



The Impact of Globalization on American Jobs

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To determine the impact that globalization is having on US jobs, we decided to look closely at what's happening in particular industries. Often, patterns show up at the industry level that don't show up when studying the economy as a whole. We chose a mix of industries – textiles and apparel, auto, health care, biotech, telecommunications, personal computers, software, and entertainment – each of which is affected by and is responding to global forces in different ways. Our research focused on three main questions. What are the key trends shaping where the industry is headed? How are global dynamics changing the competitive landscape? And what are the implications for employment in the US?

We gathered information from a variety of sources. In particular, we benefited from the research that MIT and the Sloan Industry Centers have already done on several of the industries we focused on.

We began our study with the hypothesis that if US firms can be the best in the world in developing new technologies, high value-added goods, and knowledge-based services, they should be able to create new and better jobs to replace the old ones that are disappearing, making it possible for the nation to sustain a high-skill, high-wage, high-employment economy. We found many examples of where that hypothesis holds true for particular firms. But we did not find that it holds true for entire industries.

One reason is because the competitive landscape is changing so rapidly in all of the industries we studied. It's not clear at this point how things are going to sort out globally. Another reason is because US firms are responding to global competition in so many different ways, some of which are actually making innovation more difficult. Where the good jobs end up in the years ahead will largely be determined by what happens in these two very dynamic arenas.

Innovation is Key

In general, our research supports the conclusion drawn by other recent studies that innovation is the key to long-term success in global competition.¹ To be successful in today's world, firms

¹ President's Council of Advisors on Science and Technology, "Sustaining the Nation's Innovation Ecosystems," January 2004; Council on Competitiveness, "Innovate America," December 2004; National Academies, "Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future," October 2005; MIT Industrial Performance Center, *How We Compete*, January 2006.

need to focus on what they can do better than anybody else, while constantly identifying new opportunities for products and processes that are difficult for others to replicate. The production of goods and services is becoming increasingly fragmented and modular, with operations spread across the globe, performed by whoever can do them the best. That makes it easier for newcomers to get into the game anywhere along the value chain, from anywhere in the world.

The US can't afford to wall itself off from the rest of the world. Economies that were previously closed are now opening up and are rapidly developing their capacity to deliver high-quality, low-cost goods and services. The US stands to gain through access to these new markets abroad and through access to their more affordable goods and services here at home.

We found that innovation is taking place across all the industries we studied. That holds true even in industries we commonly think of as "declining," like textiles and apparel, where firms like Avondale Mills are carving out niches for themselves by developing non-woven textiles and "smart" fabrics. In the personal computer industry, Dell's innovative build-to-order strategy has made it the global leader in sales of notebook and desktop PCs, while Apple has come to dominate the MP3 market with its innovative iPod. In the pharmaceutical industry, four out of five new drugs currently in development in the US are based on biotech discoveries or employ biotech tools, making the US a magnet for foreign investment and R&D in biotech.

The US telecom industry is going through a remarkable transformation, responding to changes in technology and consumer preferences that have led to more customers now using mobile phones than traditional handsets, 40 percent of all communication done by e-mail and instant messaging, and half of all business calls made over the internet. Meanwhile, the digital revolution is blurring traditional industry boundaries, as the chips, software, and network connections traditionally associated with computers are now being built into phones, hand-held devices, and other consumer electronics. Increasingly, these products are defined more by their software, which supports innovation in features and functions, than by their hardware. The digital revolution is also transforming the entertainment industry, which is finding new ways to create and package the content that shows up on screens of all sizes, in theaters and in homes, and on electronic devices of all types.

We looked at how these industries are faring in global competition and found that the US has many advantages when it comes to innovation -- a strong tradition of entrepreneurship, risk-taking, and innovation; the world's biggest market for goods and services; superior access to venture capital and equity funding; the world's best research labs and universities, with strong connections between research institutions and business; the strongest intellectual property protections in the world; and a more flexible, skilled, and mobile workforce than most other countries.

Those factors support a virtuous cycle of innovation that spawns new products and businesses, attracts many of the world's best and brightest individuals to study and work in the US, lures foreign firms to locate their R&D operations here, and attracts more foreign direct investment than any other country except for China. These dynamics keep the US on the cutting edge of new technologies and products, allowing those technologies and products to become commercialized first in the US, which attracts even more talent and investment.

We concluded that it will take years for developing countries like India and China to put the same kind of social and physical infrastructure in place to sustain the growth of their economies. In addition, studies conducted by McKinsey & Company² have found that, despite the higher number of engineers graduating from schools abroad, only a small fraction of them have the skills required by multinational corporations. That means that many fewer jobs can be off-shored than is commonly presumed. Meanwhile, many US companies are too small to justify the costs involved in off-shoring work. And, many large companies are finding the process too complex to manage. These factors place limits on the amount of work that can be off-shored by US firms, at least for the time being.

Industry Trends

In every industry we studied, the competitive landscape is being radically changed by new technologies and new competition. In some cases, the US is on the cutting edge and leading the way. In others, the US is lagging behind. Here is a summary of what we found.

Textiles and Apparel. The future for textiles and apparel in the US is not entirely bleak. While it's likely that the more labor intensive functions of sewing and assembling clothing will continue to move offshore, those jobs won't completely disappear in the US. Textile firms that are using new technology, speed, and flexibility to capture a market niche are successfully competing with foreign producers. In the apparel industry, the more creative functions of designing, marketing, packaging and distributing clothing and accessories largely remain in the US.

The trend toward lean retailing offers some promise for keeping jobs in the US, because proximity to the US market is such a distinct advantage in product lines that need to be replenished or updated frequently. An apparel manufacturer providing goods to the US market must weigh the benefits of more proximate, but costly, sources that offer short-cycle local production against lower-cost, off-shore operations that require far longer lead times. As lean retailing becomes even more widespread, the capacity to replenish quickly will become an even bigger factor in the sourcing decisions of major retailers like Wal-Mart, whose choices of suppliers can send ripples through the entire industry.

The lifting of quotas on imports from China at the beginning of 2005 has altered the competitive landscape. Imports from China surged during 2005, provoking a strong reaction from US apparel manufacturers. In response, the Bush Administration ordered new limits on Chinese shipments on four categories of clothing, and threatened limits on additional categories. If quotas and tariffs were to completely disappear, it's likely that could shift the balance in retailers' sourcing decisions, and an increasing number of jobs would move to China and, to a lesser extent, other developing countries.

² Diana Farrell, Martha A. Laboissiere, and Jaeson Rosenfeld, "The Emerging Global Labor Market," McKinsey Global Institute, 2005; Diana Farrell and Jaeson Rosenfeld, "US Offshoring: Rethinking the Response," McKinsey Global Institute, 2005.

Auto. US automakers are steadily losing market share to their foreign rivals, which generally have higher quality, higher productivity, lower costs, and more innovative designs. In response, US automakers are relying heavily on discounts to move cars, closing US plants, shifting vehicle production to Mexico and Canada, shifting fixed costs to suppliers, shifting health care and pension costs to employees, importing parts from overseas, and seeking new markets overseas. Meanwhile, foreign automakers are expanding their operations in the US, adding tens of thousands of new assembly jobs, mainly in the South. Foreign automakers are also locating design centers in the US to be close to their customers.

Auto parts suppliers are under intense pressure from automakers and competitors to reduce costs. They are responding by increasing productivity, outsourcing components to even lower-cost second and third tier suppliers, and shifting low-skill assembly work to Mexico and other off-shore locations. So far, the production of capital-intensive and high value-added parts (such as engines, transmissions, and body panels) has remained mainly in the US, largely due to sunk capital costs, lack of capability in low-cost countries, and union resistance to moving those jobs. However, as more and more assembly work shifts to low-cost countries, their infrastructure improves, and union influence weakens here at home, suppliers will likely shift more of their production work to low-cost countries as well.

Autoworker unions are looking for ways to stem this tide. The UAW has agreed to close unproductive plants, cut jobs, share the cost of health insurance, decrease job classifications, outsource peripheral jobs like janitorial services and material handling, and introduce a two-tier wage system (in the supply sector). But these concessions have not been enough to keep some of the biggest US parts suppliers like Delphi, Dana, Collins & Aikman, Tower Automotive, and Meridian Automotive Systems competitive. All are in bankruptcy, with GM also teetering on the brink.

A growing trend toward building vehicles to order could further disadvantage US automakers. Japanese and European automakers are aggressively preparing to take this next leap forward in flexible manufacturing. For US automakers to do the same, they would need to fundamentally transform the way they design, make, and sell vehicles. And even if they were successful in making those changes, US automakers would still be burdened with higher health care and pension costs than their competitors.

Health Care. US citizens currently spend 53 percent more for their health care than anyone else in the world, a difference that cannot be attributed to higher volume or higher quality of care. To be competitive, US-based companies either need to find ways to offset their higher health care costs, or they need to move jobs off shore to countries where health care costs are lower. The retreat from tightly managed care since the late-1990's has left employers and the government searching for new ways to reduce health care costs. However, most of their efforts have focused on shifting costs, rather than actually reducing them. Employers are trying to shift health costs to employees by reducing prescription drug benefits, increasing co-pays and deductibles, and reducing retiree benefits. The federal government is trying to shift costs to states, which have been cutting back on expenditures and shifting costs to providers, which are required by law to treat the uninsured.

One promising approach to actually reducing the cost of care is to focus on those patients who are the most costly to treat. Roughly 75 percent of all health care spending in the US is for the treatment of chronic diseases. Yet, the main focus of the US health care system is on the treatment of short-term, acute health problems. As a nation, the US emphasizes expensive cures for diseases, rather than cost-effective prevention.

One of the biggest changes taking place in the industry is the rapid growth of freestanding ambulatory care centers and specialty hospitals, driven by advances in medical technology and changes in Medicare payment incentives. These facilities pose a significant threat to traditional hospitals by drawing away doctors, patients, and the most profitable services. As these more modern, more patient-friendly, and potentially more efficient freestanding facilities demonstrate their advantages in quality and cost, they are likely to change the competitive landscape dramatically.

Traditional hospitals are attempting to slow this trend by making it more difficult for freestanding facilities to receive federal funding. In addition to self-interest, hospitals are also concerned that as patients with insurance and the ability to pay seek care at freestanding facilities, hospitals will be less able to cross-subsidize care for the elderly, disabled, poor, and uninsured, at a time when there are increasing numbers of elderly to serve and likely increases in the ranks of the uninsured, because of rising deductibles and co-insurance payments, or because states have trimmed their Medicaid rolls. If that happens, hospitals will be left with higher-risk patients with more complex medical needs, victims of trauma, and those with little or no health insurance coverage -- and fewer resources to pay for their care -- straining both hospital finances and the social fabric.

Biotech. The US established an early lead in biotechnology research and commercialization and has maintained that lead. There are more biotech companies in the US than in any other country, and US biotech firms have higher revenues than those in other countries, in part because of strategic alliances with drug companies in the US. The biotech firms provide a “farm system” for the big drug companies, doing the early research and development, while the big drug companies invest in promising late-stage development and provide the capacity to market and distribute the drug once it has been approved.

A growing number of states are targeting biotech as an economic development opportunity, making significant investments in their universities and research institutions, looking for ways to promote more academic-industry interaction, and finding ways to help companies commercialize the products of their research. The states are also experimenting with ways to help fund the development of these new technologies through tax credits and equity investments, funded in some cases by state pension funds. Finally, state higher education systems are reaching out to biotech companies to better understand their needs, and responding with new curricula at colleges and universities.

US biotech companies are outsourcing clinical trials to other countries, but they are mainly keeping their research and development operations close to home. The early research and development phase requires collaboration across disciplines and tends to flourish when linked to world-class universities. The leading university centers are currently located in the US,

particularly in Boston and in the Bay Area. In fact, these centers are magnets for foreign researchers and scientists, and for foreign investment, which is flowing into the US much faster than work is being sent overseas. The US is also attractive because of the availability of private venture capital and the world's strongest intellectual property protections.

Telecom. The telecommunications industry is one of the fastest growing and fastest changing sectors of the US economy. Over the past decade, wireless service has been growing, while the number of phone lines has been declining, so that the number of wireless customers now exceeds the number of residential wired customers, and the gap is widening. As the market for phone service, both wired and wireless, has gotten more saturated, the focus of competition has shifted to internet access, particularly broadband. The cable companies got a head start in offering high-speed internet access, but the phone companies responded with DSL technology, and more recently with fiber optic cable. While the cable companies appear to have the advantage at the moment in packaging video, high-speed internet access, and voice over internet protocol (VoIP) phone service, the phone companies are putting their own "triple play" packages together, adding 3G (third generation) technology to make broadband available over cell phones.

The US is falling behind other nations in the share of the population with broadband access and the speed of those connections. The US is also falling behind in wireless access to the internet. One reason may be the duopoly structure of the industry that limits customer choices to either the local phone company or local cable company, both of which risk undercutting their traditional and most-profitable businesses by offering new services in arenas where they face stiffer competition. Some communities have experimented with providing broadband over power lines, but have run into technical problems that haven't been completely resolved. Other communities are deploying WiFi and WiMax networks, which are cheaper to install and operate than cable or phone lines. The phone companies are trying to stake a claim to this new technology, while at the same time trying to block internet-based companies like Earthlink, Google, and Yahoo from gaining a foothold in the industry.

As voice and other communication migrate to the internet, it's getting much harder for traditional providers and for regulators to control the market. New services often come in the form of new software, which can be developed by anyone anywhere and sold over the internet. As a result, there is increasing separation between who owns the telecom infrastructure and who provides the services. Phone companies are considering charging a fee for allowing others to use their networks to access the internet, which could significantly change the competitive landscape if they are successful.

Personal Computers. The personal computer industry has had a global production network almost from its inception. Most PC component production and assembly are now outsourced, with component production located mainly in Asia, and with PC assembly located closer to the customer in North America, Europe, and Asia. With the exception of Apple, US-based PC makers make limited investments in R&D and rely heavily on contract manufacturers and Taiwanese original design manufacturers (ODMs) for product design and development. On the other hand, Chinese PC maker Lenovo is aggressively pursuing innovation through its deal with IBM and through its partnership with Microsoft, Intel, Symantec, and LANDesk to jointly conduct R&D.

Makers of hard disk drives and semiconductors, the main components of a PC, have mainly kept design and development work in house and in the US. In addition, some firms like Intel, which is often on the cutting edge with new technologies, also prefer to keep their production in house to avoid revealing technologies they consider to be a strategic advantage. These high-paying jobs are likely to expand, given the dominance of US-based companies like Seagate, Intel, and AMD in world markets, and the success they are having in bridging into new technologies.

In general, global PC production has been shifting to Taiwan and China, and will likely continue to do so. In addition, the global market has been shifting toward notebook PCs, developing countries, low-end products, and distribution through retail outlets. Those trends favor PC makers like Lenovo, which is well positioned to expand globally, at the expense of Dell, the current global leader.

The build-to-order business model that Dell exploited to become the industry leader over the past decade may be losing some of its potency. With markets becoming saturated in the US and Western Europe, an estimated 80 percent of new PC sales are expected to come from developing markets like India and China in the next 5 years. Worldwide, more than 80 percent of PCs are currently sold by retailers, where customers can get assistance from salespeople. That figure is even higher in the fastest growing markets like India and China, where most people live in rural areas, have little knowledge of computers, no credit cards, and are not accustomed to making purchases over the phone or on-line.

Dell and most other PC makers are shifting their focus to high-end products and to emerging products that perform many of the same functions as a PC or can be packaged with the PC as part of a digital home or office. However, they are limited by their over-reliance on others for innovation and by the stiff competition they face from other companies already entrenched in these product markets. Apple is the exception, with their heavy emphasis on innovation and their strategy of linking other companies' products together with Apple's software.

Software. The US leads the world in the development and production of software-related goods and services. Of the top ten software firms in the world, eight are American, earning about one-third of total global sales. Microsoft's revenues alone account for more than 15 percent of the global software market.

In addition to dedicated software firms, firms in many other industries develop software for their own internal use. This is particularly true in banking and finance, telecommunications, retail, and manufacturing, where information technologies now provide critical support to business processes. During the 1990s, firms in these industries began off-shoring business processes, ranging from lower-end data entry, customer support/billing, and call centers (back-office functions) to higher-end management consulting, engineering, and R&D. However, while off-shoring has increased steadily, it remains at low levels, particularly vis-à-vis other phenomena that induce job shifts, such as automation and technological change, job churn, and corporate mergers.

While some US software companies are conducting their design work overseas, the bulk of high-level design work remains concentrated in the US. Microsoft, for instance, still conducts 85 percent of its R&D in the US. Moreover, an increasing number of foreign-owned software companies are locating their design work in the US to be close to customers in the world's largest market and to be situated in clusters with other innovative companies. Most new applications emerge and become standardized first in the U.S. In fact, the global R&D headquarters of several leading Indian software companies are located not in India but in Silicon Valley.

A number of other factors serve to maintain the presence of critical design activity within U.S.-based firms—and, conversely, to limit the potential for U.S. off-shoring of high-level software jobs. First, the US provides sufficient access to software talent through production of highly skilled labor and, perhaps more significantly, through the attraction of skilled labor from abroad. Second, the US has the world's strongest venture capital market, which firms tend to access more successfully when they have a presence in the country. And third, design work tends to be a proprietary source of competitive advantage. Weak intellectual property laws overseas, especially in India, dampen enthusiasm for outsourcing such work to foreign-owned companies. Fear of security breaches likewise limits global outsourcing. For these reasons, it is likely that the US will remain a leader in software innovation for the foreseeable future.

Entertainment. The US entertainment industry grew out of the old Hollywood studios. Currently, six giant firms – Time Warner, Fox, Viacom, Sony, NBC Universal, and Disney – dominate the industry, owning all six major broadcast networks, sixty-four cable networks, the major radio networks, broadcast rights to all sporting events, and the worldwide distribution of movies. Because the US entertainment market is the largest in the world and distribution channels extend throughout the world, these firms have a tremendous advantage in the global economy.

Over the past decade, the focus of the industry has shifted from the box office to the home, with DVD sales now accounting for half of a film's revenues. In the home, consumers have a growing number of different entertainment products to choose from, delivered on a wide range of new digital technologies. The product growing the fastest in popularity is video games, which now rival feature films in the quality of their graphics, and which now surpass the number of hours people spend going to the movies, watching home video, and reading a book. In addition, consumers are increasingly able to access movies, TV shows, and video games over the internet with a broadband connection, both at home and with wireless devices. The traditional entertainment companies are struggling to maintain their dominance and control in this new environment. But they are facing a stiff challenge from internet and software firms, which have a distinct advantage when it comes to video games.

New computer graphics technology is revolutionizing the industry's production process, creating scenes that don't require locations, sets, props, costumes, directors of photography, stunt people, or even actors. Currently, action movies have more computer-animated scenes than live ones, and larger budgets for computer graphics than for principal photography. Since computer graphics can be done separately, both in time and space, from the actual filming, this work can

be done by anyone anywhere in the world. Other countries are investing heavily in building this capacity, and in tax breaks to lure producers to locate work there.

Currently, the industry's financial and creative center remains in Hollywood. However, given the intense pressure to cut costs, and the growing availability of state of the art production and post-production facilities and cheaper skilled labor throughout the world, it is likely that production work will shift to other countries, just as it is now shifting to other states within the US.

Firm Decisions

Within industries in the US, firms are responding to global competition in many different ways, some of which are actually making innovation more difficult. We found examples in every industry where established firms are seeking to protect themselves from new competitors and new technologies. For example, textile firms are lobbying to extend quotas on imports from China. Phone companies are lobbying state legislatures to block cities from setting up WiFi systems that can provide faster broadband service at lower cost than most DSL lines. Traditional hospitals are trying to block the funding of new specialty hospitals that have the potential to provide more efficient and higher quality care. While these efforts may be in the best interest of the firms involved, they are not in the nation's best interest, which is to keep markets open to innovative products and services, which most often come from new entrants that lack the political clout enjoyed by the established firms.

We found that many US firms, preoccupied with survival, are still outsourcing and off-shoring work solely to save on labor costs, despite ample evidence that this strategy by itself is a dead end. As labor costs rise in one developing country, firms seeking even lower-cost labor find it necessary to keep migrating, which disrupts their operations and adds other costs. Also, repeated studies show that labor costs make up only a small fraction of the total cost of off shoring most goods. As a result, the average reduction in costs achieved through off shoring is only around 9 percent, even when there is a much bigger gap in labor costs, according to a 2005 survey of more than 5,000 global corporate executives, conducted by Ventoro LLC. The key is not whether firms can realize lower costs through outsourcing, but whether they reinvest the savings into core areas of the business as part of a larger strategy that's focused on growth, rather than just survival.

We found that some firms are divesting themselves of their capacity to innovate in an effort to reduce costs and streamline operations. A big reason is the short time horizons of most US firms and investors that pressure managers to focus on near-term results to the detriment of the long-term investments needed for innovation. This is compounded by the lack of tools to account for the kind of intangible assets that support innovation, such as skills and R&D.

Design work is increasingly following production work to contract manufacturers and to other countries. In an effort to cut costs and to focus where they have a competitive advantage, US firms are relying more and more on contract manufacturers to make their products for them. For the same reasons, US firms are also relying more on contract manufacturers to design new features and products for them, since this work is best done in close connection to the

manufacturing process. As manufacturing is moving overseas, so is design work. Currently, an estimated 80 percent of design and development work for notebook computers is either done in Taiwan jointly between PC makers and Taiwanese original design manufacturers or by original design manufacturers alone, while only 20 percent is done in house by PC makers themselves. While the firms engaged in this practice may benefit in the short run, they risk losing their capacity to innovate in the long run, while building the capacity of potential competitors.

We found that, with a few notable exceptions, funding for R&D has been shrinking at major US firms, in part due to cost pressures and to the difficulty of measuring the benefits. At the same time, firms have been systematically dismantling the infrastructure that drove innovation in the 1990s. Most corporate R&D functions are now closely tied to existing products, where the returns can be more easily calculated, although experience suggests that it takes excess R&D capacity beyond what's needed for existing products to come up with entirely new technologies and product lines.

We also found evidence that US firms are doing more of their R&D outside the US. With faster growth taking place in markets overseas, R&D staff are being shifted overseas to be in closer contact with customer preferences and market developments – the same reason that so many firms from other countries locate R&D operations in the US. Another reason is because there is a growing supply of talented engineers and scientists in other countries who are willing to work for much less than their counterparts in the US. US firms are more accustomed to buying the skills they need, rather than growing them, so they are more willing to look overseas, especially if that's where they can find the best talent at the lowest cost.

With the US falling behind in broadband speed and deployment, there's the possibility that this trend will accelerate. Broadband is fast becoming the technology platform for productivity improvements across all sectors of the economy. If other countries continue to advance technologically at a faster pace than the US, then R&D will migrate to those countries, and innovations will be deployed there first. US-based multinational companies that have the capacity to operate on a global scale will be able to shift their R&D operations to where the action is. But smaller US companies, where most of the innovation takes place, will have a hard time following suit.

Implications for Employment

What does all this mean for the US economy, and particularly for the prospects for high-wage employment? Our study suggests that the picture is mixed.

It's clear that some jobs are going to continue to move off shore. Economies in developing countries, such as India and China, are expanding faster than the US economy, and US-based companies will continue to seek access to those markets for growth, as they always have. In addition, low-wage, low-skill production work will continue to migrate overseas, along with service work that involves routine tasks that can be performed in remote locations.

It's less clear what's going to happen to high-wage, high skill work. Those jobs that depend on close customer contact and can't be performed remotely, such as in health care or in R&D for the

US market, will remain in the US. In addition, the spread of build-to-order and just-in-time strategies, such as lean retailing, are likely to keep many jobs in the US. But in the final analysis, where the high-skill, high-wage jobs end up in the years ahead will largely be determined by the interaction of the shifting competitive landscape in particular industries, the choices that firms make in how to respond to global competition, and whether the US makes the investments necessary to sustain its superior infrastructure for innovation.