

**GLOBALIZATION AND TECHNOLOGICAL CHANGE:  
WHAT DO THEY MEAN FOR THE NEBRASKA ECONOMY?**

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Nebraska Economic Forums  
October 2004**

Forty years ago, a group of experts advised President Lyndon Johnson that the advent of computers would create mass unemployment by taking away jobs performed by humans. About the same time, other experts predicted that the U.S. would lose many unskilled jobs to Japan, a country which seemed to have an unlimited supply of low-wage workers. As we know, neither prediction turned out to be true. Computers did end up eliminating some jobs, but many new jobs were also created, some of which could not have been imagined in the 1960s. As for Japan, it is no longer considered a source of low-wage labor and is seeing many of its own unskilled jobs move to China.

It is well to keep these facts in mind as we contemplate the two changes I want to focus on tonight. One of those changes is the acceleration in productivity growth in the 1990s due to increased investment in information technology. The other change is a new wave of globalization in the form of offshore outsourcing of service jobs. These changes present major challenges to Nebraska. But as with those predictions in the 1960s, the adverse consequences of the changes are often overstated. Indeed, I will argue that technological change and globalization can benefit Nebraska in the long run, provided the state can continue to upgrade the education and skills of its workforce.

**The productivity revival in the U.S.**

Let me begin by discussing the implications of technological change for the U.S. and Nebraska economies. Back in the 1980s, the Nobel prize-winning economist Robert Solow

remarked that the impact of computers could be seen everywhere except in the productivity statistics. That all changed in the mid-1990s, when productivity growth in the U.S. finally began to surge (Chart 1). Productivity is measured in this chart by output per worker in the nonfarm business sector. After averaging over 2 1/2 percent through 1972, productivity growth slowed to less than 1 1/2 percent from 1973 to 1995—a slowdown that economists still do not fully understand, although some blame it on the sharp increase in the price of oil. In the mid-1990s, productivity growth picked up again, averaging about 2 1/2 percent over the next seven years—the same rate as in the 1950s and 1960s.

While economists initially disagreed about the reasons for the productivity revival, they now concur that the spread of information technology was largely responsible. Computers had been around for some time. However, in the 1990s, the fall in computer prices, the spread of the Internet, and the standardization of software all led to sharply increased investment in information technology. According to one recent estimate, shown in this chart, the increased investment in information technology accounted for virtually all of the acceleration in productivity growth in the U.S. after 1995.

Over the long run, faster productivity growth is clearly beneficial to the national economy (Chart 2). This chart shows growth in productivity and real compensation per hour by decades. Over such long periods of time, faster growth in productivity tends to be accompanied by faster growth in real compensation. To be sure, rapid productivity growth has benefited profits more than wages during the last three years. In the long run, however, the shares of wages and profits in total income do not change much, suggesting that wages will eventually catch up.

Looking ahead, most economists believe that productivity will continue growing at a rapid rate the rest of this decade, though not as fast as in the last several years. This table shows three recent predictions (Chart 3). These forecasts all fall between 2 and 2.5 percent. Such a rate of productivity growth would be a little slower than the average of 2.6 percent since 1995. However, it would be considerably faster than the average of 1.4 percent during the productivity slowdown of 1973-95. One reason for expecting productivity growth to remain high is that prices of computers and other IT hardware will continue to decline. These price declines should give businesses a strong incentive to purchase more computing capacity and make greater use of information technology in the workplace.

### **Has Nebraska shared in the productivity revival?**

Let me turn now to the impact of technological change on Nebraska. The first question we need to ask is whether Nebraska has shared in the recent productivity revival. While we don't have as good data at the state level as the national level, the data we do have suggests that Nebraska has lagged the nation somewhat (Chart 4). At the state level, the best measure of productivity available is Gross State Product per worker in the private sector, expressed in constant dollars to control for inflation. According to this measure, productivity started out considerably lower in Nebraska than the U.S. in the mid-1980s; rose a little faster than in the U.S. over the next ten years; and then grew considerably slower than in the U.S. in the second half of the 1990s. By the year 2001, real output per private worker was 79 percent as high in Nebraska as in the U.S., a slightly larger gap than in 1986.

One reason that average productivity could be lower in Nebraska than the nation is that the state does not specialize in industries with high productivity—for example, industries which

are highly capital intensive or make heavy use of the new information technology (Chart 5). Looking at the data, it appears that Nebraska's industrial mix accounts for some of the gap in productivity, but by no means all. Data on Gross State Product in constant dollars are less reliable for individual industries, so this chart calculates the impact of industry mix on productivity using the current dollar measure of GSP. The blue line shows U.S. productivity in current dollars, while the red line shows Nebraska productivity. The green line shows what U.S. productivity would have been each year if the nation had the same mix of industries as Nebraska. You can see that U.S. productivity would have been somewhat lower if the U.S. had the same industrial mix as Nebraska. However, U.S. productivity would have still exceeded Nebraska productivity by a considerable margin.

Another indication that the state's productivity has lagged behind that of the nation comes from data on wages (Chart 6). If productivity was as high in Nebraska as the rest of the nation, we would expect workers to earn just as high wages. But in fact, wages are lower in Nebraska, even after controlling for differences in occupation. The bar on the far left shows the average annual wage in Nebraska, while the bar in the middle shows the average annual wage in the U.S. The bar on the right shows what the average wage in the U.S. would have been if the nation had exactly the same mix of occupations as Nebraska—for example, the same percentage of call center operators and the same percentage of scientists and engineers. Comparing the first and the second bars, you can see that average annual wages were about \$4,500 lower in Nebraska than the U.S., a difference of roughly 12 percent. Comparing the second and third bars, you can also see that the mix of occupations in Nebraska is slightly unfavorable, but not nearly enough to explain the state's lower average wage. In particular, if the U.S. had the same

occupational mix as Nebraska, wages would still have been \$3,800 lower in Nebraska than the U.S.

What accounts for the lower level of productivity and wages in Nebraska? Economists have come up with several reasons why productivity might differ across states. One of these reasons is educational attainment. This explanation would not appear to work very well for Nebraska (Chart 7). As this chart shows, Nebraska does have a slightly smaller percentage of working age people with advanced degrees. However, it has a slightly larger share of working age people with college degrees, and it has a substantially larger share of people with some college experience, such as a degree from a community college.

Another possible explanation for the variation in productivity across states is differences in capital per worker—the amount of machines and other equipment that each employee has to work with. This explanation is difficult to evaluate because there is very little data at the state level on capital per worker. However, we do have some data on capital spending per worker in the manufacturing sector, and this data suggests that Nebraska firms do invest less than their counterparts in the rest of the nation (Chart 8). Over the period 1997-2001, for example, capital spending per factory worker averaged about \$2,200 less in Nebraska than the U.S. Some of this difference in capital spending was due to a tendency for Nebraska to specialize in less capital intensive manufacturing industries. However, the right-hand bar shows that even if the U.S. and Nebraska had the same industrial mix, capital spending per worker would have been quite a bit lower in Nebraska.

Why would firms invest less per worker in Nebraska than the U.S.? One possibility is that the state's low wages give firms less incentive to automate their operations. This might

explain why productivity is lower in Nebraska, but it raises another question—if wages are lower in Nebraska and the only reason workers are less productive is that they have less capital to work with, why don't firms move here from other states to take advantage of the state's lower labor costs? Until we have a satisfactory answer to that question, I do not believe we can accept low ratios of capital to labor as the main explanation for Nebraska's productivity gap.

A final explanation for Nebraska's lower productivity is its low population density. Economists have suggested a number of reasons why productivity might be higher in big cities than in small cities or rural areas. One reason is that big cities tend to have thick labor markets in which workers can easily change jobs. Such labor markets allow workers to specialize in a particular skill with less risk of suffering long-term unemployment if their firm goes out of business. Thick labor markets also lead to better matches between workers and firms, increasing the chances that workers find the jobs in which they are most productive. A second reason productivity might be higher in big cities is that they facilitate knowledge spillovers between firms and workers. The idea is that workers may be more productive if they are located near other workers in the same industry, because they can exchange ideas through face-to-face contact. The bigger the city, the greater are the opportunities for such contact.

Economists have come up with two main pieces evidence in support of the view that productivity increases with population density. The first is that Gross State Product tends to be lower in states with low population density than states with high population density, after controlling for other factors such as level of educational attainment. The second piece of evidence is what is called the "urban wage premium." This is the tendency for wages to be higher in big cities than small cities, and for wages to be higher in small cities than rural areas

(Chart 9). In 2003, for example, the average annual wage in metro areas over 2 million in population was more than \$8,000 higher than the average annual wage in metro areas under 250,000 in size, even after controlling for differences in occupational mix.

Skeptics might argue that wages are higher in bigger cities only because the cost of living is higher in such areas and workers have to be compensated to be willing to live there.

However, this immediately raises the question why so many firms are willing to do business in big cities. Most economists believe the answer is higher productivity—firms are willing to operate in big cities and pay higher wages because factors such as thick labor markets and knowledge spillovers make workers in those areas more productive.

How much of Nebraska's productivity shortfall can be explained by its low population density and lack of big cities? We saw earlier that average wages are appreciably lower in Nebraska than the nation. But this chart shows that when we compare different areas in Nebraska to similar size areas in the nation, the gap in wages largely disappears (Chart 10). The conclusion I draw is that Nebraska's low population density accounts for a substantial portion of its productivity gap. I hasten to add, however, that just because a city such as Omaha is relatively small does not mean that it is doomed to a low level of productivity (Chart 11). It is true that cities of Omaha's size tend to have lower productivity and wages than much larger cities. But as this chart illustrates, there is still substantial variation in wages and productivity within each size class. There is no reason why a city such as Omaha should not aspire to move to the top of its size class, boosting productivity and wages through such measures as improving the skills of its labor force.

### **Globalization and the outsourcing of production to other countries**

Having discussed the impact of technological change on Nebraska, let me now turn to the implications of globalization. Globalization refers to the increased movement of labor, goods and services, and information across countries. There are many aspects to globalization, but I want to focus on one that has received a great deal of attention lately—the outsourcing of production to other countries.

In manufacturing, offshore outsourcing has been going on for some time. This outsourcing of manufacturing operations to other countries has been a double-edged sword for the economy. On the one hand, it has displaced many workers who have had to find jobs in other firms or industries. But on the other hand, it has helped lower the cost of high-tech manufactured goods. This reduction in the cost of high-tech goods has encouraged more business to embrace information technology, contributing to the surge in productivity growth after the mid-1990s.

The offshore outsourcing of services jobs is a newer phenomenon. In recent years, U.S. companies have begun to send some of their white-collar jobs overseas to less developed countries such as India, China, and the Philippines, where workers have the skills to do the job but do not have to be paid nearly as high wages. Two factors have contributed to the recent growth in such outsourcing. One is the dramatic reduction in the cost of communicating overseas as a result of the spread of the Internet and satellite communications. The other factor has been a big increase in the supply of educated workers in some less developed countries, including countries such as India where many of the workers also speak English.

Unfortunately, there is very little data on the number of service jobs that have been outsourced overseas. Most experts believe that about 100,000 service jobs in the U.S. have been



moved overseas each year since 2000. That may sound like a lot of jobs, but it represents less than 0.1 percent of total employment. It is also small compared to the roughly 30 million jobs that get created and destroyed each year as part of normal churning in the labor market.

What has been the impact on Nebraska of the offshore outsourcing of service jobs? One way to address the question is to see what has happened to the types of jobs considered by economists to be most vulnerable to outsourcing. It has been claimed that any job that involves sitting at a desk, talking on the phone, and working on a computer is at risk. More specifically, the most vulnerable jobs would appear to be those that involve routine tasks, do not require face-to-face contact with the customer, and can be conducted via the Internet or telephone.

Economists have come up with several categories of occupations that meet these conditions and are thus at risk of outsourcing (Chart 12). The first category is office support, which includes such jobs as customer service representatives and bookkeeping clerks. The second category is business and financial support, which includes accountants and claims adjusters. The third category is computer and math professionals, which includes computer system analysts and computer programmers. The last group consists of miscellaneous occupations such as X-ray technicians and medical transcriptionists. Altogether, these four groups of occupations accounted for 13.5 percent of Nebraska services jobs last year, a slightly greater share than in the nation as a whole.

The next chart shows that employment in these at-risk occupations actually increased slightly in Nebraska from 2000 to 2003, a period during which the state's economy slowed and total service jobs edged down (Chart 13). As you can see, jobs in the computer and math category did decline substantially during the period. However, job losses in this category

probably had more to do with the technology bust in the U.S. than the outsourcing of jobs overseas. Meanwhile, jobs in the business and financial support category grew at a very strong pace, and jobs in the office support category barely declined. Overall, therefore, the evidence would suggest that the offshore outsourcing of service jobs has had little overall impact on employment in Nebraska.

Looking forward, we can expect offshore outsourcing to grow in importance, but not without limit. As demand for workers with language or computer skills increases in countries such as India, their wages will be bid up, reducing the cost advantage to companies of shifting jobs overseas. Some companies will also be reluctant to move jobs overseas because of concerns about political stability in foreign countries, possible loss of intellectual property, and the strength of internal controls at the outsourced location. However, there is no denying that powerful forces will work in the other direction, keeping the outsourcing trend alive. These forces include further advances in technology that expand the range of jobs that can be performed overseas, and further increases in the supply of highly educated workers in less developed countries. The next chart shows a typical forecast of offshore outsourcing over the next decade—this one by the private consulting firm Forrester Research (Chart 14). They predict that 800,000 service jobs will have moved overseas by the year 2005, 1.7 million jobs by the year 2010, and 3.4 million jobs by the year 2015.

### **Costs and benefits of offshore outsourcing to the U.S. and Nebraska**

As offshore outsourcing continues, what will be the costs and benefits to the economy? In the short run, the U.S. workers who are displaced are clearly worse off, while the owners and customers of the firms doing the outsourcing are clearly better off. Indeed, some economists

argue that outsourcing will lead to another surge in productivity growth by driving down the cost of IT services to businesses—just as outsourcing helped boost productivity growth in the 1990s by driving down the cost to businesses of IT hardware.

In the long run, the net effect of outsourcing on the U.S. depends on what new industries and products arise to pay for our increased imports of services. International trade economists have long recognized that increases in skilled labor and technological know-how in less developed countries such as India could leave developed countries worse off. But most economists regard such an unfavorable outcome as highly unlikely. The gap in skills and technological know-how between the U.S. and developing countries is simply too great for those countries to catch up in the foreseeable future. As the labor and capital displaced by offshore outsourcing shifts into those high-value activities in which the U.S. still has a comparative advantage, the nation should continue to reap substantial gains from trade and improve its standard of living.

Another reason for doubting that growth in skills and technology in less developed countries will harm the U.S. is that the nation is unlikely to stand still as other countries catch up. Instead, we can expect U.S. firms to come up with new ideas and technology, opening up new sources of comparative advantage that boost our exports. As long as U.S. firms can continue introducing such advanced products, increased employment in the nation's export sector should make up for the loss of some service jobs through outsourcing, and the U.S. standard of living should improve. This is not to deny, however, that some U.S. workers may face painful adjustments as a result of offshore outsourcing—especially those who have to change professions or move to another part of the country to find a new job.

**What can Nebraska do to benefit from globalization and technological change?**

To conclude, let me say a few words about how Nebraska can ensure that it benefits from globalization and technological change instead of losing. The most obvious way is by improving the skills and educational level of its workforce. We have seen that Nebraska workers are already a little more educated than their peers in the rest of the country. That does not mean, however, that further improvements in education would be of no value to the state. Further increases in the number of people with community college and university degrees would boost productivity directly, helping overcome the disadvantages the state faces as a result of its low population density. Further increases in educational attainment would also make Nebraska more attractive to highly productive workers in other states, helping Lincoln and Omaha attain the critical mass they need to reap the full benefits of knowledge spillovers and thick labor markets. Last but not least, improvements in the educational system would help Nebraska and the nation cope with outsourcing—not only by promoting the development of new high-value products to pay for our increased imports, but also by enabling workers who are displaced by outsourcing to find new high-quality jobs.

The other way Nebraska can ensure it benefits from globalization and technological change is to avoid actions that seek to arrest technological progress or inhibit market forces. The U.S. has the high standard of living it does because its firms and workers have always been innovative and unafraid of change. Looking back at those dire predictions of the 1960s, I think most of us would agree that we would have a lower standard of living now if we had tried to protect U.S. jobs by restricting the spread of computers or banning Japanese imports. Let's hope

we can continue to avoid such unwise policy responses as we face the latest round of globalization and technological change.