods.

Appendix A: Exports of Goods and Services and Jobs Supported by Them, 1993–2008

Year	Value of exports (billions of dollars)			Jobs supported by exports (thousands of jobs)		
	Total	Goods	Services	Total	Goods	Services
1993	617.9	429.8	188.1	7,394.5	5,950.7	1,443.8
1994	675.3	473.4	201.9	7,839.5	6,289.3	1,550.2
1995	759.2	539.6	219.7	8,568.1	6,911.4	1,656.7
1996	809.3	571.4	237.9	8,768.6	7,042.9	1,725.7
1997	890.6	633.7	256.9	9,245.8	7,425.0	1,820.8
1998	886.1	621.9	264.2	8,970.6	7,109.1	1,861.5
1999	911.8	628.4	283.4	8,806.0	6,879.8	1,926.2
2000	996.3	692.4	303.9	9,171.5	7,225.8	1,946.0
2001	935.1	641.5	293.6	8,514.2	6,607.1	1,907.1
2002	909.5	608.5	301.0	7,802.4	5,890.3	1,912.1
2003	937.7	629.7	307.9	7,566.2	5,671.3	1,894.9
2004	1,062.1	706.3	355.8	7,949.9	5,883.1	2,066.9
2005	1,177.6	782.6	385.0	8,249.6	6,052.4	2,197.2
2006	1,338.2	900.2	438.0	8,949.8	6,575.7	2,374.1
2007	1,510.4	1,008.2	502.2	9,539.7	6,920.1	2,619.6
2008	1,693.6	1,131.5	562.1	10,293.4	7,525.3	2,768.1

Source: U.S. Department of Commerce, Office of the Chief Economist.

Appendix B: IO Analyses—Methodology, Strengths, and Weaknesses

The following highlights the methodology and caveats of the IO-based figures. This research is based on the IO framework. The Bureau of Labor Statistics (BLS) developed and published the accounts used in this research.

The BLS Web site at *www.bls.gov* provides files of IO data for the U.S. economy from 1993 to 2008. The IO tables produced by the BLS are derived from IO data initially developed by the Bureau of Economic Analysis (BEA).

The BLS IO accounts provide detailed, consistent information on the flow of goods and services that are involved in the production processes of industries. For each year, the accounts show how industries interact as they provide inputs to and use outputs from each other to produce GDP.

IO accounts begin with *make* and *use* tables. The make table shows the commodities produced by each industry. The use table shows the inputs to industry production and the commodities consumed by final users (including exports to foreign customers).

Requirements tables are derived from the make and use tables. The *direct requirements* table shows the amount of a commodity that is required by an industry to produce a dollar of the industry's output. A *total requirements* table shows the production required, directly and indirectly, from each industry and commodity to deliver a dollar of a commodity to final users. A *domestic requirements* table shows the domestic output of goods and services required to meet final demand (including exports). To calculate the domestic output requirements, one must subtract imports from the use table before calculating the total requirements matrix. This subtraction is made for each industry. The ratio for the subtraction

is the value of imports over domestic supply:

Import ratio = Imports / (Commodity output – Imports + Exports) (1)

BLS published an additional table of domestic employment requirements. The table shows the direct and indirect effect of changes in final demand on employment. The changes stem from the domestic requirements tables. First, a ratio for jobs per dollar of output was calculated. This ratio was then applied to the domestic output requirement for each industry to derive the employment requirement. The requirement was found by multiplying the industry employment ratio with the respective domestic requirements data contained in each row.

Employment in the requirements tables is based on a count of jobs. The job count includes wage and salaried workers, self-employed workers, and unpaid family workers.

The jobs in this research are not full-time equivalents (FTEs). FTEs are estimates for adjusted industry employment for the mix of full- and part-time workers. BLS's IO accounts include substantial detail on more than 200 industries (including 84 manufacturing industries) and more than 200 categories of final demand (including exports of goods and services).

BLS data for exports of goods and services can be regrouped to allow estimates of jobs supported by exports of goods, services, manufactured items, agricultural products, and other sources.

BLS focuses on employment outlook by industry and occupations for the next decade (2008–18). The November issue of the *Monthly Labor Review* presents five comprehensive articles that describe the outlook.[4]

BLS makes the underlying data and methodology of these projections available to researchers. The details include time series of industry output and employment and interindustry relationships, including final demand expenditures and IO matrixes.

BLS presents the formulas for calculating the requirement matrixes in "Employment Outlook: 2008–2018," which is available on its Web site. The final demand and employment requirement matrixes were critical components of the findings.

Exports in this study reflect IO concepts and, as a result, exclude reexports and reimports of goods. *Reexports* are foreign-origin goods that have previously entered the United States and, at the time of exportation, have undergone no change in form, condition, or enhancement in value by further manufacturing in the United States. *Reimports* are U.S. merchandise that has been returned. *Exports of* military goods are included in goods exports.

Exports are measured by their value at the point of leaving the country and are equivalent to their purchase price. The national income accounts and the U.S. Census Bureau data on exports of goods are also measured at the value leaving the country.

IO analysis, however, shows exports at producer prices, and the transportation costs and margins required to move the export to the port are included in the respective commodities for transport and trade.

This paper's introduction highlighted a number of caveats to IO analyses, including the following:

• IO analyses (and this analysis) reflect *average* (sometimes labeled *accounting*) *relationships*. If 10 percent (or 20 percent) of an industry output is exported, then 10 percent (or 20 percent) of its employment is attributed to exports. Those averages tell us nothing about employment requirements for the first or last dollar of output.

• The findings are sensitive to numerous factors,

including macroeconomic developments. Those developments include the pace of overall economic growth; the degree of resource use; and the pace of productivity growth and industry-level developments, such as the speed of innovation, attitudes toward out- and in-sourcing shifts, and the use of imports as material and service inputs.

BLS IO and final demand data do not reflect the BEA Comprehensive National Income and Product Accounts revisions that were published in July 2009. The data also do not reflect BLS's annual revisions to the nonfarm payroll employment that were published in February 2010. Because BLS published its projections of industry and occupational employment every other year, the analyses presented in this white paper will not be updated until November 2011.

End Notes

1. The Department of Commerce has published previous IO analyses of jobs supported by exports. This research updates Lester A. Davis, "U.S. Jobs Supported by Goods and Services, 1983–1994," U.S. Department of Commerce, Economics and Statistics Administration, November 1996. The U.S. Census Bureau also produces reports on jobs supported in each state by exports of manufacturing goods. One example is the "Exports from Manufacturing Establishments: Preliminary Report for 2006," U.S. Census Bureau, April 2008.

2. The Bureau of Labor Statistics published this time series of IO tables, industry and commodity output, and employment in December 2009. For more information, see *http://stats.bls.gov/news.release/ecopro.toc.htm* and *http://bls.gov/emp*. The Office of the Chief Economist took great advantage of the considerable efforts by the Bureau of Labor Statistics. The final demand and employment requirement matrixes were critical components of the findings.

3. Macroeconomic Advisers ("Outlook Commentary," February 2010) forecasted a 4.2 percent increase in nominal nonfarm business productivity (output per hour) in 2010 and a recovery of manufacturing capacity use from 66.8 percent in 2008 to 70.6 percent in 2010.

4. BLS projections were summarized by Kristina J. Bartsch, "The Employment Projections for 2008–18," *Monthly Labor Review* 132, no. 11 (November 2009): 3–11.

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