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The Evolving Structure of the American Economy and the Employment Challenge

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Abstract

This paper examines the evolving structure of the American economy, specifically, the trends in employment, value added, and value added per employee from 1990 to 2008. These trends are closely connected with complementary trends in the size and structure of the global economy, particularly in the major emerging economies. Employing historical time series data from the Bureau of Labor Statistics and the Bureau of Economic Analysis, U.S. industries are separated into internationally tradable and nontradable components, allowing for employment and value-added trends at both the industry and the aggregate level to be examined. Value added grew across the economy, but almost all of the incremental employment increase of 27.3 million jobs was on the nontradable side. On the nontradable side, government and health care are the largest employers and provided the largest increments (an additional 10.4 million jobs) over the past two decades. There are obvious questions about whether those trends can continue; without fast job creation in the nontradable sector, the United States would already have faced a major employment challenge.

The trends in value added per employee are consistent with the adverse movements in the distribution of U.S. income over the past twenty years, particularly the subdued income growth in the middle of the income range. The tradable side of the economy is shifting up the value-added chain with lower and middle components of these chains moving abroad, especially to the rapidly growing emerging markets. The latter themselves are moving rapidly up the value-added chains, and higher-paying jobs may therefore leave the United States, following the migration pattern of lower-paying ones. The evolution of the U.S. economy supports the notion of there being a long-term structural challenge with respect to the quantity and quality of employment opportunities in the United States. A related set of challenges concerns the income distribution; almost all incremental employment has occurred in the nontradable sector, which has experienced much slower growth in value added per employee. Because that number is highly correlated with income, it goes a long way to explain the stagnation of wages across large segments of the workforce.

The authors are grateful to the Stern School of Business at New York University for support for this research. We would like to thank Sebastian Mallaby at the Council on Foreign Relations for his valuable insights and comments. The main body of the paper is a detailed and data intensive look at changes in employment and value added in U.S. industries. For readers who are interested in the major trends and findings, but not the industry-level detail, we suggest reading the executive summary, the introduction and following section on the evolving structure of the global economy. Then near the end, the last four sections related to policy implications, starting on page 32, may be of interest.

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Executive Summary

1. Employment growth in the U.S. economy between 1990 and 2008 was substantial, on the order of 27.3 million jobs, off a base in 1990 of 121.9 million.
2. Virtually all (97.7 percent) of the incremental employment stems from the nontradable sector. This occurred despite dramatic labor-saving technology in information processing that ran across all sectors of the economy.
3. The leading employment sectors are government and health care, in that order, both on the nontradable side. Together these two sectors generated more than 10 million additional jobs over the period, accounting for almost 40 percent of the increment. Health care added 6.3 million jobs on a base of 10 million. Government added 4.1 million on a base of 18.4 million.
4. Given the pressure on the government budgets, continued gains in government employment seem unlikely. Equally, health care absorbs a large enough fraction of GDP (on the order of 16 percent) that expansion in that sector is at least questionable. An aging population may require more health services, but the government's ability to finance the expansion is in doubt.
5. Growth in other nontradable services that generated employment gains—for example, retailing—has been driven in part by debt-financed consumption. After the financial crisis, the prospects for job growth in these sectors are duller.
6. The tradable sector experienced job growth in high-end services including management and consulting services, computer systems design, finance, and insurance. These increases were roughly matched by declines in employment in most areas of manufacturing.
7. The loss of employment in the manufacturing sector was caused by the out-migration of functions in global supply chains associated with lower valued added per job. But as the emerging markets grow, they will compete for more sophisticated functions. This does not mean that the United States will lose all the sectors in which it has developed a comparative advantage—just that more potential competition is on the horizon.
8. Manufacturing sectors that suffered a loss of employment nevertheless experienced rising value added. Therefore value added per job rose, in some cases dramatically. High-income jobs remained in the tradable sector.
9. For the tradable sector as a whole, value added per job rose substantially, an increase of 44 percent from 1990 to 2008, far above the increase of 21 percent in the economy as a whole. The tradable sector is gravitating toward higher value-added components of global supply chains. These consist, in broad terms, of high-end services, some in manufacturing industries and some, like finance and insurance, in pure service industries.
10. Given the prospect of slowing employment growth in nontradables and rising competitive pressure on tradables, major employment problems in the near future are a certainty. Even if the nontradable sector is able to continue to absorb the growth in the labor force, pres-

sure on wages and salaries will be downward, and consequences for income distribution unavoidable.

11. The postcrisis shortfall in domestic demand is causing stubbornly high unemployment even as the economy begins to recover some of its growth momentum. In principle, foreign demand, especially from the high-growth emerging economies could make up some of the difference. But it probably will not happen. Although the U.S. trade deficit fell to $375 billion in 2009, from $702 billion in 2007, the adjustment came entirely from a sharp decline in imports, from $2.35 trillion to $1.95 trillion, whereas exports actually fell slightly, from $1.65 trillion to $1.57 trillion. In other words, the adjustment came from a fall in imports not a rise in exports.
12. To create jobs, contain inequality, and reduce the U.S. current-account deficit, the scope of the export sector will need to expand. That will mean restoring and creating U.S. competitiveness in an expanded set of activities via heightened investment in human capital, technology, and hard and soft infrastructure. The challenge is how to do it most effectively.

Introduction

In the postcrisis environment, issues of sustainability in the trajectory of the U.S. economy have come to the fore. Among the problems pointed to are a large current account deficit, the paucity of household savings, overleveraging in the financial and household sectors, and stagnation of middle-class incomes. However, what appears missing is a detailed look at the structural shifts in the economy over longer periods, and the way in which the emerging economies' growth is affecting the pattern of industry employment and value added in the United States. This paper attempts to close the gap, offering a fresh look at the U.S. economic structure over the past twenty years and exploring the implications of such shifts.

The American economy does not exist in a vacuum; some of its most striking evolving characteristics are tied to long-term trends in the developing world and especially the large emerging economies. The first section describes the evolving structure of the global economy and offers perspective on how emerging economies have increased their influence on the U.S. economy since the early 1950s. The next section describes the tradable and nontradable parts of the economy. It then looks at the trends in employment, value added, and value added per employee across industries in the tradable and nontradable sectors of the economy. The paper concludes with an assessment of the structural and employment challenges and begins a preliminary exploration of possible policy responses.

The main body of the paper is a detailed and data-intensive look at changes in employment and value added in U.S. industries. Readers interested in the major trends and findings should read the executive summary and the evolving structure of the global economy, and then the last four sections, starting on page 32, which discuss policy responses that may help shift the trajectory.

Changing Structure of the Global Economy

Since the end of World War II, the global economy has steadily increased its trade and financial openness, enabled in part by the International Monetary Fund (IMF), the World Bank, and the General Agreement on Tariffs and Trade (GATT), now the World Trade Organization (WTO). In parallel, colonialism, with its inherent constraints on economic development and its built-in asymmetries, collapsed. Although two hundred years behind the advanced countries, whose growth accelerations began in the late eighteenth century with the British industrial revolution, developing countries across the globe began a century-long process of modernization. We are slightly more than halfway through that century.

As formal barriers to trade and capital flows declined, a number of other trends combined to accelerate the growth and structural changes in the developing economies. They included advances in transportation and communications technology, management innovation in multinational companies, a process of learning about doing business in multiple and diverse environments, and the integration of multinational supply chains.

Thanks to information technology, services formerly in the nontradable part of the economy, from radiology to accounting and IT servicing, have become tradable. Large emerging economies, with varying starting points (and many false starts), have accelerated to sustained growth rates, often exceeding 7 percent a year. After several decades of high-speed growth, these economies have become larger and richer. An essential ingredient in that growth is structural change. With increases in size, the shifting structures of emerging markets have larger impacts on the structures in advanced countries. A growing emerging economy shifts to higher value-added components of international supply chains as physical, human, and institutional capital deepen and emerging economies begin to compete directly with rich ones.

In the early part of the postwar period, as successive rounds of the GATT agreement removed restrictions on manufacturing exports, developing countries—whose exports consisted mainly of natural resources and agricultural products—expanded into labor-intensive and lower value-added manufactured goods. Textiles and apparel production were prominent. Other industries were added as time progressed. The list is almost endless: luggage, dishes, cutlery, toys, personal products, and so on.

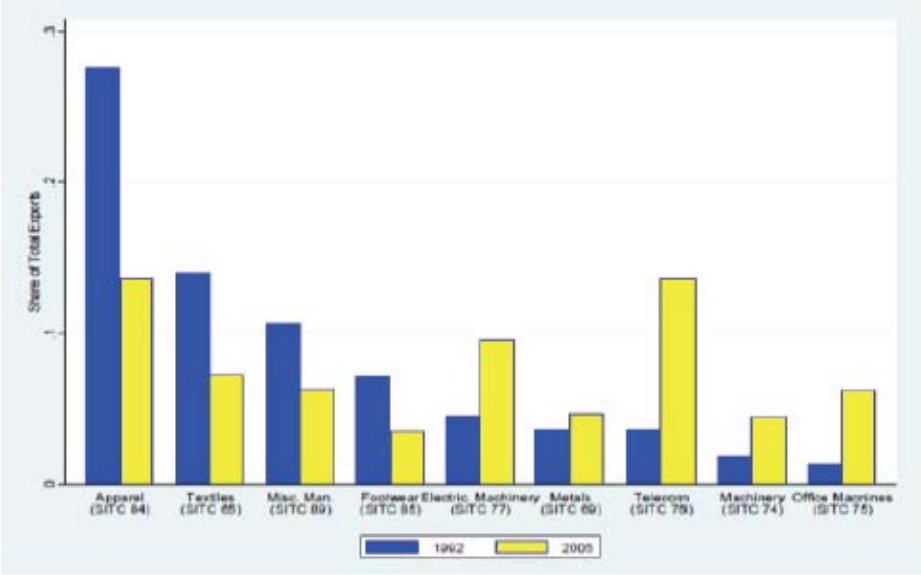
But it was not just finished products that were added to emerging economy portfolios. Labor-intensive and relatively low value-added parts of global supply chains moved to emerging economies as multinational companies progressively learned how to integrate geographically dispersed operations efficiently. In consumer electronics, the labor-intensive assembly process is a natural fit for lower-income countries. Semiconductors, circuit boards, and other components are designed and manufactured elsewhere, namely in high-middle-income or high income countries such as South Korea and Japan. Branding, marketing, and research tend to be done in rich countries. Each component of the supply chain has its most cost-efficient location.

The shape of global supply chains is constantly shifting. Countries enter and engage with the global economy at different times and expand at different rates. The early high-growth economies—Japan, South Korea, and Taiwan—initially exported labor-intensive products, then graduated to more capital-intensive products such as automobiles and motorcycles, and then to human capital-intensive activities such as design and technology development. The labor-intensive activities, which these early high-growth markets exited as their costs of labor rose, moved to later arrivals in the global economy, predominantly Asian economies such as China and Vietnam.

The shifting global structure is not static, cyclic, or mean-reverting. It is best described as a journey that will only be taken once. Late arrivals to industrialization tend to follow the same path as earlier ones.[1]

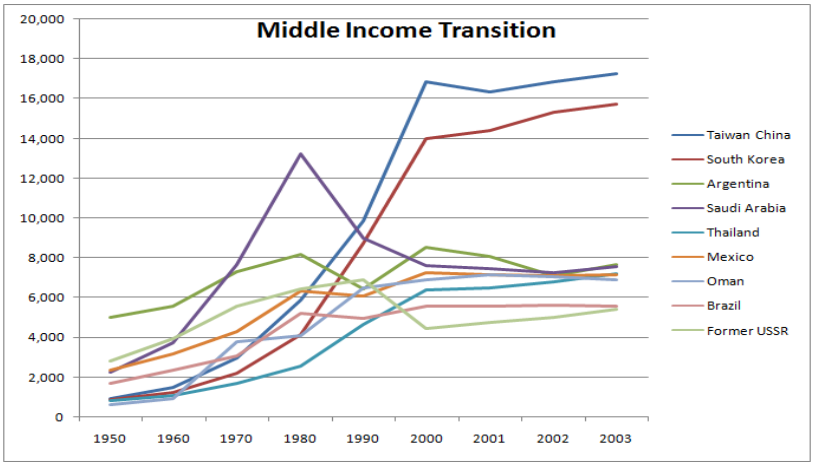
After thirty years of very high growth, the structure of China's economy is shifting as Japan's and South Korea's did before it. The pattern of diversification is evident in figure 1.

Figure 1. Reallocation of Manufacturing Exports in China across Major Two-Digit Sectors



China, with a per capita income of about $3,800, is now entering what is called the middle-income transition. This phase of development is sometimes called a trap. It is one of the more complex and risky transitions that occur in developing countries on the long, multidecade journey from low-income to advanced country levels. The evidence we have from the postwar history suggests that the majority of countries entering the middle-income transition have slowed significantly or even stalled. Of the sustained high-growth cases in the postwar period (thirteen, soon to be fifteen, with the addition of India and Vietnam), only five have maintained high growth rates through the middle-income transition and proceeded toward advanced country income levels of $20,000 per capita or above (see figure 2). Those high-speed transitions occurred in Japan, South Korea, Taiwan, Hong Kong, and Singapore.

Figure 2. Real Per Capita GDP and the Middle-Income Transition



For China and other middle-income countries, therefore, sustaining fast growth is not automatic. That said, the aggregate size of the developing countries (especially the major emerging economies), coupled with their rising incomes and industrial sophistication, are beginning to have an increasingly large impact on the structure of advanced economies, in particular on the part of their economies that is exposed to trade. We refer to that part as the tradable sector.

Tradable and Nontradable Sectors

In the global economy, some goods and services trade internationally and some do not. The tradable sector consists of the goods and services that can be produced in one country and consumed in another, or, as in tourism or education, consumed by people from another country. The nontradable sector is the set that must be produced and consumed in the same country.

Examples of tradable goods and services include most manufactured products, many agricultural products, a growing set of business services and technical services, minerals, energy, and gas. The nontradable sector includes government, retail, health care, construction, hotels and restaurants, most legal services, and so on.

The boundary between the tradable and nontradable sectors is not fixed. Twenty-five years ago, business services such as information technology (IT) maintenance and support were not traded internationally; now Internet connectivity and innovative software permits many of these services to be performed remotely at lower cost, often in another country. Over time, cross-border specialization and learning brings higher quality and efficiency as well as lower cost.

Tradable and nontradable parts of the economy do not line up perfectly with conventional industry definitions. The latter are groupings of industries based on final products. Some of these products within a particular grouping may be tradable internationally but others not tradable. For example,

most legal services are not tradable internationally, but a subset dealing with international business and financial transactions are.

But far more important than comingling of tradable and nontradable products within an industry group is another phenomenon altogether. A good or service is produced and delivered to the final consumer in a series of steps called the value-added chain. Total value added is defined as the final sales of a company or industry less its purchase inputs (excluding labor and capital). Purchases would include services such as legal services and accounting services, as well as parts and components made by other industrial sectors (or companies), and raw materials, energy, and the like. The idea is that labor (of all kinds, including management) and capital combine to add value to the purchased inputs, and that value is reflected in the sales value of the final output. If the final output (a good or service) is not sold, as in the case of most of government, there is no market mechanism for determining value of output. The final output is then taken to be the total cost of labor, capital (annualized) and the purchased inputs, including intermediate products and services. The idea is that the democratic collective choice mechanism that replaces the market works reasonably well and incurs these costs because the society places at least this much value on the services that are delivered. Of course, one can and people frequently do question that. But, in any case, that is the value-added calculation for services that are delivered but not sold.

To illustrate what a value-added chain might look like, imagine that we are planning to launch a new electronic product. From initial design to store sales are a multitude of steps that must be taken, each of which can be broken down into smaller steps and processes (see figure 3). In sum, these steps form the value-added chain. The value added for the final product would be the retail price (complete with markups) less all the costs that went into getting it into the consumer's hands (excluding labor and capital).

Figure 3. Value-Added Chain for an Imaginary Electronic Product

The details and number of steps vary across industries. When viewed this way, manufacturing, in the sense of production of a commodity, is not a single industry. It is a subset of the steps or stages in the value-added chain, and often, for complex products like autos, more than one stage.

Complex value-added chains usually include both tradable and nontradable components. Just as industry data do not capture these complexities, trade data also have shortcomings. An iPad shipped from Foxconn in China has value-added components from the United States and several countries in Asia embedded in it. Without a large amount of supplementary information, it is effectively impossible to track back from the consuming country to find the locations of the creation of value added for a particular product.[2] Moreover, the value-added chains for final products can overlap. Some parts of the chain are specific to the particular product (assembly, for example), whereas others can be shared (component parts or logistics or back office functions). The global economy does not divide neatly into totally separate value-added chains with one for each industry or class of final products.

Part of the tradable sector is a set of functions that involve information processing and services related to them. These sectors have been the subject of numerous studies and much attention. Impor-

tant technological innovations have enabled labor savings in information processing, and transactions automation. In addition, some of these functions have been outsourced. The evidence thus far appears to favor the conclusion that much of the employment reduction has been the result of labor-saving technology rather than of outsourcing. However, some analysts confuse these sectors with the entire tradable sector, and conclude that globalization has had relatively small impacts until now. The premise is inaccurate and the conclusion false. Information processing and related services are a small, growing part of trade. It is interesting, relatively new, and the studies are useful. But one should not draw broad conclusions about the impact of the integration of global markets from analyses of one relatively small part. As we shall shortly see, employment is declining in manufacturing and rising in finance. Both groups outsource and offshore information services. But to conclude that the manufacturing employment decline can be attributable to an unusually large impact on those sectors from information processing outsourcing or labor savings transactions automation, is simply incorrect.

To summarize, the best way to think about the tradable sector of an economy is to define it as the set of activities that can be part of global supply chains. At this stage, we have data on industries. So, as a first approximation, we will classify goods and services (that is, industries) proportionately as tradable and nontradable depending roughly on the tradable proportion of the value-added chain (using value added as the measure).

Structural Evolution of the U.S. Economy

The structure of the American economy is evolving. Technology is one of the driving forces, both domestically and in integrating the U.S. economy with the global economy. The domestic economy does not operate in a vacuum. In a relatively open global economy, structural change in emerging economies causes structural change in advanced countries. When a certain kind of activity declines in our economy, normally it does not just disappear from the global economy, but instead moves to another location. These powerful market forces operate directly on the tradable sector, and indirectly on the nontradable portion through wage and price effects and shifting opportunities in labor markets.

To divide the economy and its component industries into the tradable and nontradable parts, we used a methodology developed by Bradford Jensen and Lori Kletzer.[3] Their approach determined the tradability of an industry based on its geographic concentration—the more concentrated the industry, the higher its tradability (and vice versa). For example, take retail trade: its ubiquitous geographic presence implies that it is highly nontradable. The same could be said for dry cleaners, construction, and most health care. On the other hand, mining tends to be geographically concentrated, which points to its tradability.

Jensen and Kletzer's classifications reflect domestic more accurately than international tradability. For instance, in legal services, domestic tradability and international tradability diverge. We adapted and adjusted their classifications by critically looking at each industry's tradability estimate and using both common sense and export and import data to see whether their proportions reflect industries'

international tradability. Generally, the divisions seem correct, certainly close enough that the larger picture of structural evolution would not be misleading. The details of the methodology and sources of data are described in appendix I. Many industries are entirely tradable or nontradable, though in most industries there is a growing set of service components that are in principle tradable.

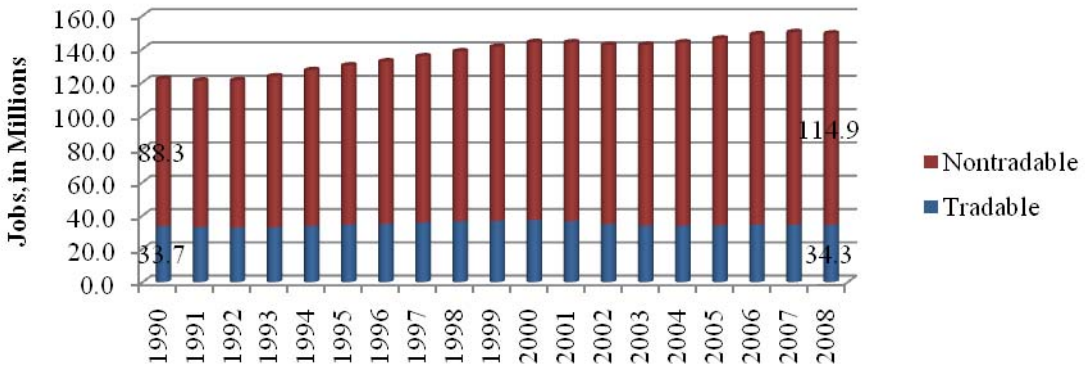
We look at the shifting structure of the U.S. economy from 1990 to 2008, just before the crisis. We examine employment and value added overall and by industrial sector. Then combining the two, we look at value added per person employed, a number closely related to income.[4]

Employment

Between 1990 and 2008, jobs have seen a net increase of 27.3 million on a base of 121.9 million in 1990. Hidden by this figure is a multitude of differing employment trends across industries; the figures reported here are the net amounts.

Almost all of those incremental jobs (26.7 of 27.3 million) were created in the nontradable sector. In the aggregate, tradable sector employment growth was essentially flat: some industries grew and others declined. Within the period considered, employment rose for about a decade and then fell back to its 1990 starting level. As is clear in figure 4, the nontradable sector is large, and, in terms of share of total employment, became larger over time.[5]

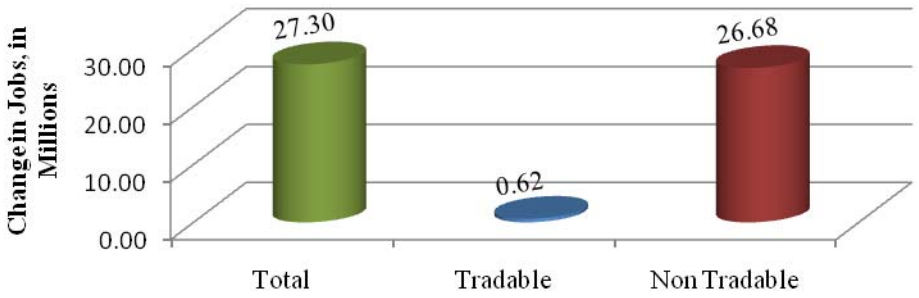
Figure 4. Tradable/Nontradable Jobs, 1990–2008



Source: Authors' calculations using Bureau of Labor Statistics historical data series

In terms of total changes over the sample period, the tradable sector saw a net increase in jobs of less than 1 million (figure 5).

Figure 5. Total Change in Jobs, 1990–2008



Source: Authors' calculations using Bureau of Labor Statistics historical data series

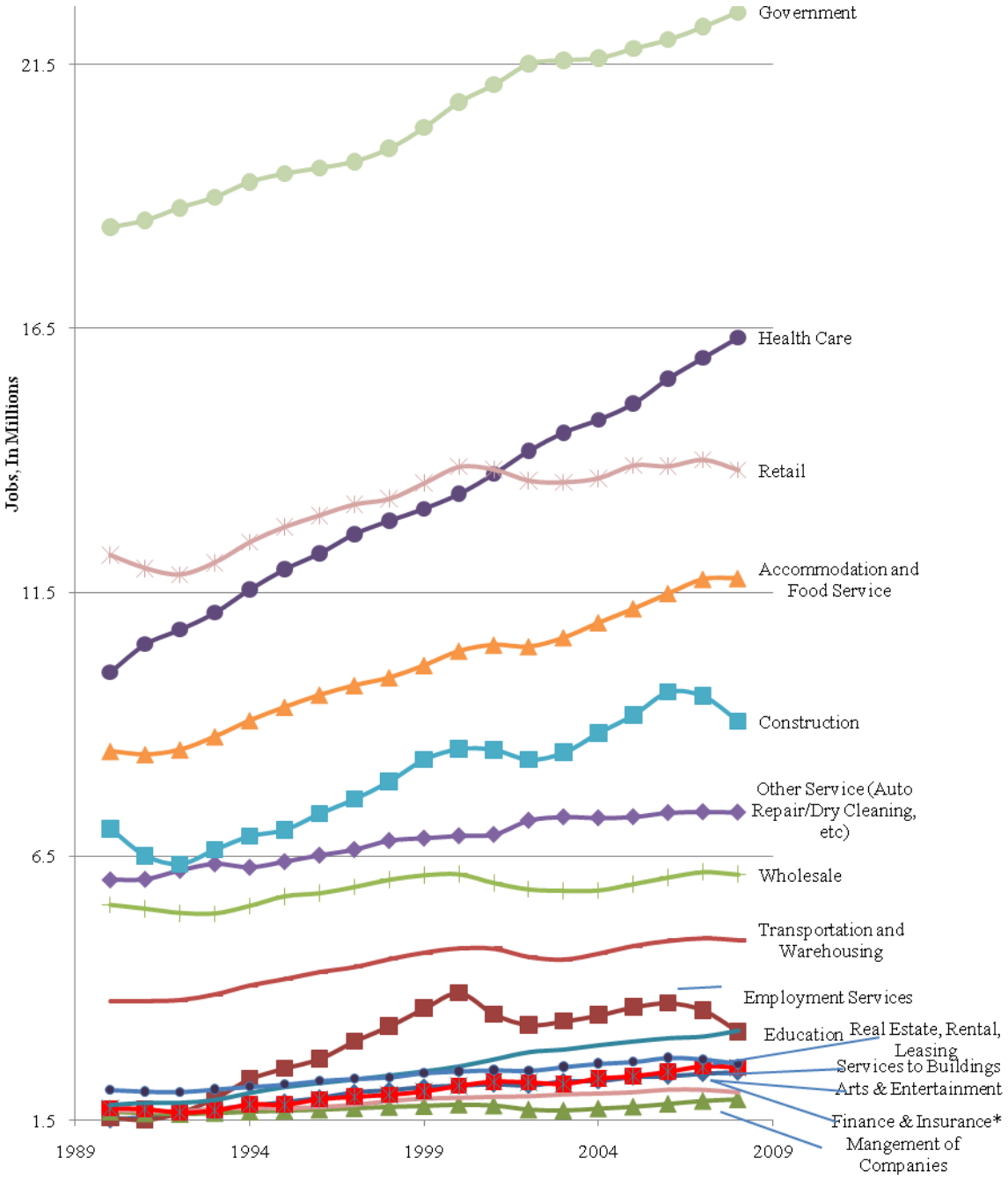
NONTRADABLE EMPLOYMENT

The large nontradable sectors are government, health care, retail, accommodation/food service (i.e., hotels, restaurants, and hospitality), and construction (see figure 6). In 2008, these accounted for 73.5 million jobs, 64 percent of employment in the nontradable sector and just under 50 percent in the whole economy. Together, the top five nontradable sectors contributed 65 percent of the total increment in jobs from 1990 to 2008.

Government at all levels is the largest employer in the nontradable sector and accounts for more than 22.5 million jobs in 2008. Health care is a close second, with an end of period total of 16.3 million. In terms of increments, health care's growth of 6.3 million jobs tops the list and the government's addition of 4.1 million comes in second. These two increments combined produced almost 40 percent of the total net incremental employment in the economy since 1990. For later discussion, we note that government employment is not driven primarily by market forces, and health care is something of a hybrid. Market forces do operate in health care, but with large informational asymmetries and substantial public-sector participation on the demand side and in regulation. In both government and health care, there are at least some questions about their future ability to be to primary drivers of employment growth.

Figures 6 and figure 7 present trends in the nontradable sector. They include nontradable components of industries such as finance and insurance, even though most of these industries are tradable. To ensure that the data are viewed in context, industries that are not predominantly or entirely nontradable include an asterisk. We have no way at present of isolating employment growth or the decline in the tradable and nontradable subcomponents of an industry that is a mixture. We therefore simply allocate the increase or decline in employment (or later value added) to the tradable and nontradable parts based on the fraction of the industry estimated to be on each side.[6] This is unlikely to be accurate, at least for declines; declines are more likely to occur in the tradable subcomponent. The declines in the nontradable part therefore should not be taken too seriously. Fortunately they are relatively small and do not substantively affect the overall picture. We detail our methodology in appendix II.

Figure 6. Nontradable Industry Jobs, 1990–2008 (Majors)[7]

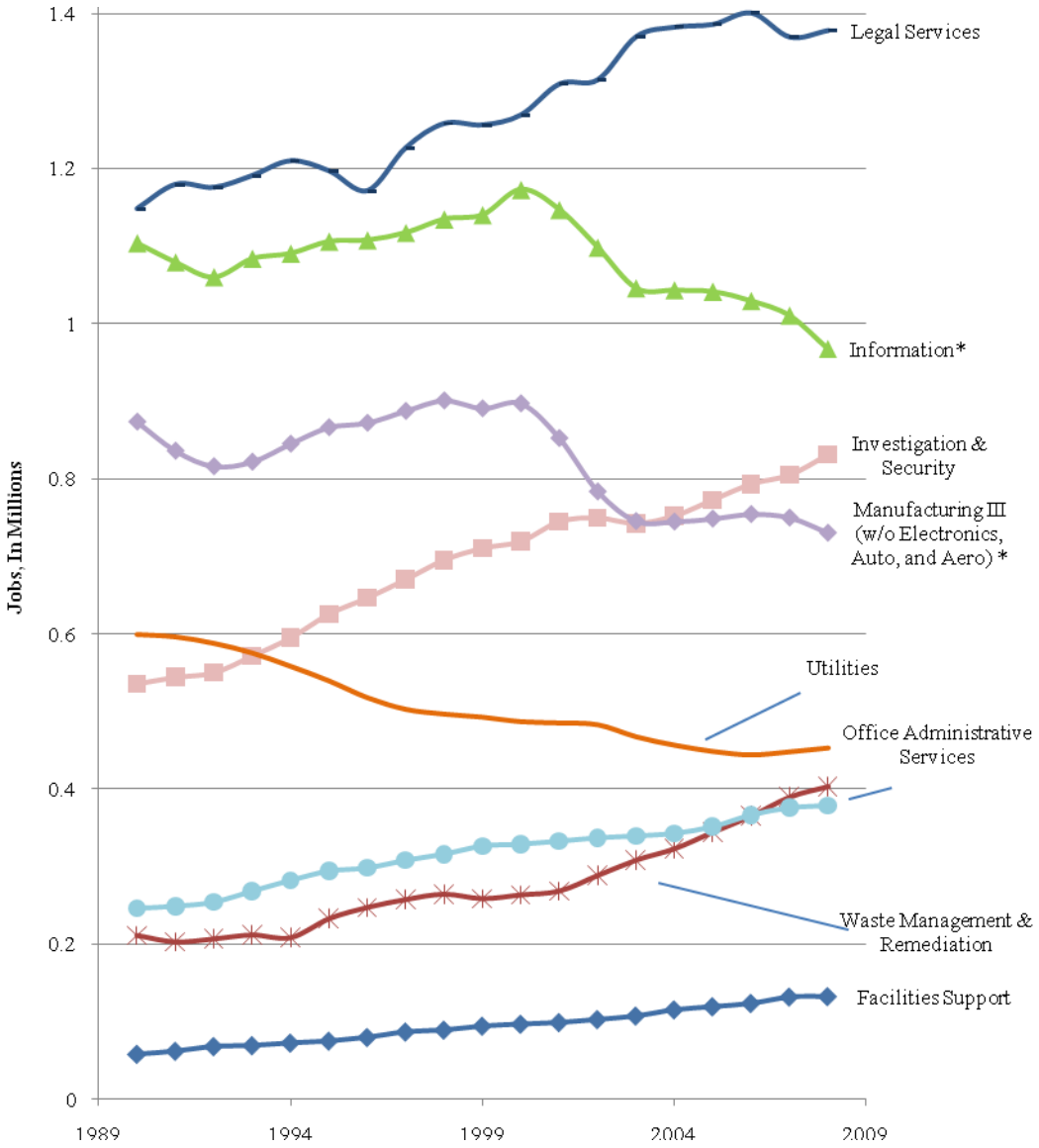


Source: Authors' calculations using Bureau of Labor Statistics historical data series
*Industries that are not predominantly or entirely nontradable include an asterisk.

For ease of viewing, smaller nontradable industries on a different scale are included in figure 7. Again, the reader will notice that certain categories—like Manufacturing III, which consists of largely

capital-intensive manufactured tradable goods, such as heavy machinery—include a nontradable component.

Figure 7. Nontradable Industry Jobs, 1990–2008 (Minors)[8]



Source: Authors' calculations using Bureau of Labor Statistics historical data series
*Industries that are not predominantly or entirely nontradable include an asterisk.

TRADABLE EMPLOYMENT

The tradable part of the economy presents a different picture. Employment in different industries shows increases and declines, which net to a positive but very small number. Figure 8 shows the larger or major tradable sectors across three groups of manufacturing (see table 1).

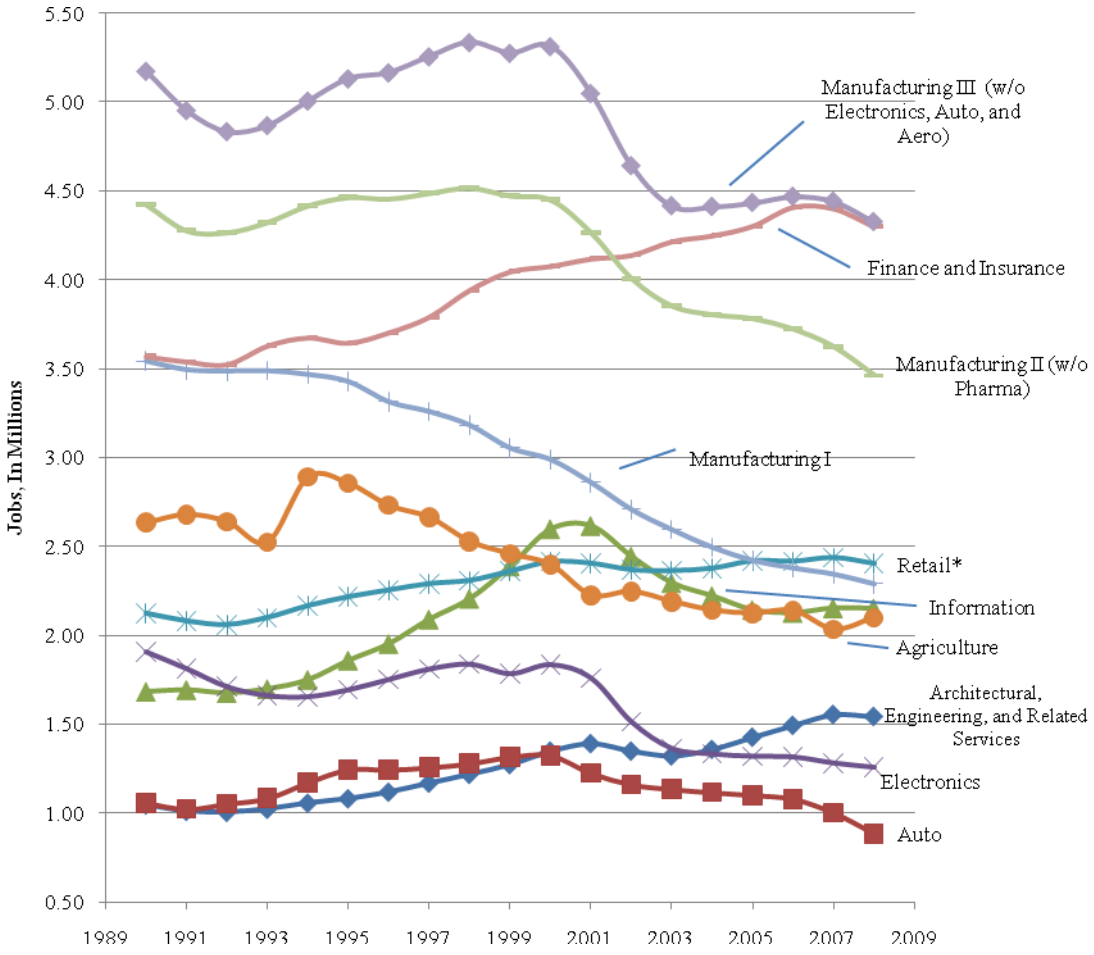
Table 1. Description of Manufacturing Industry Splits

Manufacturing I	Food, beverage, and tobacco production; textile, apparel, footwear, and leather goods
Manufacturing II	Wood and paper products; petroleum and coal; basic chemical products; synthetic materials; nonmetallic mineral products; glass; and cement products
Manufacturing III	Primary and fabricated metal products; heavy machinery; transportation equipment; computers and electronics; household appliances; semiconductors; and furniture production

Source: Summary of the North American Industry Classification System descriptors for manufacturing.

In Manufacturing III, we isolated electronics, autos, and other transportation (aero, rail, and ships) to get a closer look at these industries. In Manufacturing II, we isolated pharmaceuticals. Sticking with the methodology just described, those industries that are not predominantly tradable have an asterisk to indicate that most of the industry is on the nontradable side.

Figure 8. Tradable Industry Jobs, 1990–2008 (Majors)[9]



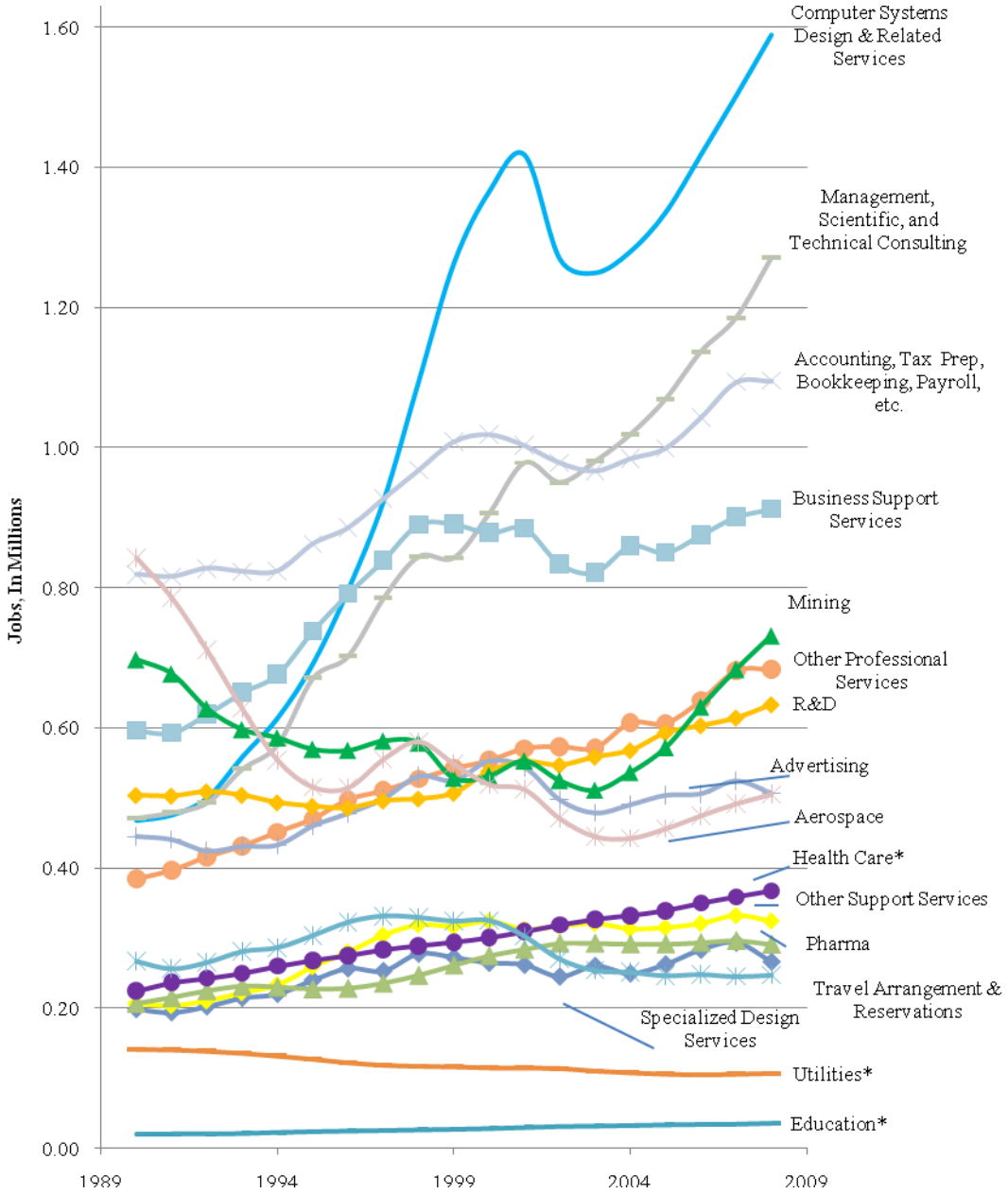
Source: Authors' calculations using Bureau of Labor Statistics historical data series
*Industries that are not predominantly or entirely tradable include an asterisk.

The pattern is mixed but clear. The manufacturing sectors declined substantially in employment in all three groups. Manufacturing III accounts for the largest drop in jobs between 1990 and 2008 (2.2 million). Major industry job loss was in the electronics industry (650,500), aerospace (337,400, see figure 9), and the auto industry (172,400). Manufacturing I accounts for the second-largest drop over the period (1.3 million). In this sector, major industry job loss came from cut-and-sew apparel manufacturing (597,300), and fabric mill (203,000). Manufacturing II accounts for the third-largest drop (880,400), driven by the paper (-438,000) and chemical industries (-165,600). Agriculture also posted losses of 535,000 jobs. Parts of agriculture are highly capital intensive but others (like fruit and vegetables) remain labor intensive. The most notable increases in major tradable industries were in finance and in architectural and engineering services. The tradable portion of information—the telecommunications, data hosting, broadcasting, motion picture, recording, and publishing subindustries—rose overall, but experienced a sharp rise and fall during the Internet bubble.

Among the smaller tradable sectors and industries (figure 9), computer systems design experienced the most striking growth, with a temporary reversal around the end of the Internet bubble.

Management, scientific, and technical consulting along with accounting and tax preparation, business support services also showed impressive employment gains. Interestingly, pharmaceutical employment rose (83,500), counter to the trend in much of the rest of manufacturing. Mining declined and then rose for a modest net gain overall. This is probably driven by the pattern of general commodity prices, which first fell and then rose as growth in emerging markets drove prices up.

Figure 9. Tradable Industry Jobs, 1990–2008 (Minors)[10]



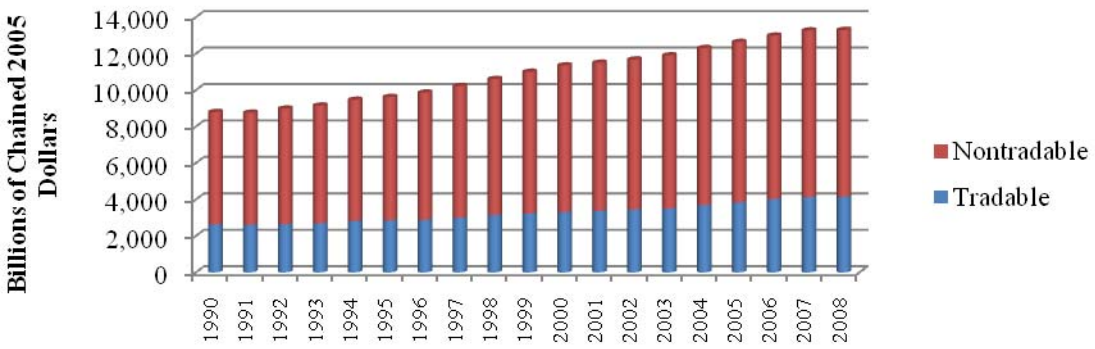
Source: Authors' calculations using Bureau of Labor Statistics historical data series
*Industries that are not predominantly or entirely tradable include an asterisk.

Value Added

If a company performs a service internally at one point in time, and then at a later point, purchases the service from an outside source, then the value added by the company (other things equal) falls because a service has been created outside— that part of value added becomes a purchased input. Similarly, when a domestic industry moves some part of the supply chain to another country, the value added in the outsourcing country will fall, even though the final sales of product may remain the same. In short, value added can decline either because the industry is in decline or because more of the value added is created by different companies, countries, or both. We call it outsourcing when the function is performed by another company and off-shoring when the function is performed in another country. Clearly offshoring is possible without outsourcing (a multinational company moves the activity to another country but continues to perform the function itself), as is outsourcing without offshoring (the function is performed domestically but by another company), as is offshore outsourcing.[11] All elements of this grid can be found in advanced economies, and in the global economy.

The evolution of the economy suggested by the employment data is really quite different from that painted by the value-added data. The methodology employed here is similar to that for employment. Value added is allocated to the tradable and nontradable sectors.

Figure 10. Tradable/Nontradable Value Added, 1990–2008



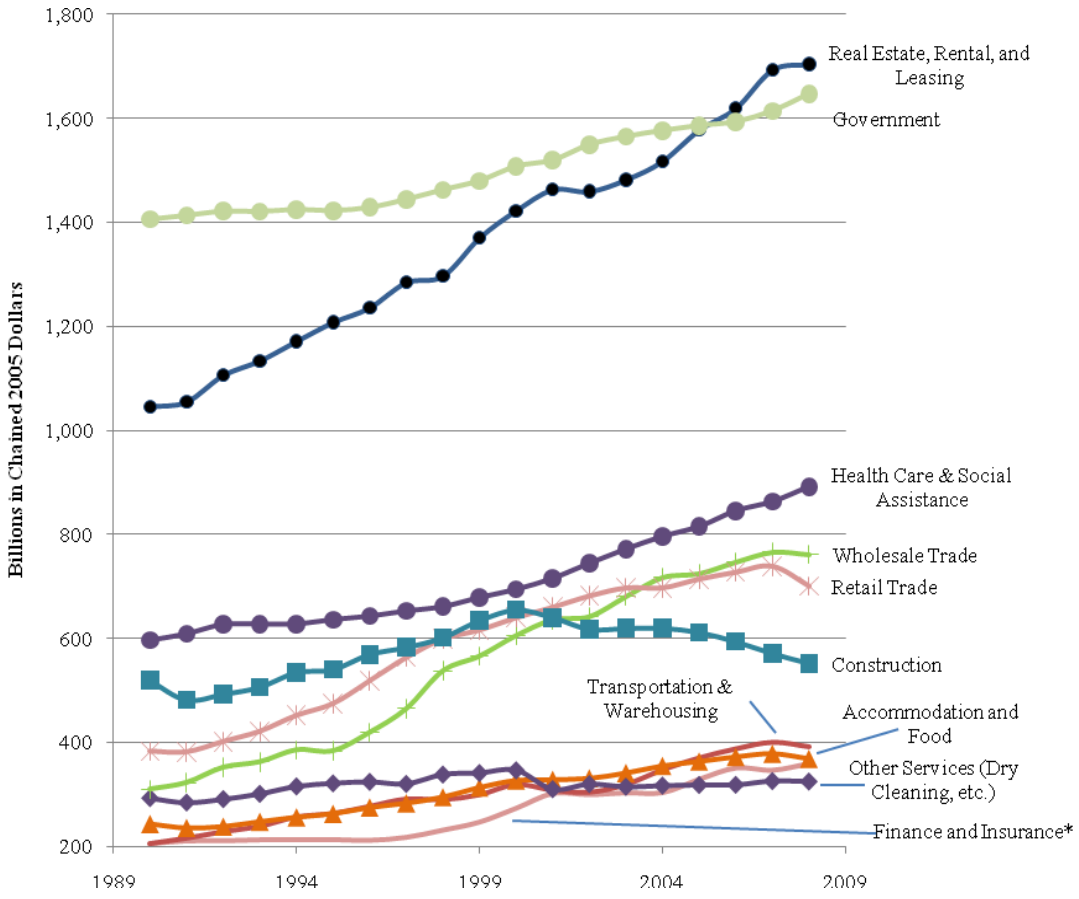
Source: Authors' calculations using Bureau of Economic Analysis historical data series

Figure 10 depicts the value added in the economy in constant 2005 dollars for the tradable and nontradable sectors. Total value added is close to the GDP of the economy. Valued added in the tradable and nontradable parts of the economy grew at similar rates. In fact, the tradable sector, though smaller than the nontradable, grew slightly faster and hence marginally increased its share of total value added, in marked contrast to the employment trends.

NONTRADABLE VALUE ADDED

Figure 11 depicts the trends in value added in the major sectors of the nontradable part of the U.S. economy. As before, government is large and expanding, with a 16 percent increase in value added from 1990 to 2008. The real estate, rental, and leasing industry grew from $1 trillion in 1990 to $1.7 trillion by 2008, a 49 percent increase. Postcrisis, it has undoubtedly become smaller. Health care (+40 percent), wholesale (+90 percent), and retail (+60 percent) all grew. Construction value added peaked around 2000, earlier than its 2006 peak in employment. Accommodation and food (hotels, restaurants and food service) also grew in value added, but what is perhaps striking is its relatively small size in value compared with its share of employment: in 2008, the industry accounted for 10 percent of jobs in the nontradable sector, but only 4 percent of nontradable value added. This, of course, means that value added per employee will be relatively low in this sector, as inevitably wages and incomes will also be.

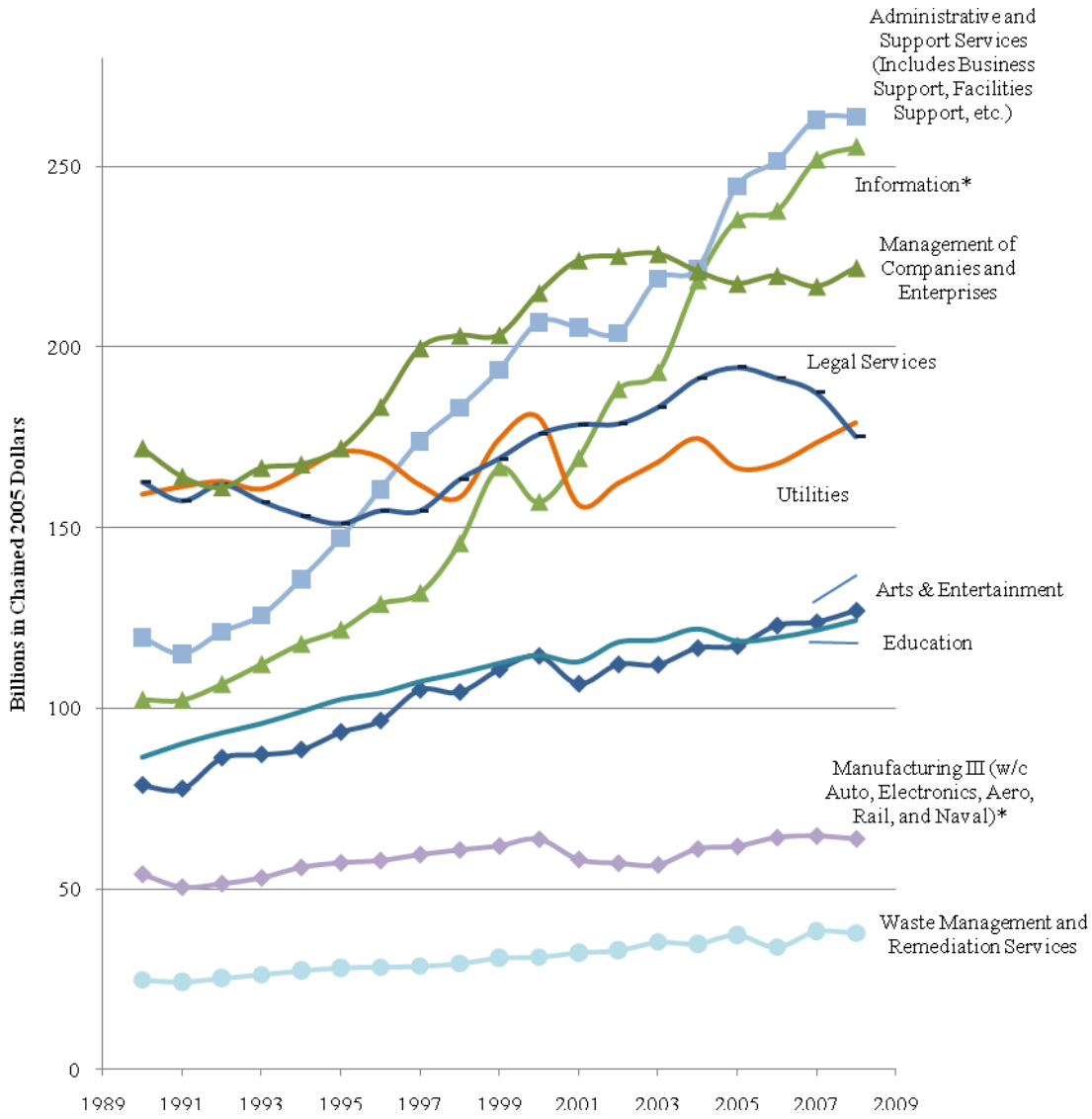
Figure 11. Nontradable Value Added, 1990–2008 (Majors)[12]



Source: Authors' calculations using Bureau of Economic Analysis historical data series
*Industries that are not predominantly or entirely nontradable include an asterisk.

The minor nontradable sectors are presented in figure 12. Substantial increases from 1990 to 2008 are visible in information (+91 percent), management of companies and enterprises (+25 percent), and in business and administrative support services (+79 percent).

Figure 12. Nontradable Value Added, 1990–2008 (Minors)[13]



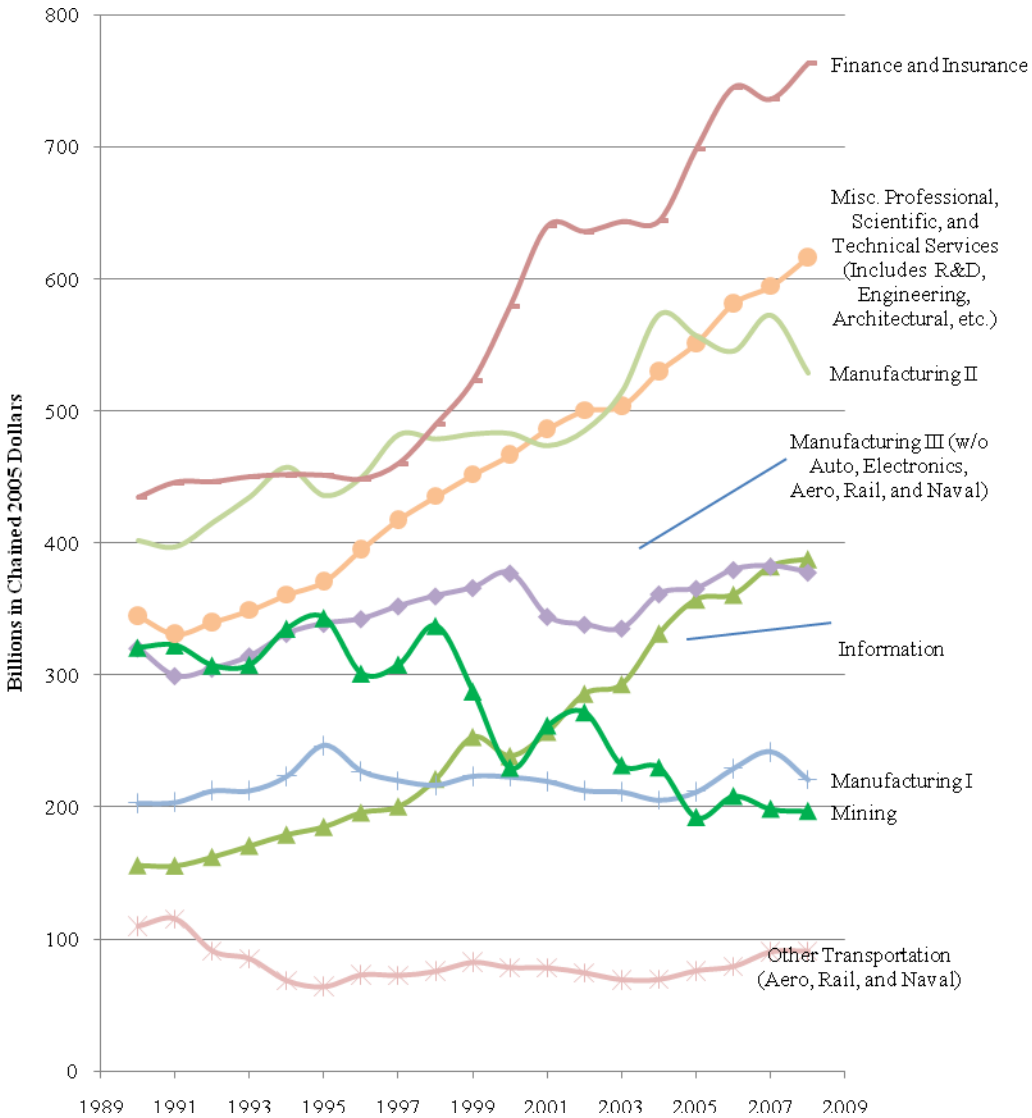
Source: Authors' calculations using Bureau of Economic Analysis historical data series
*Industries that are not predominantly or entirely nontradable include an asterisk.

TRADABLE VALUE ADDED

The most interesting data concern the value-added trends in the tradable part of the economy. The major tradable sectors (shown in figure 13) deserve careful scrutiny. One might have expected that

the trends in value added would be similar to those for employment, some rising and some declining. But in fact, the pattern is mostly increasing value added across industries. In parallel with increases in employment from 1990 to 2008, tradable value added also increased in finance and insurance (+56 percent); professional, scientific, and engineering services (+72 percent); and information (+91 percent). But the manufacturing sectors, where employment declined, all show increases in value added—manufacturing I, 8 percent; II, 27 percent, and III (excluding electronics, auto, aero, and naval), 17 percent. The only two major sectors to register a decline were other transportation (which includes aero, rail, and naval), 19 percent, and mining, 49 percent.

Figure 13. Tradable Industries' Value Added, 1990–2008 (Majors)[14]

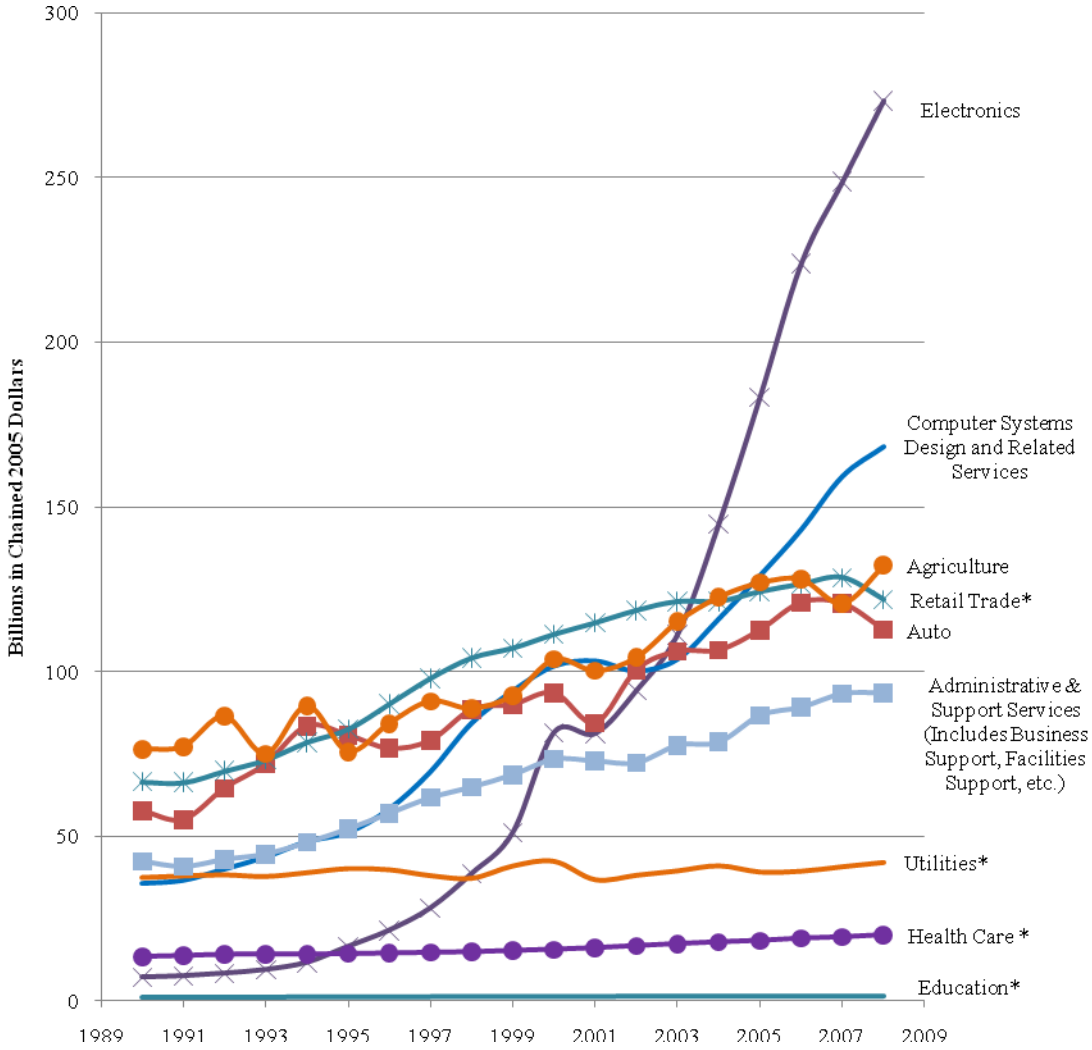


Source: Authors' calculations using Bureau of Economic Analysis historical data series
*Industries that are not predominantly or entirely tradable include an asterisk.

Switching to the smaller value-added sectors (figure 14), value added in computer systems design grew along with employment. But the largest increase occurred in electronics (+363 percent), which is a declining employment sector. The explosive growth in electronics sales and value added is not a surprise given the growth in demand for computers, cell phones, and many other devices that connect to the Internet.

Declining employment in electronics in the United States, despite the high growth in value added, is explained by the offshoring of a growing number of parts of the value-added chain, ranging from labor-intensive assembly to semiconductor manufacturing and design, and even to product development. So here we have the classic case: industry growth is high and value-added growth is high because the high value-added portions of the supply chains have remained in the domestic economy. Meanwhile, the lower value-added portions migrate off shore, explaining declining employment.

Figure 14. Tradable Industries' Value Added, 1990–2008 (Minors)[15]



Source: Authors' calculations using Bureau of Economic Analysis historical data series
*Industries that are not predominantly or entirely tradable include an asterisk.

To summarize, in some sectors—largely services—the U.S. economy continues to have a comparative advantage. In them, employment and value added grew together. But in another class of industrial or manufacturing sectors, value added rose and employment declined. The explanation for this pairing in the context of the global economy and the shifting characteristics of the emerging economies is not hard to uncover. Parts of the value-added chain in these industries are moving to other countries, prominently the emerging economies. The parts that are moving are those with lower value added per person. As the emerging economies grow and mature, competition will move up the value-added chain. This has been going on for some time.

Value Added per Person Employed (or per Job)

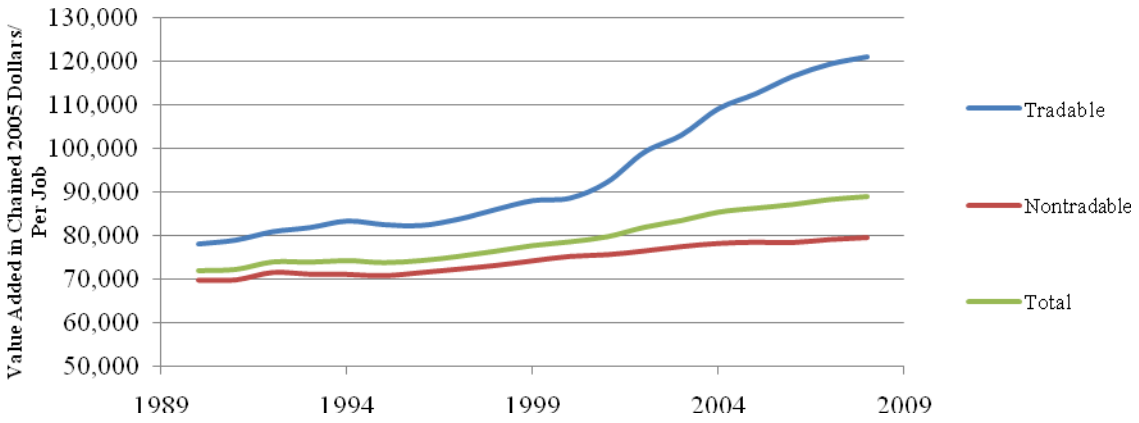
You can put the employment and value-added data together and look at value added per person employed, in the economy as a whole, in the tradable and nontradable sectors, and industry by industry.

In 1990, value added per person employed (VAP) in the tradable and nontradable sectors was rather similar, the tradable sector at almost $80,000, roughly $10,000 above the nontradable figure (see figure 15). But the value added per person employed on both sides diverged slowly during the 1990s and then rapidly after 2000. VAP in the tradable sector grew at an average of 2.3 percent per annum, and the nontradable sector at 0.7 percent. By 2008, VAP in the tradable sector was just over 50 percent above that for the nontradable sector.

As noted earlier, there are two kinds of sectors in the tradable category. In manufacturing supply chains, the lower value-added components are going offshore. These chains saw declines in employment and rising value added, which implies a sharply rising pattern of value added per employee.

In the second kind, employment and value added increased together. These tend to be high-end services in which the U.S. economy continues to enjoy a competitive position or better. In this set of sectors, one would not know in advance, by the logic and arithmetic, whether value added per person employed would rise or fall. In fact, VAP seems to have risen in most of them. These are growing sectors where both value added and VAP are increasing together; here, the value added chain is not (or not yet) migrating to other parts of the global economy.

Figure 15. Value Added per Job, 1990–2008

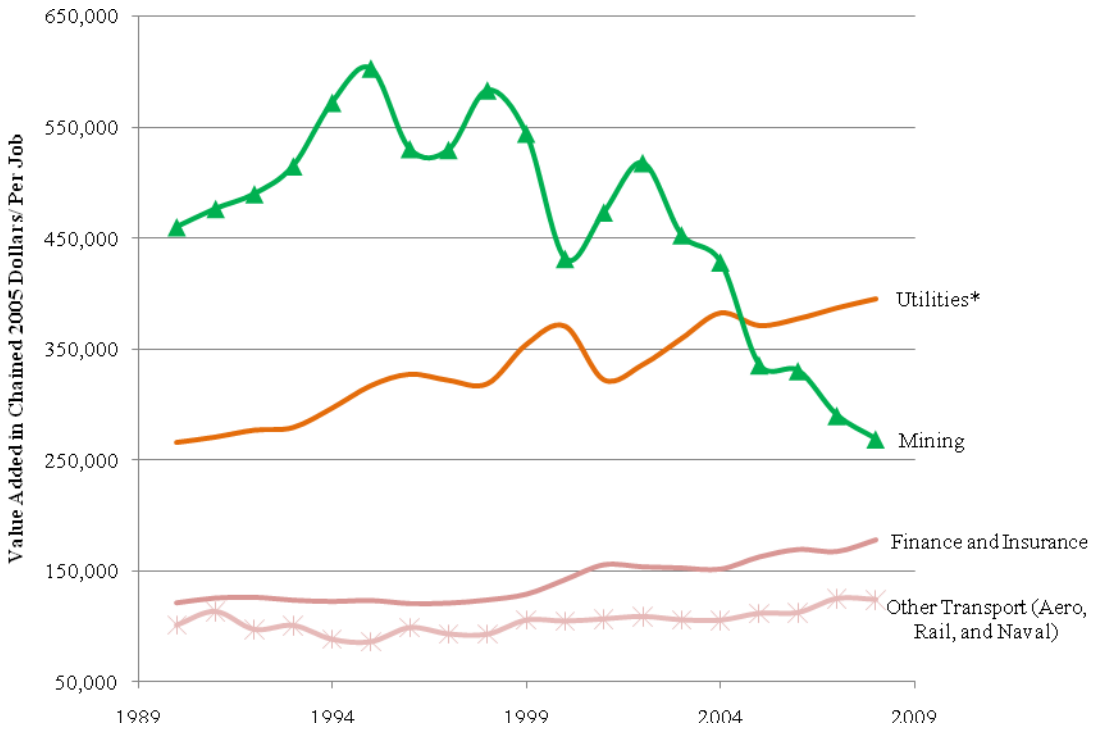


Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series

TRADABLE VALUE ADDED PER PERSON

Figures 16 and 17 depict value added per person employed by industry in the tradable sector. Figure 16 (majors) presents those with a starting value of above $100,000, and figure 17 all the rest (minors). Mining and utilities are highly capital-intensive industries, hence the high value added per employee. In addition, utilities are mostly nontradable, with a small number of components that are tradable. From 1990 to 2008, VAP rose in finance and insurance (+38 percent), utilities (+40 percent), and other transport (+20 percent), but fell in mining (-54 percent).

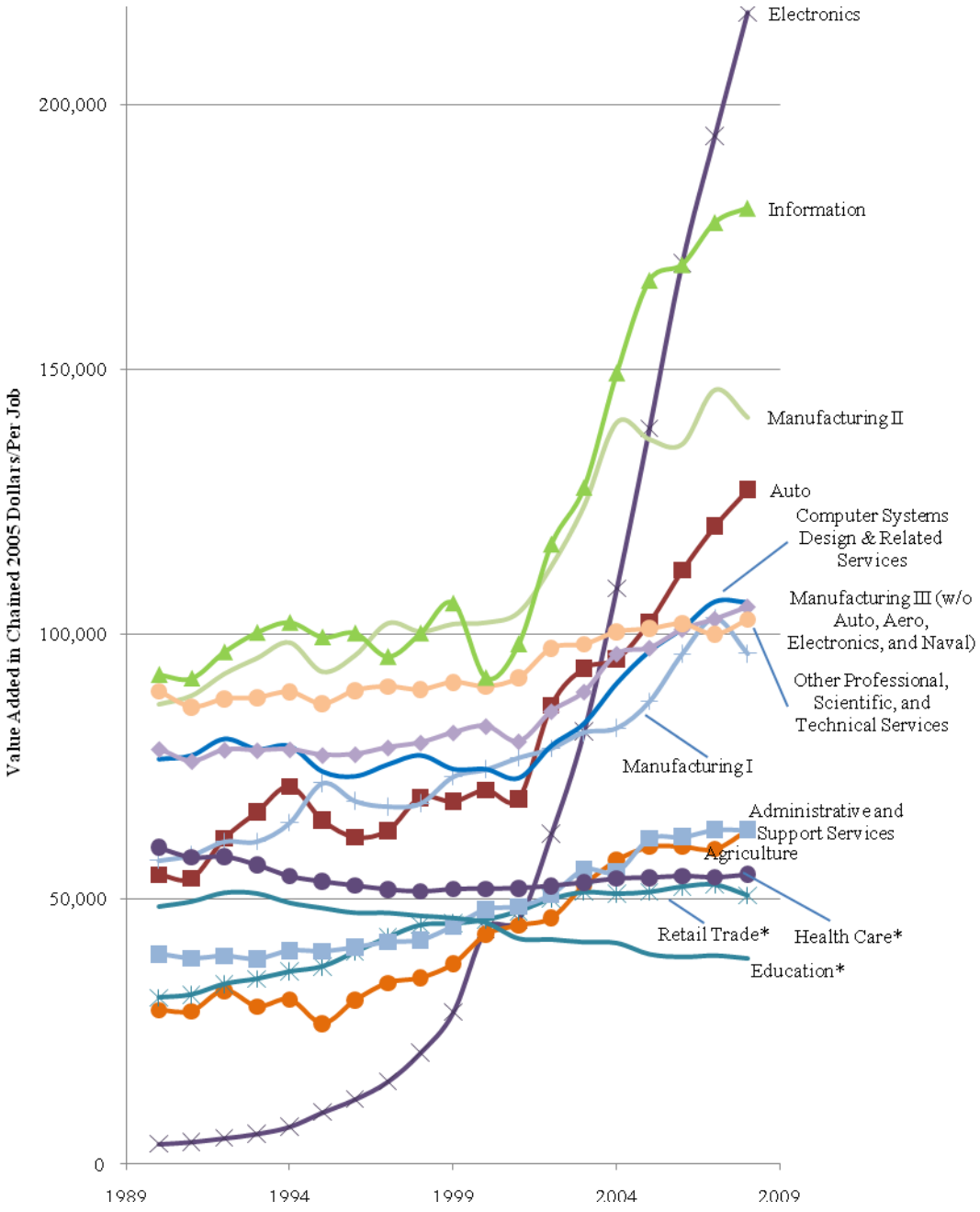
Figure 16. Tradable Industries' Value Added per Person, 1990–2008 (Majors)[16]



Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series
*Industries that are not predominantly or entirely tradable include an asterisk.

But the large increases are observed in figure 17. These tradable categories experienced, for the most part, rising VAP, including both the declining employment manufacturing industries (as expected, because value added was increasing) and the services sectors with rising employment, where the VAP figure could have risen or fallen. In fact, VAP is rising rapidly in these high-end service sectors, particularly in the information industry (+67 percent).

Figure 17. Tradable Industries' Value Added per Job, 1990–2008 (Minors)[17]

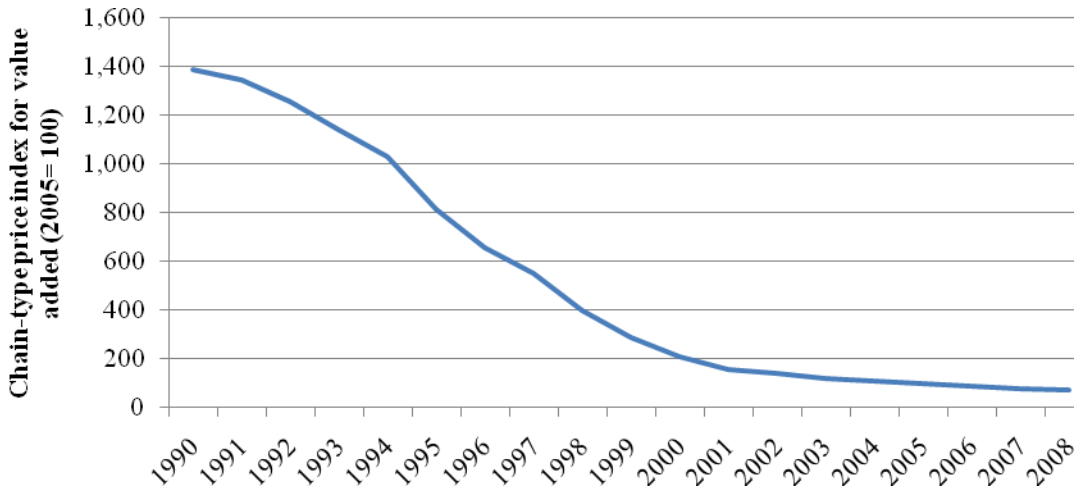


Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series
*Industries that are not predominantly or entirely tradable include an asterisk.

The most noteworthy rise in VAP was in electronics, from roughly $4,000 in 1990 to more than $200,000 in 2008, a 405 percent increase. Of course, the low VAP in 1990 needs to be put in proper context; its extremely low level is a statistical artifact, reflecting the construction of the real value-added data using 2005 as its benchmark. Early consumers of personal computers will recall the exorbitantly high prices of electronics in the early 1990s by today's standards; since then, prices have fal-

len dramatically year after year (see figure 18). Costs fell with them (for comparable amounts of computing power), the economic effect of the operation of Moore's law. Basically, the value-added data do not reflect what consumers actually paid for the products in the early years.

Figure 18. Computer and Electronics Chain-Type Price Index for Value Added (2005=100)



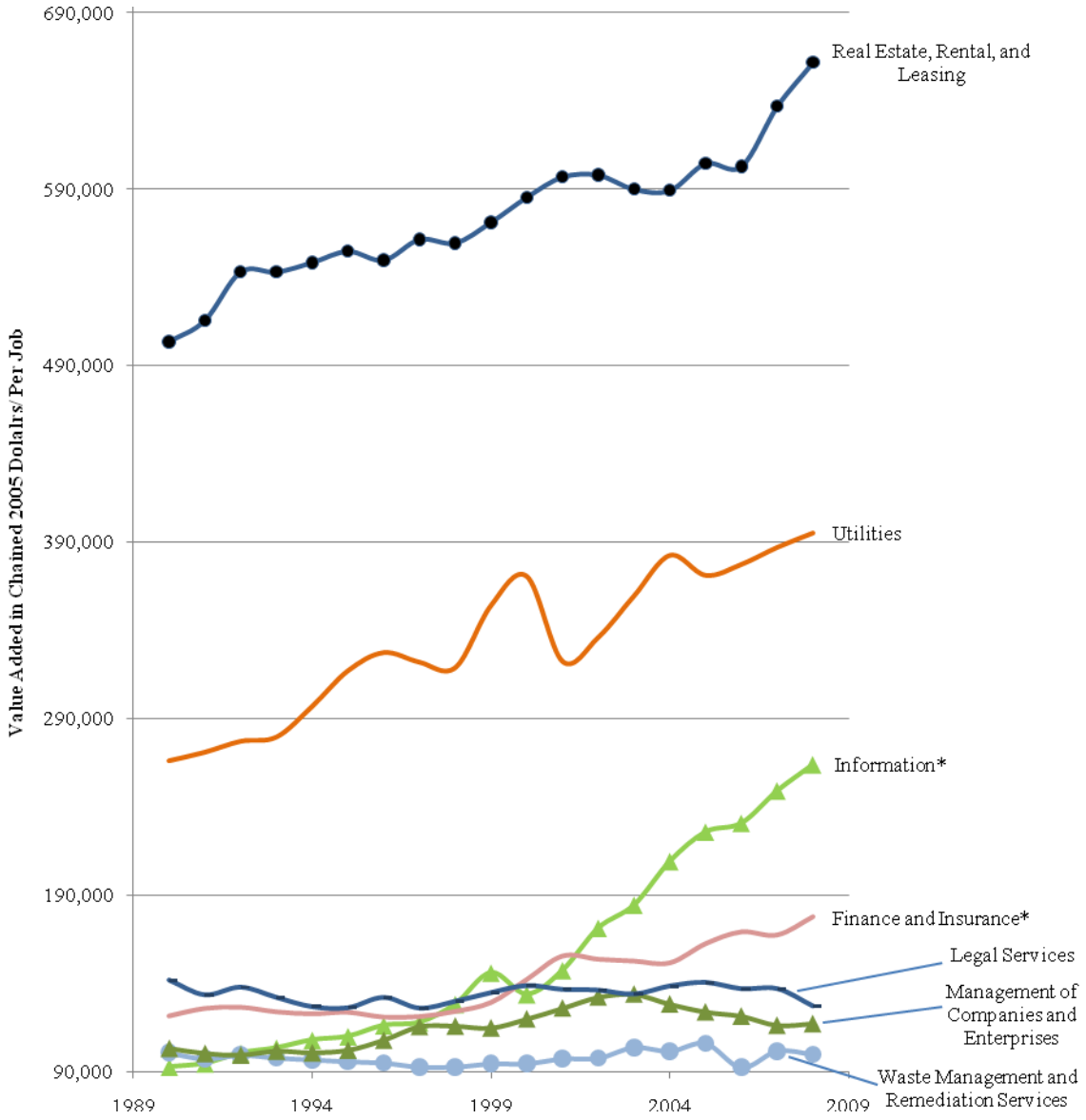
Source: Authors' calculations using Bureau of Economic Analysis historical data series

For perspective, the nominal VAP in 1990 was roughly $52,000, far above the real VAP of roughly $4,000. The details of this industry's rise are discussed in more detail in an appendix.

NONTRADABLE VALUE ADDED PER PERSON EMPLOYED

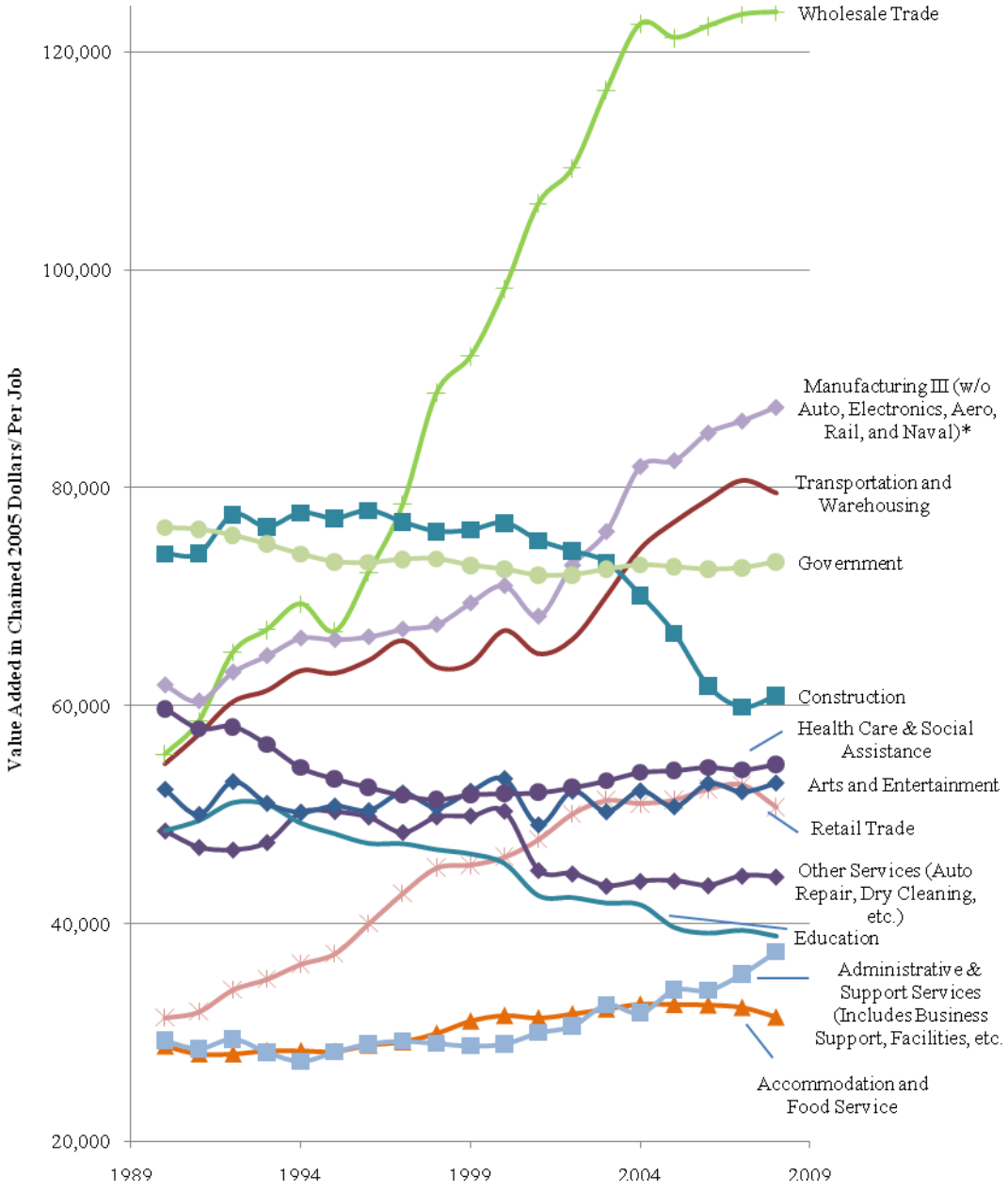
The nontradable VAP is shown in figures 19 and 20. In the higher VAP group, both the levels and rates of increase of real estate, rental, and leasing services are striking. Presumably, some of this observed trend was related to the real estate bubble that preceded the crisis. Real estate, rental, and leasing is a rising employment industry and a substantial one (accounting for 2.6 million nontradable jobs in 2008), but its growth in value added from 1990 to 2008 (+49 percent) exceeded its job growth, resulting in a rise in VAP of 27 percent. Utilities as a group are capital intensive and rising labor productivity may be related to increased capital intensity and to information technology advances that automate some of the control systems. Its VAP rose by 40 percent. Information and finance and insurance are largely tradable; here we are seeing mainly tradable gains reflected on the smaller nontradable side. Interestingly, legal services, which is largely though not entirely nontradable at this stage, shows a slightly declining pattern (-11 percent from 1990 to 2008).[18]

Figure 19. Nontradable Industries' Value Added per Job, 1990–2008 (Majors)[19]



Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series
*Industries that are not predominantly or entirely nontradable include an asterisk.

Figure 20. Nontradable Industries' Value Added per Job, 1990–2008 (Minors)[20]



Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series
*Industries that are not predominantly or entirely nontradable include an asterisk.

A few aspects of the nontradable VAP data are worthy of note. As mentioned earlier, the giant employers in the nontradable sector are government and health care. Both are experiencing declining VAP (-4 percent for government, -9 percent for health care). Construction's VAP also declined by 19

percent from 1990 to 2008. The dominance of these sectors causes the declining VAP to overwhelm any sectors in which it is increasing. The result is modest growth of VAP on the nontradable side of the economy (about 0.7 percent per year). Moreover, government and health care employ large numbers of workers in the midrange of the income distribution. Declining VAP in these sectors has had the effect of depressing middle income growth and increasing income inequality, as the high end rose faster.

Wholesale trade's VAP expanded very rapidly in the 1990s, reflecting dramatic increases in productivity and flat employment growth. According to a 2002 Bureau of Labor Statistics study, the industry's productivity boom was caused by three factors: improvement in technology, specifically the introduction of systems like the Electronic Data Interchange (EDI); Internet communication to buy and sell products; and a rapid expansion in the size of wholesale businesses and the adoption of new business models.[21] Accommodation, food service, and administrative and support services have low VAP. Even when discounting for part-time work, the figures are low. Moreover, accommodation and food service are high and rising employment sectors, so their low VAP further explains wage stagnation. Education has experienced declining VAP, as has construction, another high employment sector. A possible reason for the declining VAP in these sectors is the wage effect of increased competition for nontradable jobs, because jobs in the tradable sector were flat and the employed population continued to grow. Government VAP is essentially flat, perhaps because the government sector is relatively insulated from the price effects of excess labor supply.

A Brief Summary

In summary, over the past twenty years in the U.S. economy, some parts of the tradable sector grew in value added and employment (e.g., the finance, insurance, and computer systems design industries) whereas others grew in value added but declined in employment (e.g., the electronics and auto industries). The former are where most of the value-added chain is in the upper range in terms of value added per employee. The latter are sectors, like manufacturing, with a range of value-added components. In these, the lower value added per employee portions moved offshore, causing a decline in employment and leaving the higher value-added parts that remain competitive and thrive by operating in a global economic environment with access to high-growth emerging market economies and expanding commercial and business opportunity. Overall, the tradable sector generated negligible incremental employment.

Yet the economy did not have an unemployment problem, at least until the crisis of 2008. The expanding labor force was absorbed in the nontradable sector (roughly 26.7 out of a total of 27.3 million net new jobs), government and health care leading the growth (10.4 million incremental jobs between them). In our view, it is unlikely that this pattern will continue. Chances are good that the pace of employment generation on the nontradable side will slow. Fiscal conditions, the costs of the health-care sector, a resetting of real estate values, and the elimination of excess consumption all point to the potential for a longer-term structural employment problem. Expanding employment in

the tradable sector almost certainly has to be part of the solution. Otherwise, the United States will have a longer-term employment problem.

Market Failure or Distributional Issue?

In describing these trends, we have been asked several times what the nature of the market failure is. The answer seems fairly clear. There is no major market failure in the way economists normally use the term. Multinationals, businesses that operate in the global economy, and those who have a role in creating and managing global supply chains are good at what they do and getting better all the time. They are knowledgeable about doing business in multiple national environments (an important capability). They identify and respond to market and supply chain opportunities. The transactions costs of complex and geographically disperse supply chains are coming down because of a combination of management expertise and information technology that allows efficient coordination of complex, geographically dispersed systems. The costs of remoteness are declining, or, as Thomas Friedman would say, the world is becoming more flat.

The global economy has an abundance of human resources and they are becoming more accessible as time goes on. They deepen in human capital and skills as the emerging economies develop. The portions of the supply chain in which these economies have the potential to be competitive are growing.

Multinational companies, which operate in a way that gives them access to these assets and to growing markets, are doing exactly what one would expect them to do. The resulting efficiency of the global system is high and rising. *So, there is no market failure.* The system is complex and constantly evolving, but the operatives in the system adapt to the shifting sands of comparative advantage and market size, and move economic activity (think of parts of the value-added or global supply chains) to the places where it can be performed at high efficiency and low cost.

If the issue is not about efficiency or market failure, what then is the problem? The answer is that market forces have distributional consequences in employment opportunities and incomes. Subsets of the world's population, including those within individual countries, may experience adverse effects.

Table 2. Measure of Income Distribution in Selected Economies

Country	Gini Coefficient	R/P 10%	R/P 20%
Israel	39.2	13.4	7.9
United States	45 or 40.8	15.9	8.4
China	41.5	21.6	12.2
United Kingdom	34	13.8	7.2
Germany	27–28	6.9	4.3
Sweden	23	6.1	3.9
Brazil	57	51.3	21.8

India	36.8	8.6	5.6

Source: Author's compilation. R/P 10 percent means the ratio of the average income of the richest 10 percent is to the poorest 10 percent.

One way to think about what is going on is that global markets are becoming more integrated in tradable sectors and functions, whereas before they were separated geographically by high transactions costs and policy barriers. When markets merge, or partially merge, there are effects on prices, wages, and incomes. Some rise and others fall. Not everyone is happy.

This seems fairly clear in the U.S. economy. The most educated, who work in the highly compensated jobs of the tradable and nontradable sectors, have high and rising incomes and interesting and challenging employment opportunities, domestically and abroad. Many of the middle-income group, however, are seeing employment options narrow and incomes stagnate. Recent surveys suggest that people have doubts about the opportunities available for future generations. This may be pessimism induced by the tremendous shock of the crisis, high unemployment, and a difficult recovery. But it appears that the declining employment opportunities in the tradable sector for middle-income employees predate the crisis. Uncertainty about both the quantity and quality of the employment opportunities for this group is considerable.

The distributional changes within the United States are mirrored by those between nations. In most of the postwar decades, advanced countries did well. War-damaged economies recovered and advanced economies grew at respectable rates (on the order of 2.5 percent in real terms per year). By and large, they did not have major unemployment problems. Meanwhile, the developing countries, admittedly with numerous false starts and different starting points, began to grow. The pattern of that growth spread. Poverty reduction has been tremendous, and more is yet to come. The arrival of China and India (at different times) in the high-growth group was a major turning point because of their large populations (almost 40 percent of the world's population between them). But even then, because they were relatively poor and economically small, in the early stages of their growth, their global economic impacts were also small. That is now changing. Over time, at growth rates in excess of 7 percent a year (which implies doubling or more every decade), their economies are becoming larger and richer, and beginning to have a systemic impact.

During the postwar period, the distributional effects of globalization were largely benign, but we now appear to be at a crossroads. The major emerging markets and the developing countries more broadly are collectively, and in some cases (like China) individually, systemically important, in terms of both macroeconomic and financial stability and the effect they have on the structure of other economies. Many of those effects are positive. Consumer goods, for example, are less expensive than they would be in a less open environment. But the distributional effects may be negative. Within countries, inequality may rise. Between countries, the success of the emerging economies may impose costs on richer ones, straining public support for globalization.

Implications for Policy

One possible response to these trends would be to assert that market outcomes, especially efficient ones, always make everyone better off in the long run. That seems clearly incorrect and is supported by neither theory nor experience. It is true, as in the United States, that many goods and services are less expensive than they would be if the economy were walled off from the global economy, and that the benefits of lower prices are widespread. But these cost savings do not necessarily compensate for diminished employment opportunities, and it would be presumptuous in the extreme for policymakers to tell voters what their values and preferences should be. People might trade cheaper goods for assurances that a wide range of productive and rewarding employment options would be available, now and in the future, for themselves and their children and grandchildren, even if the cost of goods they consume were to rise.

A second position acknowledges the distributional effects. If we want to use the market system in the context of an open global economy, distributional implications are inevitable, but we have to accept them. Why? Because, the argument goes, the alternative is not having an efficient market system operating in a relatively global open economy, which would be far worse. However much one might wish otherwise, it is impossible to fully compensate those whose employment opportunities or incomes are adversely affected. This stance is more realistic than the first one. There probably are real choices between aggregate income levels and efficiency on the one hand, and distributional equity and employment opportunities on the other.

But, to complete the assessment, one needs to explore policies that may improve the trade-off. In principal, one could restrict access to the domestic market by foreign suppliers. This generally falls under the heading of protectionism, risks reciprocal action, and sets an escalating pattern almost certain to cause more harm than good. Further, it raises prices for many goods for the whole population. It is not a good idea when carried out aggressively on a broad front. The G20 is right to caution repeatedly about widening protectionism. A preferable approach is to accept globalization but to look for domestic policies that will reduce the distributional impact at home.

Admittedly, no simple policy fix will achieve this. Addressing inequality is a complex challenge; almost certainly a multipronged approach will be needed. But the challenge should not be ducked, because the availability of quality employment and the rising gaps in income distribution are politically and socially salient issues, and opportunity is a core piece of the social contract. The absence of rewarding employment opportunities in the lower- and middle-income ranges breaks an important part of the social contract in America, which holds that you are largely on your own but that if you work hard the opportunities will be there. The second part of that contract is now in question. The follow-on question is what practically speaking can be done to shift the evolving global structure in our favor without causing excessive damage to the overall system or to others.

This analysis indicates that part of the answer must come from altering the trends in the tradable sector. Market forces operating in the global economy are powerful. It is not reasonable to define the challenge as resisting or overriding them. But the goal must be to shift incentives at the margin so as

to improve the distributional effects in U.S. favor. What follows is not meant to be a full discussion of policy options but rather a suggestive starting point.

On the supply side of labor markets, the state and individuals can invest or co-invest in physical capital (infrastructure), institutions, human capital, and the knowledge and technology underpinnings of the economy. These investments generally have the effect, in advanced and developing countries alike, of raising the return to private investment, causing the latter to expand in scale and scope and employment along with it.

What type of investments would make sense? Maintaining the U.S. lead in higher education is a starting point. The high value-added jobs, especially the higher paying ones in the tradable sector, generally are filled with highly educated people with college degrees and above. Making sure that the United States does not fall behind in this regard makes sense as part of a portfolio of policies. Of course, it does not guarantee that the number of jobs is significantly expandable, given the scope of the tradable sector, but it might promote job growth and, with more scientific and engineering degrees, the scope might expand too. There is some evidence that U.S. leadership in education has been eroding in some areas.[22]

Next, Washington should continue to support fundamental research. The public-sector investment in knowledge and technology is large in the United States, and has been an important foundation for driving new technology, growth, and productivity. But, in some areas, given budget constraints and competing obligations, this investment is on the decline. Human capital is a byproduct of the research investment, and many think that the byproduct is as important as the direct knowledge output.

It is probably a good idea to explicitly target some of the public-sector investment at technologies with the potential to expand the scope of the tradable sector and employment. Coinvestment with the private sector, which has relevant knowledge about where these opportunities might be, would make sense.[23] This public investment would have the effect of shifting private incentives so that they are better aligned with social objectives. Multinational firms operating in the tradable sector have access to abundant supplies of relatively low-cost labor in the global economy. In this kind of environment, the payoff to investing in capital-intensive technologies that increase labor productivity in high-income countries in the tradable sector is minimal. However, that incentive can be shifted somewhat with public-sector coinvestment that would lower the private sector's cost of investment. The shift of incentives would expand the employability of domestic citizens in the tradable sector.

Infrastructure should also be part of the portfolio. It directly adds employment and improves competitiveness and efficiency in a wide range of sectors. Given the difficult current fiscal situation, it will be hard to find the fiscal space to expand investment in these areas. Exploring public-private joint ventures to build or upgrade infrastructure may therefore be a useful avenue. There is a growing body of experience with the public private partnership approach to infrastructure in developing countries, which often want to accelerate infrastructure investment to support growth, but which have limited and constrained fiscal resources.

Finally, tax reform would help if in addition to eliminating waste, complexity, and perverse incentives, it were to clearly favor investment in a broad range of productive assets of all kinds, including hard and soft infrastructure and human capital.

The evolution of economic structure differs across advanced countries. The forces are similar but the market and policy responses have varied. We envision a broader study of structural evolution in a

broad range of major economies in collaboration with a major private-sector institution with global research and data collection capacity. Right now this is beyond our resources.

We do know, however, that the German economy's structure on the tradable side is really quite different from that of the United States, as is the current account situation. This may in part be the result of replicable policy choices; German reforms of the past decade have been designed with competitiveness and employment in mind. One element is particularly noteworthy: wage increases have been low for the best part of a decade. That appears to have had a material effect on export competitiveness in a range of manufacturing industries, such as industrial machinery. Subject to more detailed investigation, it looks as though the preservation of employment was part of a broad agreement among business, labor, and government, and that sacrifices were made to achieve this objective in the area of income growth. Interestingly, the income distribution in Germany is much flatter and appears not to have moved adversely, as it has in America.

Recovering manufacturing activity that has departed will not be easy. Manufacturing competitiveness is supported by skilled labor and by training and technical institutions. Once these institutions are gone, it is difficult to get them back.[24] One implication is that long-term policy frameworks should include an evolving assessment of competitive strength and employment potential across sectors and at all levels of the human capital and education spectrum, and a goal of steering or nudging market outcomes to achieve the social objectives. The structural evolution of the economy matters and can be influenced in relatively efficient ways.

This recommendation is not as radical as it may sound. Despite much comment to the contrary, the sharp line between intervening to influence market outcomes over time and a hands-off approach is an illusion. Most countries (advanced and developing) adopt policies and invest public resources in assets that increase human capital, the technological base of the economy, and its competitiveness. That will and should continue. It is a benign form of competition among nation states, which increases productivity everywhere, provided that the markets for final and intermediate goods and services remain open.

The alternative is to use more blunt and destructive forms of intervention, generally falling under the heading of protectionism. And the incentive to resort to that kind of "solution" increases as the distributional effects on employment opportunities and incomes become more adverse.

International Dimensions

Although most of the heavy lifting on these issues of structural change, diversification in the tradable sector and distribution needs to be carried out at the national level, certain dimensions are international as well. If a relatively open global system is going to survive in a world in which nation states are the principle decision-makers with respect to policy, then it will have to be managed and guided by a set of principles designed not just to achieve efficiency and stability (important as those are), but also to try to ensure that, as the system evolves, the benefits are spread equitably across countries and subgroups within countries. What is needed is an understanding of the distributional issues and their structural underpinnings and an ability to discriminate between destructive national policy res-

ponses, those that threaten the openness of the system, and those that are relatively benign in the sense of imposing limited costs on other countries. Although the World Trade Organization is the arena where rules are negotiated, the G20 is where the priorities and guiding principles for policy coordination are set.

Looking Forward

In the United States, it is hard to predict how these issues will be addressed as the economy evolves. Given the condition of municipal, state and federal budgets, long-term public-sector investments in growth and employment are likely to be deferred. But the central unknown is how the employment situation will evolve. If employment bounces back with growth and if the trends reverse in the tradable sector, or the nontradable sector continues to have high absorptive capacity, then from a political point of view, the issue will be less important and the political support for an open global economy will be easier to sustain. This scenario does not seem to be the most likely one.

It is more likely that growth bounces back to some extent but that unemployment remains stubbornly high. This is consistent with the fact that value added increased briskly in the tradable sector while employment in the tradable sector stagnated. Growth and employment are set to diverge. Eventually the frictions and lags in labor markets will be overcome, and the unemployment problem will more into a employment opportunity and income distribution problem.

In this kind of environment, politics will probably become divisive and polarized, and the inclination to use protection and market access to expand employment options will increase. Because that will undoubtedly provoke responses by other countries, the openness of the global economy will be at risk.

Easy answers appear to be missing. Investing in hard and soft infrastructure with an explicit focus on employment is almost surely the right way to get started. But it isn't possible to know in advance how effective this will be in expanding employment options. Experimenting is only the way to solutions.

These structural issues deserve attention and debate sooner rather than later. A broad discussion involving policymakers, business, labor, universities and research institutes, and concerned social organizations is needed, in part because the knowledge required to create and evaluate possible responses is highly decentralized. The president has appointed a distinguished business leader, Jeffrey Immelt, the CEO of GE, to head a commission to tackle these issues with a focus on employment. It is an important step forward and it is well targeted.

Assuming that the markets will fix these problems by themselves is not a good idea; it may be approximately true for the global economy as a whole, but is not necessarily for its parts. In truth, all countries, including successful emerging economies, have addressed issues of inclusiveness, distribution, and equity as part of the core of their growth and development strategies. Now advanced countries will need to follow suit. Confronting the tension between efficiency and distribution and attempting to strike an appropriate balance is critical.

The late Paul Samuelson once said that every good cause is worth some inefficiency. Morally, pragmatically, and politically that seems right. Delivering on the opportunity part of the social contract is one such cause.

Appendix I. Data and Methodology

DATA

The analysis uses employment data from 1990 to 2008 from the Bureau of Labor Statistics, Office of Occupation Statistics, and Employment Projections. The data used for industry value added estimates are from the Bureau of Economic Analysis; value added data are in real terms, with 2005 as a benchmark. The industry classifications are based on the 2002 North American Industry Classification System (NAICS).

METHODOLOGY

Industries were split based on Jensen and Kletzer's (2006) geographic concentration index, which measures domestic tradability and *potential* international tradability, a subjective assessment of whether domestically tradable industries are in fact internationally tradable, and using export/import data as a final check. For instance, legal services, though tradable domestically, are not very tradable internationally. The results of the classification are found in appendix II.

Although almost all industries were proportionately split, information was split based on specific subindustry sectors. For information, the following subindustries are tradable: telecommunications, data processing and hosting, software publishers, and motion picture, video, and sound recording industries. Nontradable information industries include newspaper, periodical, book, and directory publishers, and broadcasting (not including Internet broadcasting).

Because of the difference in measurement between the Bureau of Economic Analysis and the Bureau of Labor Statistics, value added for the information industry was split based on the average proportional split in the employment data rather than on a subindustry by subindustry basis.

Appendix II. Allocation of Tradability by Industry

	Tradable	*Nontradable*
Agriculture	100	0
Mining	100	0
Utilities	10.11	80.89
Construction	0	100
Manufacturing I	100	0
Manufacturing II	100	0
Manufacturing III (without auto, electronics, and aero)	85.56	14.44
Electronics	100	0
Auto	100	0
Aerospace	100	0
Wholesale	0	100
Retail	14.815	85.185
Transportation and warehousing	0	100
Information	~60	~40
Newspaper, periodical, book, and directory publishers	Nontradable	
Software publishers	Tradable	
Motion picture, video, and sound recording industries	Tradable	
Broadcasting (except Internet)	Nontradable	
Telecommunications	Tradable	
Data processing, hosting, related services, and other information services	Tradable	
Finance and insurance	67.95	32.05
Real estate, rental, and leasing	0	100
Legal services	0	100
Accounting, tax preparation, bookkeeping, and payroll services	100	0
Architectural, engineering, and related services	100	0
Specialized design services	100	0
Computer systems design and related services	100	0
Management, scientific, and technical consulting services	100	0
Scientific research and development services	100	0
Advertising and related services	100	0
Other professional, scientific, and technical services	100	0
Management of companies and enterprises	0	100
Office administrative services	0	100
Facilities support services	0	100

Employment services	0	100
Business support services	100	0
Travel arrangement and reservation services	100	0
Investigation and security services	0	100
Services to buildings and dwellings	0	100
Other support services	100	0
Waste management and remediation services	0	100
Education	1.11	98.89
Health care	2.2	97.8
Arts and entertainment	0	100
Accommodation and food	0	100
Other services (auto repair, dry cleaning)	0	100
Government	0	100

a. Although B2B electronics markets are tradable, this subsector could not be broken out of wholesale trade because the data available are not detailed enough.
b. There was no additional employment from special industries (e.g., owner-occupied dwellings).

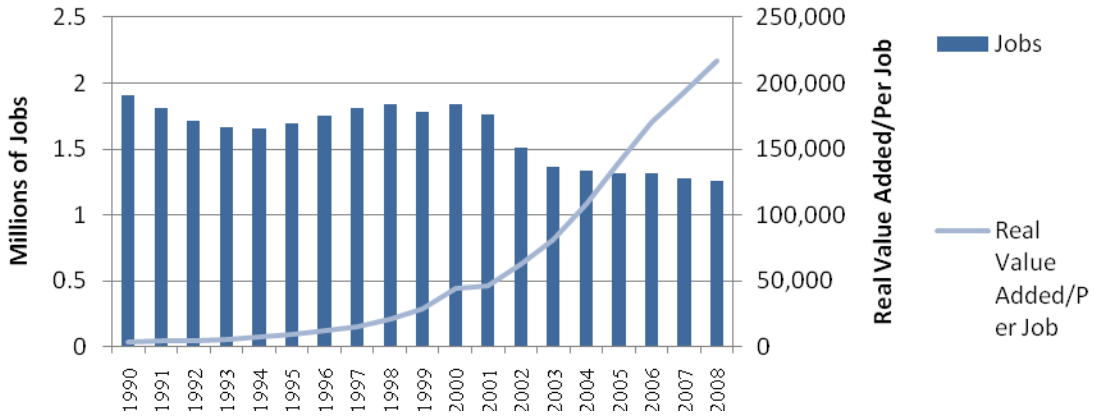
Appendix III. A More Detailed Look at Selected Industries

ELECTRONICS

Because of the perception that the United States' competitive edge lies in its ability to develop and leverage human capital and innovation, the electronics industry is often used as a main indicator for the overall competitiveness of the U.S. tradable sector. Unlike other industries, electronics receives especially widespread attention because of its pervasive presence and impact in the lives of so many.

Although U.S. employment in this entirely tradable sector has fallen by roughly 650,000 jobs over the past two decades, value added has increased 363 percent, by far the largest increase amongst all industries, tradable or otherwise. The dual impact of falling employment and increased value added resulted in a 405 percent increase in value added per job from 1990 to 2008 (see figure 22). Of course, the large increases in value added are also partially attributable to the construction of the real value-added data, as discussed earlier.

Figure 21. Electronics (Tradable)



Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series

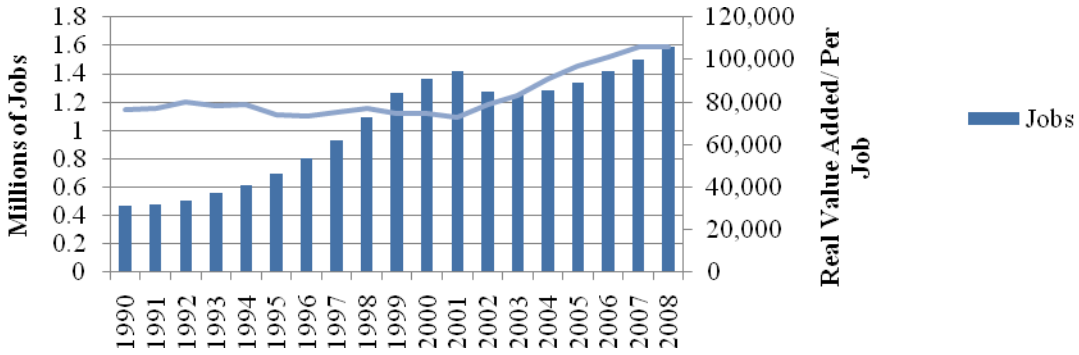
Even without the effect of Moore's law on the real value-added data, the rise in VAP is large. As a paragon for geographic shifts in value chains, the labor-intensive aspects of the electronics production have steadily moved offshore to lower-cost regions, particularly Asia. As these jobs have shifted abroad, the domestic industry has become far more concentrated in skill-intensive aspects of the value chain (e.g., design). The results from the ability of the industry to pursue the most cost-efficient means of production are clear; even at the height of the recession, electronics companies continued to post profits. Industry standouts like Apple, Inc. escaped seemingly untarnished—in October 2009,

CEO Steve Jobs was quoted saying, "Recession? What recession?" as his company continued to break its previous profit records.

COMPUTER SYSTEMS DESIGN AND RELATED SERVICES

Although its growth has come off a small base, the computer systems design sector—another entirely tradable piece of the value-added chain—presents an ideal combination, with both growing employment and growing value added. Employment growth yielded just over a million incremental jobs in the past two decades, driving employment growth in the professional services sector (the largest contributor to increases in employment growth over the past two decades in the tradable part of the economy). The sector also has the second highest increase in value added, an estimated 155 percent rise. The parallel increase in employment and value added resulted in an overall increase in value added per job of 33 percent from 1990 to 2008. The industry's growth was severely dampened by the dot.com bust in the early 2000s, but it has since rebounded in both value added and jobs.

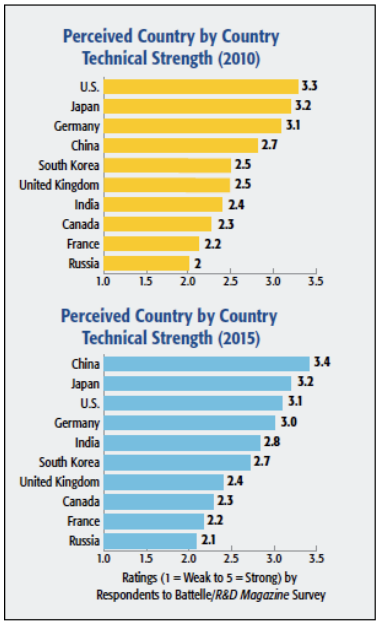
Figure 22. Computer Systems Design and Related Services (Tradable)



Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series

A large portion of the employment in this sector falls under computer software engineers and systems analysts, both skill-intensive fields—one of the United States' strong points. Still, although the record is promising, there is reason to worry about the sustainability of this industry. Companies have begun to shift a portion of software research and development operations abroad. As early as 1995, Microsoft established R&D facilities in China. Since then, it has ramped up its software development pursuits in the Asia-Pacific region; in 2008, the company announced its intention to invest more than $1 billion in further investments. And the trend in software is replicated across the rest of the tech industry; Asian countries such as India and China far outpace the United States in growth in R&D investment. In its 2010 survey, *R&D Magazine* found that participants still view the United States as the most "technically strong" country, but expect that to change in the next five years as both China and Japan replace it as leader (see figure 23).

Figure 23. *R&D Magazine* Technical Strength 2010 Survey Results

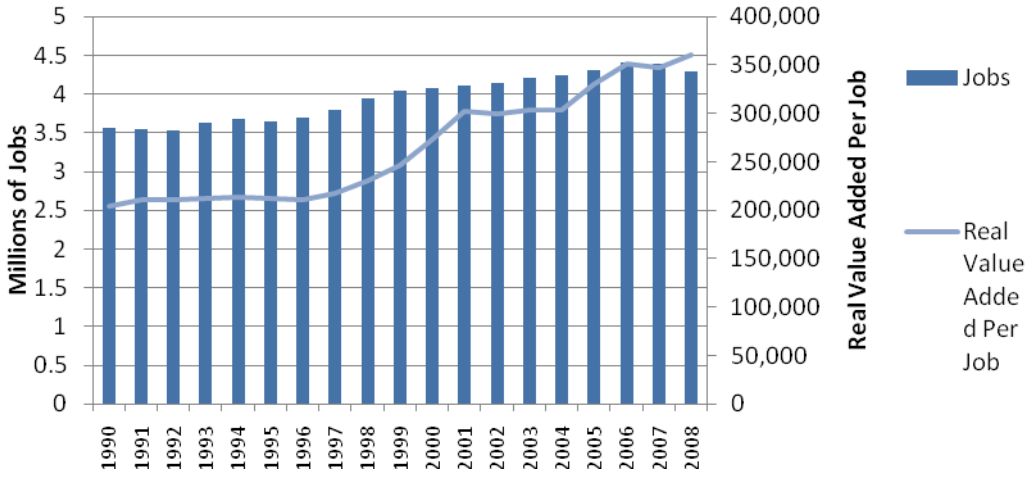


Source: *R&D* magazine, December 2010.

FINANCE AND INSURANCE

The finance and insurance industry, the second-largest contributor to tradable sector employment growth after professional services, saw an increase of roughly 730,000 jobs on the tradable side from 1990 to 2008 and an additional 340,000 on the nontradable side (see figures 24 and 25). Because our methodology assumed constant proportions of tradability over the period, the increase in value added was the same for the sector's tradable and nontradable subindustries, with a 56 percent increase in value added overall and a 38 percent increase in value added per job.

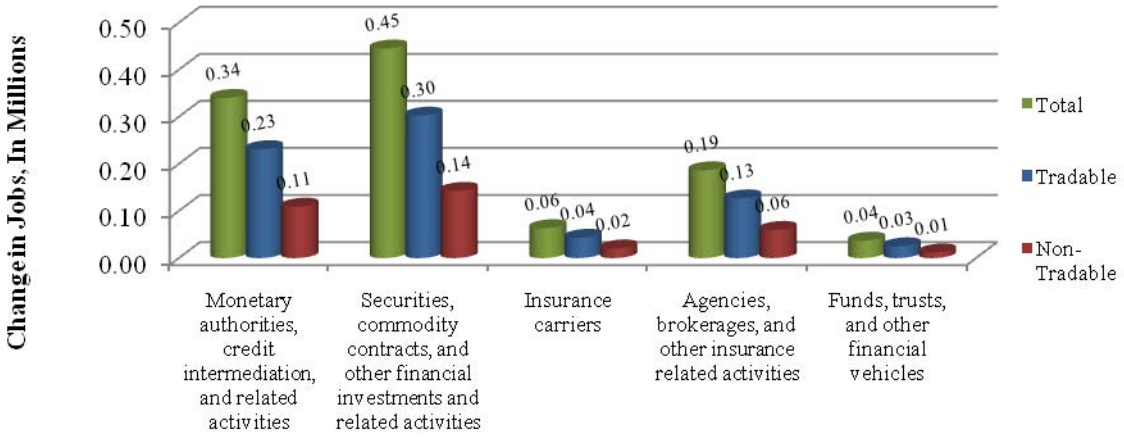
Figure 24. Finance and Insurance (Tradable)



Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series

Job growth in the total industry was driven by the securities, commodity contracts, and other financial investments (+450,000 jobs), monetary authorities, credit intermediation (+340,000 jobs), and "agencies, brokerages" (+190,000 jobs).

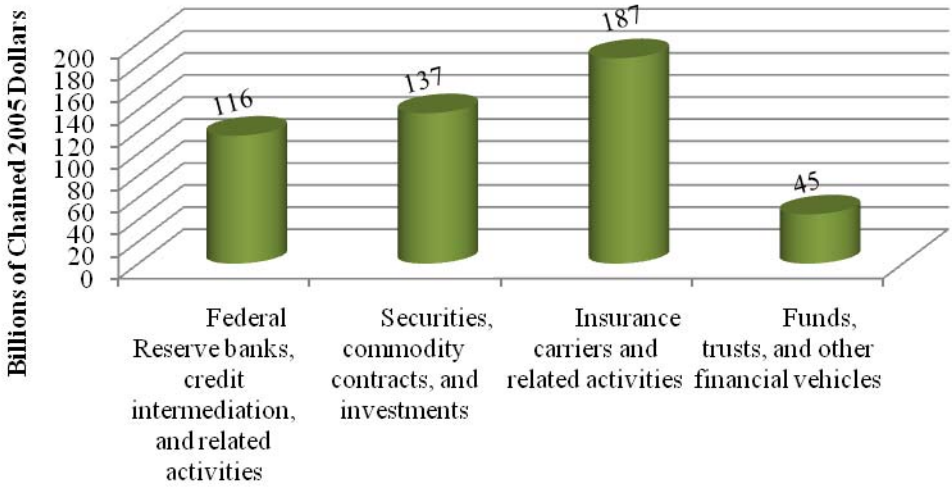
Figure 25. Finance and Insurance, Change in Jobs 1990–2008



Source: Authors' calculations using Bureau of Labor Statistics historical data series

Unlike the computer systems design industry, the finance and insurance industry was already a well-established service sector, accounting for 7 percent of national real value added in 1990 (8.4 percent in 2008). In the tradable sector, finance and insurance was the largest industry in value-added terms in 2008 and the second largest based on employment. The primary driver of the increase in value added for the sector was insurers, who accounted for an increase in value added of 187 billion from 1990 to 2008 (see figure 26).

Figure 26. Finance and Insurance Value-Added Change, 1990–2008



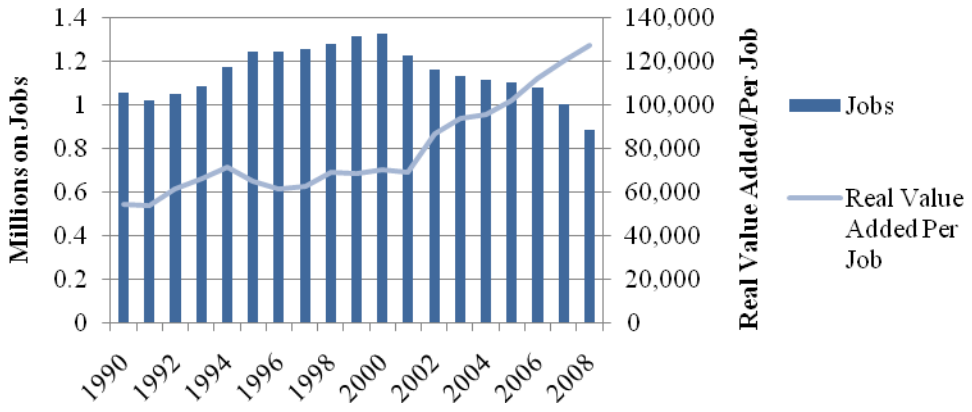
Source: Authors' calculations using Bureau of Economic Analysis historical data series

Given the widely cited bankruptcies and losses in the finance and insurance industry during the past few years, one can probably safely assume that, when the data become available, employment and value-added figures for 2009 and 2010 will show a slowdown in this industry (which the data point to in 2008); it remains to be seen, however, whether the sector can return to its previous growth trajectory and how the current efforts at regulatory reform might impact future industry development. What is clear is that this industry will play a central role in establishing the U.S. ability to regain growth momentum.

AUTO

Over the last two decades, an estimated 172,000 jobs have been lost in the U.S. auto industry as domestic production declined. In parallel the production portfolio of the U.S. Big Three has seen a substantial change—by 2005, despite losses of market share in cars, U.S. car companies still led in sales of light trucks. According to a congressional report, GM production was 64 percent in trucks in 2003, the opposite of its 1990 ratio of cars to trucks; the same year Ford produced 74 percent trucks and Chrysler almost 80 percent.[25] In addition to a drop in employment, the increase in sales of light trucks relative to cars increased the industry's value added (+67 percent from 1990 to 2008): one analyst estimates that GM makes four times the profit from a sale of an SUV as from that of a small car.[26] The increase in value added per job is higher than the increase in gross value added because of the drop in employment, with an 85 percent increase from 1990 to 2008.

Figure 27. Auto (Tradable)



Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series

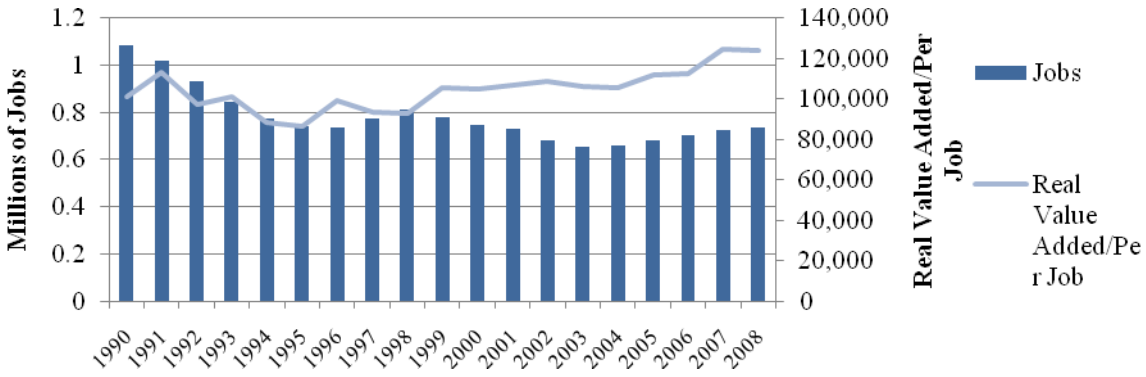
To be sure, the employment losses in the auto industry are disappointing. However, given the oft-heard dismal statistics about the decline of the U.S. auto industry, that its value-added contribution continued to rise over the past twenty years is welcome news. After all, by 2003, the majority of cars sold in the domestic market were from U.S.-based foreign manufacturers (e.g., Toyota's plant in Kentucky) or were imported; whereas in 1979, Ford, General Motors, and Chrysler sold eight of every ten cars in the United States.[27] In addition to a shifting production portfolio, the marked increase in value added since 2000 indicates that American car companies started rising to the challenge of competing in the global environment before the Great Recession. The challenge for the industry will now

be finding a way to continue increasing value added per worker while increasing, or at least maintaining, employment. Based on reported figures from the White House, it seems that the industry, thanks to the direct intervention by the government, has done just that: from mid-2009 to mid-2010, the industry gained more than fifty thousand jobs in addition to recording profits for the first time since 2004 and increasing exports abroad.[28]

AEROSPACE, RAIL, NAVAL, AND OTHER TRANSPORTATION EQUIPMENT

Nonauto transportation equipment production was a major contributor to job losses in the tradable sector since 1990 (roughly 353,000 jobs). The vast majority of the loss occurred in aerospace (roughly 340,000 between 1990 and 2008). In total, the nonauto transport equipment industries saw a decrease in value added of 19 percent as one of only two industries to see a decrease between 1990 and 2008; the other is mining (59 percent). Still, the drop in employment was enough to offset the drop in value added, resulting in a positive increase of 20 percent in value added per job over the same period. To a large extent, the decline in aerospace value added reflected falling military procurement after the end of the Cold War. However, since 2003, the industry has been rebounding behind multifront military activities, and both employment and value added are on the rise. Value added has grown more than 27 percent since 2003 alone.

Figure 28. Aerospace, Naval, Rail, and other Transport Equipment Industries (Tradable)



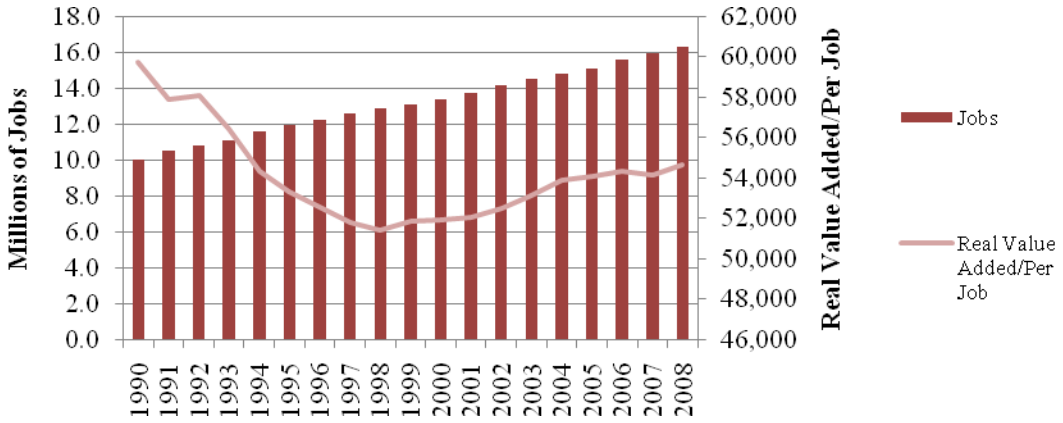
Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series

Notably, the United States had a trade surplus in the aerospace industry in 2009, $47.2 billion, up 6.3 percent from 2008.[29] According to the International Trade Administration, the surplus in aerospace was the largest amongst all U.S. manufacturing industries. It is the result of the top end of the value chain being in the United States, accurately reflecting the global configuration of the supply chain. This is the direct analog of China's apparent surplus in electronics, which results from the assembly piece of the value-added chain being performed substantially in China. Whether the positive trends seen in recent years continue will depend in part on foreign policy decisions.

HEALTH CARE

With its incremental 6.3 million jobs added between 1990 and 2008 (a 49 percent increase), the health-care industry shows the largest absolute increase in jobs. Employment growth in the industry was largely driven by the offices of health practitioners (+1,504, 457 jobs), hospitals (+1,111,008 jobs), and nursing and residential care facilities (+1,080,103 jobs). Value added increased, but at a slower pace than employment, at 40 percent over the same period, resulting in a decrease in value added per job of 9 percent. However, the trend in value added per job since the late 1990s has been upward as medical-care providers like hospitals improved their profit margins behind increased bargaining power with insurers, moderating expenses, the provision of more high-cost services (e.g., cardiac surgery), and strong returns on stock market investments.[30]

Figure 29. Health-Care Industry (Nontradable)



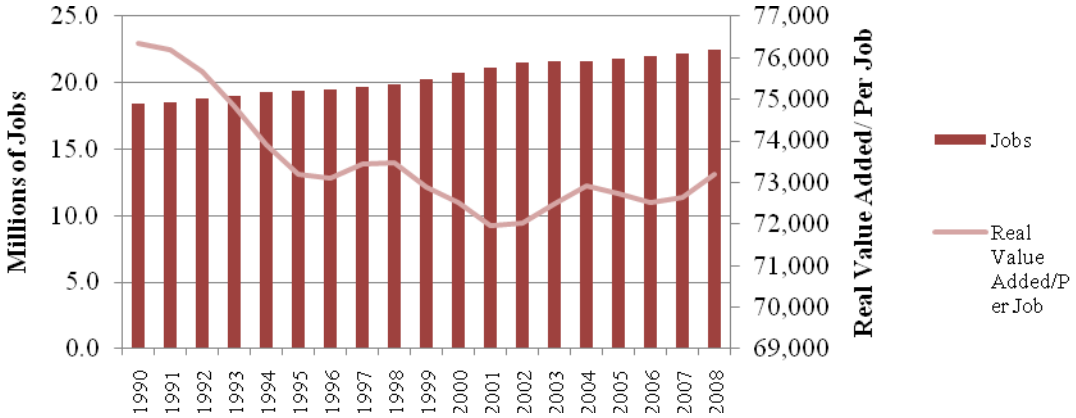
Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series

The expectation is that this industry will continue to grow as baby boomers age and require more medical services. Already, half of the twenty fastest-growing occupations are in the health-care industry and more than 3 million jobs are projected to be added by 2018 based on Bureau of Labor Statistics estimates, more than any single other industry.[31] The number of in-home health-care aides alone is expected to rise by more than 50 percent by 2018.[32] Still, the impact of government fiscal pressure on the health-care industry remains to be seen.

GOVERNMENT

Government maintained its leadership as the largest single employer in the United States over the period, which paralleled its 20 percent increase in employment from 1990 to 2008 (+4,084,400 jobs), the second-largest absolute increase after health care. Well over half of the increase is attributed to local and state government—local education (+2,173,500 jobs), local government, other compensation (+981,700 jobs), and state government, educational services compensation (+629,100). Like health care, government's value added increased (by 16 percent), but employment outpaced it, resulting in a decrease in value added per job of 4 percent from 1990 to 2008. After a drop in VAP in the early 1990s, since 2000 VAP has effectively stagnated (an average of $73,000).

Figure 30. Government (Nontradable)



Source: Authors' calculations using Bureau of Economic Analysis and Bureau of Labor Statistics historical data series

The Bureau for Labor Statistics expects government to continue to be a major contributor to employment over the next decade, with an expected 1.6 million additional jobs by 2018 (largely at the local and state level).[33] Will their predictions come to pass? State and local budget crises across the country have put pressure on government employment, particularly in education. Although the 2009 stimulus helped delay teacher layoffs, reportedly saving 325,000 jobs in education, the fiscal position of government at all levels remains precarious.[34] The employment generating capacity is therefore also in question.

Endnotes

1. Our understanding of the dynamics of rapid developing country growth and the policies and investments that support it, represent a vast area of learning from a growing body of experience and from research. It is much too large a subject to cover here. One of us has attempted to describe it in terms that are accessible in a forthcoming book. Michael Spence, *The Next Convergence: The Future of Economic Growth in a Multispeed World* (New York: Farrar, Straus and Giroux, 2011).
2. See Yuqing Xing and Neal Detert, "How the iPhone Widens the United States Trade Deficit with the People's Republic of China" (working paper 257, Asian Development Bank Institute, Tokyo, December 2010); Andrew Batson, "Not Made in China," *Wall Street Journal*, December 15, 2010.
3. J. Bradford Jensen and Lori G. Kletzer, "Tradable Services: Understanding the Scope and Impact of Services Outsourcing," Peterson Institute for International Studies (Washington, DC: Peter G. Peterson Institute for International Economics, September 2005). Though the title suggests the focus is tradable services, the authors in fact divide all industries into a tradable and a nontradable component.
4. The divergence between value added per worker and average income per worker can occur as a result of difference in capital intensity across industries. But for industries with similar capital intensities, value added per person employed and average incomes will be quite close.
5. All the figures we report are net increases or decreases. In any sector and in the economy as a whole, jobs are created and destroyed by market forces and competition. The net increase is the total number of jobs created minus those that disappeared, and can be positive or negative.
6. With the exception of information, this industry was split based on its specific subindustries rather than on a proportional basis. For instance, software publishers were classed as entirely tradable, whereas newspaper publisher were classed as nontradable. See appendix II for all of the splits for information.
7. Nontradable Majors indicate initial 1990 gross jobs greater than 1.5 million.
8. Nontradable Minors indicate initial 1990 gross jobs less than 1.5 million.
9. Tradable Majors indicates initial 1990 industry gross jobs over 1 million.
10. Tradable Minors indicates initial 1990 gross jobs less than 1 million.
11. Many associate outsourcing with off-shoring. But it is useful to remember that the early service outsourcing was domestic and involved moving service functions to locations where the availability of suitable labor was abundant and the costs relatively low.
12. Nontradable majors indicate gross value added greater than 200 billion in 1990.
13. Nontradable minors indicate gross value added less than 200 billion in 1990.
14. Tradable majors indicate gross value added greater than 100 billion in 1990.
15. Tradable minors indicate gross value added less than 100 billion in 1990.
16. Tradable majors over 100,000 value added per job in 1990.
17. Tradable minors under 100,000 value added per job in 1990.
18. This result offers supporting evidence for the finding that the allocation of a country's human capital towards the legal profession often is a barrier to growth. Kevin Murphy, Andrei Shleifer, and Robert Vishny, "The Allocation of Talent: Implication for Growth," *Quarterly Journal of Economics* 106, no. 2 (May 1991): 503-30.
19. Nontradable majors over 90,000 value added per job in 1990.
20. Nontradable minors under 90,000 value added per job in 1990.
21. Christopher Kask, David Kiernan, and Brian Friedman, "Labor Productivity Growth in Wholesale Trade, 1990–2000," *Monthly Labor Review*, December 2002.
22. According the 2009 Program for International Student Assessment Test, a survey administered by the OECD that compares student performance across countries, American students not only scored below typically competitive countries (e.g., Finland, Norway, Singapore etc); the United States also was beat out by students in Shanghai (China).
23. In December 2010, Ken Chenault, the CEO of American Express, suggested that the United States create a taskforce comprised of both public and private leaders to determine where the opportunities are for employment growth. Francesco Guerrera and Suzanne Kapner, "Amex Chief Calls for Jobs Taskforce," *Financial Times*, December 5 2010, www.ft.com/cms/s/0/5b4322f8-009b-11e0-aa29-00144feab49a.html#axzz1BNhexIRt.
24. That is one of the reasons that competitive manufacturing in a wide range of industries is clustered, as documented in Michael Porter's book, *The Competitive Advantage of Nations.*

25. Stephen Cooney and Brent Yacobucci, *U.S. Automotive Industry: Policy Overview and Recent History*, *CRS* Report RL32883 (Washington, DC: Congressional Research Service, April 25, 2005), www.ncseonline.org/NLE/CRSreports/05apr/RL32883.pdf.
26. Greg Bensinger, "GM Cuts Truck Production, Adds No-Interest Financing (Update2)," Bloomberg.com, June 23, 2008, www.bloomberg.com/apps/news?pid=newsarchive&sid=amf8CmBH40L0.
27. Cooney and Yacobucci, *U.S. Automotive Industry: Policy Overview and Recent History* and Tanvir Orakzai, "US Auto Industry Decline: Lesson from Ford and GM," *American Chronicle*, 2006, www.americanchronicle.com/articles/view/11242.
28. White House, "Rebuilding the American Auto Industry," July 2010, www.whitehouse.gov/files/documents/20100729-autos-report-final.pdf.
29. International Trade Administration, "Flight Plan 2010: Analysis of the U.S. Aerospace Industry," www.trade.gov/mas/manufacturing/OAAI/aero_reports.asp.
30. Julie Appleby, "Hospitals' profit margin hits 6-year high in 2004," *USA Today*, January 4, 2006.
31. Bureau of Labor Statistics, "Career Guide to Industries, 2010-11 Edition: Healthcare," www.bls.gov/oco/cg/cgs035.htm.
32. Ibid.
33. Bureau of Labor Statistics, "Employment Projections 2008–18," December 2009, www.bls.gov/news.release/archives/ecopro_12102009.pdf.
34. Michael Cooper and Ron Nizon, "Schools Are Where Stimulus Saved Jobs, New Data Show," *New York Times*, October 30, 2009.

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