GLOBALIZATION AND TECHNOLOGICAL CHANGE: WHAT DO THEY MEAN FOR THE NEW MEXICO ECONOMY?

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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 New Mexico. 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 New Mexico in the long run, provided the state can 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 New Mexico 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 only 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.

Of course, in the short run, faster productivity growth can hurt job growth by allowing firms to get by with fewer workers (Chart 3). That was clearly the case during the period from 2000 to 2003, when productivity growth surged in the U.S. but employment growth turned negative. In the long run, however, faster productivity growth eventually leads to faster growth in real income. Such income growth increases the total demand for goods and services and allows workers who have been displaced to find new jobs. Thus, for periods as long as a decade, employment growth shows little relation to productivity growth, being determined more by demographic factors such as population growth and labor force participation.

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 (Chart 4). This table shows three recent predictions. 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 the quality-adjusted prices of IT hardware will continue to decline (Chart 5). This chart shows the dramatic decline in the quality-adjusted prices of microprocessors and personal computers that occurred during the 1990s. Most experts expect such price declines to continue, which should give businesses a strong incentive to purchase more computing capacity and make greater use of information technology in the workplace.

Has New Mexico shared in the productivity revival?

Let me turn now to the impact of technological change on New Mexico. The first question we need to ask is whether New Mexico has shared in the recent productivity revival. A cursory look at the data would suggest that productivity growth in New Mexico has been quite favorable (Chart 6). At the state level, the best measure of productivity available is Gross State Product per worker, expressed in constant dollars to control for inflation. According to this measure, productivity started out much lower in New Mexico than the U.S. in the late 1980s but then grew much faster during the next decade, catching up by 2001.

On closer inspection, however, it turns out that New Mexico's favorable productivity performance in the 1990s was due entirely to one sector—electronic equipment and components, which in New Mexico consists mainly of semiconductors. As we saw earlier, the quality adjusted price of semiconductors has fallen dramatically. As a result, each thousand dollars of revenues produced by a worker in the semiconductor industry now corresponds to a much bigger level of real output. The semiconductor industry also tends to have very high output per worker because it is highly capital intensive. That means the rapid growth in the state's semiconductor industry during the 1990s would have raised the state's average productivity, even if productivity in other sectors had remained unchanged.

When we exclude the semiconductor industry from the data, New Mexico's productivity performance during the 1990s looks much less favorable (Chart 7). Data on Gross State Product in constant dollars are less reliable for individual sectors, so this chart uses the current dollar measure. By this measure, productivity outside the electronic equipment sector remained lower in New Mexico than the U.S. throughout the 1990s. In fact, over the period shown here, the

productivity gap between New Mexico and the nation actually widened, with New Mexico's productivity falling from over 95 percent of the national level in 1986 to 83 percent in 2000.

Another indication that the state's productivity has lagged behind that of the nation comes from data on wages (Chart 8). If productivity were as high in New Mexico as the rest of the nation, we would expect workers to earn just as high wages. But in fact, average annual wages are $5,000 lower in New Mexico, even after controlling for differences in occupation. The bar on the far left shows the average annual wage in the U.S., while the bar on the far right shows the average annual wage in New Mexico. The bar in the middle shows what the average wage in the U.S. would have been if the nation had exactly the same mix of occupations as New Mexico.

Comparing the first and the second bars, it is clear that the lower average wage in New Mexico is not due to the state having a disproportionate share of workers in low-wage occupations such as call center operators. On the contrary, New Mexico's occupational mix is slightly favorable, tending to boost average wages by about $500. Thus, the reason New Mexico has a lower average wage than the nation is that wages tend to be lower in each occupation—a finding consistent with our earlier evidence that productivity is lower.

The wage gap is also fairly pervasive across the state (Chart 9). For each of the three areas in the chart, the bar on the left shows the average local wage, while the bar on the right shows what the U.S. wage would be if the U.S. had the same occupational mix as that area. Thus, comparing the two bars provides an indication of whether wages in an area tend to be lower than in the nation in all occupations. As you can see, wages tend to be the same as in the nation in the Santa Fe metro area, reflecting the fact that the area's scientists and government

workers earn close to the national average for their occupations. Elsewhere, however, New Mexico workers tend to earn less than workers in the same occupations nationwide. The discrepancy is especially large outside of Albuquerque and Santa Fe. In that part of the state, workers tend to earn over $7,000 less than the national average, even after controlling for the fact that these workers tend to be in somewhat lower-wage occupations.

What accounts for the lower level of productivity and wages in New Mexico? Economists have come up with several reasons why productivity can differ across states. One is differences in the amount of capital per worker. Unfortunately, it is difficult to evaluate this explanation, because there is very little data by state on the amount of capital per worker. Instead, I will focus on two other possible reasons economists have suggested why some states have lower productivity than others—low education and low density.

According to the 2000 Census, New Mexico has only a slightly lower share of college graduates in the working age population than the nation as a whole. Specifically, 25 percent of the population in New Mexico between ages 25 and 64 have graduated from college, only a percentage point lower than in the nation. However, the average for the state masks some very big differences within the state (Chart 10). Albuquerque and Santa Fe both have a higher percentage of college graduates than the nation—especially Santa Fe, where over 40 percent of the working age population has graduated from college. In the rest of New Mexico, by contrast, the share of college graduates is only 17 percent, much lower than in the nation. Thus, low educational attainment can explain why productivity and wages are so low in that part of the state. But low educational attainment cannot explain why productivity and wages are lower in Albuquerque than the nation.

A second reason productivity might be lower in New Mexico is that the state does not have highly dense population centers. Some economists argue that productivity is higher in big cities because they 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. Another advantage of big cities is that they facilitate knowledge spillovers between firms and workers. The idea is that workers may be more innovative 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.

One measure of innovative activity that economists often look at is patents per capita (Chart 11). This measure provides some support for the view that Albuquerque may not benefit as much from knowledge spillovers as some larger cities. Compared to other metro areas under 1 million in size, Albuquerque has a high rate of patent issuance. But as you can see Albuquerque does not compare so favorably with larger metro areas. Specifically, Albuquerque has a lower rate of patent issuance than cities over 1 million in size.

Globalization and the outsourcing of production to other countries

Having discussed the impact of technological change on New Mexico, 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 (Chart 12). In the U.S., imported inputs rose from 10 percent of total manufacturing inputs in 1987 to 16 percent in 1997. For high-tech manufacturing, the increase was even greater, with the import share reaching 38 percent in 1997. We do not have more recent data, but anecdotal evidence suggests that the share of imports in total inputs has continued to rise since the late 1990s. 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 types of jobs are most vulnerable to outsourcing? 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 three main categories of occupations that meet these conditions and are thus at risk of outsourcing (Chart 13). The first category is computer and mathematics, which includes computer programmers and actuaries. The second category is business and financial support, which includes accountants, financial analysts, and claims adjusters. The last category is office support, which includes such jobs as telephone operators and bookkeeping clerks. This chart shows that total at-risk jobs are somewhat less important in New Mexico than the U.S. but still quite numerous, representing 10 percent of all service jobs in the state.

For clues about the impact of outsourcing, it is natural to look at recent job growth in these at-risk categories (Chart 14). In New Mexico, job growth turns out to have differed sharply among the three at-risk categories. Total at-risk employment fell 2 percent per year from 2000 to 2003. However, most of the decline in the total was due to losses in the computer and math category, which probably had more to do with the technology bust in the U.S. than the outsourcing of jobs. In contrast to the computer and math category, jobs in the office support category continued growing from 2000 to 2003. As I noted earlier, this category includes call center operators and customer service representatives, one of the groups considered most vulnerable to outsourcing. We have seen no evidence either in New Mexico or the region that the majority of these jobs are being moved offshore. To be sure, a substantial number of call

centers in our district have closed during the year. At the same time, however, many other call centers have opened up, keeping total jobs in the office support sector growing.

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 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 15). 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 New Mexico

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 (Chart 16). New Mexico already benefits from the sale of high-technology products to other countries, with exports accounting for more than half of the total output of such products in 2001. 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 New Mexico do to benefit from globalization and technological change?

To conclude, let me say a few words about how New Mexico 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. Higher educational attainment would help New Mexico workers become more productive and catch up with their counterparts in the rest of the country. Higher educational attainment would also make it easier for workers displaced by offshore outsourcing to move into the new higher-value jobs that are likely to be created. In the past, New Mexico has been able to make up for the low college graduation rates of its young by attracting large numbers of highly educated workers from out of state. Given its scenic amenities and high quality of life, there is good reason to believe that the state will continue to attract such in-migrants in the future. Such inflows may also help Albuquerque attain the critical size it needs to exploit knowledge spillovers between firms and workers. However, New Mexico would be unwise to depend entirely on the in-migration of highly educated workers, because the state will need better skills at *all* levels of the work force to reap the full benefits of globalization and technological change.