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Productivity: Key to the Economic Future

Hello. Good to be here in Indianapolis. Part of my job as President of the Chicago Fed is to speak to business and community leaders around the Midwest about the state of the economy. Most audiences are interested in hearing from me about one thing, and one thing only: interest rates. Instead, I'm here to tell you there's more to the economy's future than interest rates.

The key to that economic future? Productivity. Productivity growth is the crucial development behind the remarkably good performance of the U.S. economy over the last several years — and productivity growth will determine the health of the economy in the years to come.

We at the Federal Reserve cannot directly increase America's productivity. Rather, it's your creativity and skills — your investment and management decisions — that will determine our productivity. Indeed, the productivity of every worker in America impacts our economy's health and helps increase our standard of living. Thus, in a very real sense, the economic future is more in your hands than mine, or the hands of anyone at the Fed for that matter, including Alan Greenspan — although don't tell him I said that.

Why should you care about productivity? Because it has a direct effect on your real income — your ability to buy things. Over time, real wages grow at about the same rate as productivity. For example, let me take you back to life in the mid-1970s. Back then the U.S. and the Midwest were struggling with poor productivity growth. This meant that peoples' standard of living wasn't improving very quickly.

Think back to what it would have been like to come out of college in the mid-1970s. Even if, despite the sluggish economy and high unemployment, you were able to get a job, what did you have to look forward to? Because productivity wasn't increasing very quickly, neither were real incomes. In fact, if you were the average person graduating from college in the 1970s, it would have taken you to the age of forty, at least, to obtain the standard of living that at today's rate of productivity growth, you could have expected to obtain by your early 30s. Our experience in the 1970s demonstrates the importance of productivity to our economy's health — and more importantly, to our personal standard of living. Now let's turn to today.

Our current nearly 10-year-old economic expansion ranks as the longest on record. Surprisingly, about the time a typical expansion would start to lose steam, this one got a new burst of energy. Since late-1995, our economy has grown an average of over 4 percent per year. We haven't had such an extended period of strong growth since the 1960s.

The icing on the cake? The good news on inflation. In the past, we've often seen inflation build over the course of a long expansion, eventually grinding economic growth to a halt. In this case, though, inflation is lower now than the levels we saw at the outset.

This expansion is every central banker's dream. Contrary to popular opinion, we do dream about other things too. But economically speaking, like you, we want to see the economy, and American business, flourish. We want to see incomes increase, but we want to make sure they increase over the long haul.

Our goal? Fostering maximum sustainable growth. We achieve this through price stability. Here's how it works. Economic growth relies on several factors, including innovation and investment in human and physical capital. The Fed can't affect any of those things directly. But indirectly, a central bank plays a pivotal role by maintaining price stability. Prices signal where resources need to flow. Consumers and investors use them to compare alternatives. Inflation distorts those signals and makes it harder for businesses and consumers to make good decisions. By maintaining price stability, the Fed helps make sure signals don't get distorted. This fosters the best possible allocation of resources and helps ensure a healthy growing economy.

Of course, the Fed has to make some difficult decisions — setting monetary policy isn't an exact science. For inflationary pressures to remain in check, the economy's demand for goods and services must be balanced with its supply. This requires the Fed to evaluate both the growth in aggregate demand and the economy's sustainable growth in supply. Recently, the surge in productivity has led to a renewed focus on assessing this sustainable growth.

How does the Fed judge the economy's maximum sustainable growth? Roughly speaking, it's determined by adding growth in the labor force to growth in productivity. There is wide agreement that the labor force is growing at about 1 percent per year, roughly the same as the working age population.

There is, however, considerably more uncertainty about productivity growth. From 1948 until 1973, labor productivity growth averaged 3 percent per year. It was an unusually prosperous time. Then, something happened. We don't know what. All we know is that it was a grizzly crime: from 1973 until 1995, annual productivity growth dropped to 1.4 percent on average — less than half the rate before 1973.

Many economic researchers identified possible suspects: the oil price shock, the closing of the gold window, the use of wage and price controls, increased government regulation — just to name a few. But ultimately, no perpetrator was ever convicted.

The Midwest was not spared from the economic turmoil associated with the productivity slowdown. The deficiencies in our once-dominant manufacturing industries—autos, machinery, and steel—became exposed to the harsh reality of more-productive foreign competitors. What was once known as the economic heartland became known as the “Rustbelt.” Consequently, high productivity/high wage Midwestern manufacturing jobs evaporated quickly in states such as Indiana—with losses of approximately 20 percent from 1979 to 1982.

Indeed, during the darkest hours for the Midwest, the question wasn’t one of sustainable growth, but rather, whether we would again experience any growth at all. As you all know, the Midwest responded to this wake-up call — its economic renaissance is a dramatic success story.

While the Midwest became much more competitive in the global marketplace, productivity growth nationwide was sluggish until the mid-1990s. When I started at the Fed in 1994, the productivity experience of the previous 20 years had led most economists to the view that sustainable growth was just over 2 percent per year. That figure reflected the belief that productivity growth and labor force growth could only be expected to be slightly more than 1 percent each. And that was probably about right then. But today, most economists believe the economy can grow at a higher sustained rate. The reason: the acceleration of productivity growth.

How fast is productivity growth increasing? Well, since the end of 1995 we’ve averaged about 3 percent — just like the good old days of the 1950s and 1960s. If productivity increases 3 percent and labor force increases 1 percent, the economy can sustain a growth rate of around 4 percent — double the estimate for the early 1990s. The big question then: where’s productivity headed?

For the remainder of my talk, I’d like to address that question. I’m going to look at why productivity increased so dramatically in recent years and whether we should expect more of the same. I’ll also address the implications for monetary policy.

First, let’s define productivity. Usually, people discuss labor productivity, which refers to the real output produced per hour worked. Managers in many industries judge their performances at least in part on some measure of labor productivity. For example, in the mid-1980s, it took nearly 8 man hours to produce a ton of steel. Now it’s less than 4. That’s an increase in productivity of nearly 5 percent at an annual rate.

So, is the dramatic increase in productivity growth a temporary phenomenon? Some economists say “yes.” They note that measured productivity growth can temporarily increase when the economy as a whole speeds up, as it has in the 1990s. This temporary increase comes from a variety of sources. For example, when firms are struggling to keep up with increased demand, they may require more effort from their employees, causing a temporary uptick in measured productivity. But they cannot keep up this intensity level indefinitely without sacrificing quality. Eventually, effort returns to normal and measured productivity slips.

But, it appears that the cyclical effect on recent productivity growth is actually quite modest. Indeed, Chicago Fed research suggests that the late-1990's productivity revival owes little to cyclical factors. While this was an important factor early in the expansion, it hasn't been in recent years. Rather, the evidence suggests that more fundamental changes may have improved the productivity growth rate.

What are these changes in the fundamentals? Economists attribute longer-lasting changes in productivity growth to three factors. These factors are known as capital deepening, labor quality improvement, and what economists like to call multifactor productivity. Let me briefly discuss the first two, so we can focus on the third.

Let's start with capital deepening. This means giving workers more tools or better quality tools by investing in more capital per worker. Obviously, capital deepening has a big impact on worker productivity. A worker sitting on top of a Caterpillar tractor can move a lot more dirt than one armed only with a shovel.

In recent years, we've seen investment spending growth in the double digits. Growth in spending on high-tech capital equipment and software was especially high, averaging 20 percent per year or more. Spending in this area accounts for about three-quarters of the recent growth in overall investment spending. As a result, we've transformed the way we work. Back in 1984, only about 25 percent of Americans used a PC at work. I suspect only a small number of people in the audience haven't used a computer at least once in the past week.

Computers not only make us more productive in the office, they also increase our flexibility to work on the road. By using a laptop or a Palm Pilot you can work anywhere — not merely when you are chained to your desk. For example, you could increase your productivity right now by checking your e-mails while listening to this speech — not that I'm encouraging you to do that.

Since 1995, the rate of capital deepening has increased, contributing to our higher productivity growth. In the early 1990s, official statistics suggest that capital deepening was responsible for about 0.5 percentage point of the 1.5 percent productivity growth we were experiencing. But from 1995 to 1998, the last year we have capital deepening data, that contribution increased to about 0.8 percentage point. Our analysis indicates that the trend towards capital deepening has continued in the last two years. The true contribution now could be easily above 1 percentage point. If so, the pace of capital deepening would have more than doubled since the early 1990s.

The second factor contributing to the growth of labor productivity is improvement in worker skill levels, which includes education and experience. Clearly, education levels have improved over time. Sixty percent of those just starting their careers today have some post-high school education. For those near retirement, that figure is only around 40 percent. This pattern is age-old, each new generation of workers has more education than the last; as the average level of education increases, each new generation becomes more productive. However, the contribution of worker skill improvements to productivity growth has held steady at about 0.3 percentage point since the early 1990s. Thus this factor does not explain any of the increase in productivity growth since 1995. The third and last factor is what economists call multifactor productivity growth. Typical of many economic terms, this name does little to illuminate the subject it describes. It means, more or less, productivity gains that ultimately stem from innovation: innovation in technology, innovation in management processes, and what economists call creative destruction, the process by which firms that innovate replace those that don't. In the long run, the pace of innovation is the most important determinant of an economy's growth prospects.

Why is innovation so important? In a nutshell, innovation not only raises productivity directly, it leads to the process of capital deepening. That's because firms are more likely to invest when the expected returns are high. And innovation is what brings about those high returns. So innovation drives current productivity improvement and sets the stage for future improvements by fostering capital deepening.

Consider first the extraordinary technological advances we've seen in recent years. This innovation is distinct from capital deepening, which, again, refers to investment in technology, rather than its invention. Technological innovation by engineers, computer programmers, and others, has been extremely rapid over the course of this expansion.

Only nine years ago, I served as Deputy United States Trade Representative; we had extensive negotiations to encourage the Japanese government to open their market to U.S. supercomputers. Those room-sized monsters cost millions of dollars. Now, equivalent computing power can be found on a modest network of high-end desktop computers. What a thought: countless hours negotiating about products, the equivalent of which can now be found on a shelf at Best Buy! It was technological innovation that allowed computer prices to fall so very rapidly, and which has facilitated the rapid spread of computers throughout our offices, stores, and factories, as part of the capital deepening process.

High-tech innovation has also had a revolutionary impact on the productivity of factory workers. For me, this innovation is embodied in the changes we've seen in manufacturing technology. Ten years ago, at the manufacturing technology trade show held in Chicago, there were few machine tools with computer technology and they represented the cutting edge; now they're the norm.

But high-tech wizards aren't the only innovators in our economy. Many innovations come in the form of how we do things, rather than what we use to do them. That's one aspect of productivity growth that tends to be overlooked but I think is very important.

Managers are constantly finding better ways to enhance their firms' performance such as reducing inventory, improving logistics, and finding better ways to organize production and reduce inefficiency.

One important development is just-in-time production. Many companies have saved on storage costs and delivery times by synchronizing the purchase of supplies and the manufacture of products to maximize efficiency. Since just-in-time manufacturing became widespread around 10 years ago, the inventory-to-sales ratio in the durable goods manufacturing sector has continuously fallen at a rapid clip.

But management innovation means more than just manufacturing processes: people processes have been revamped during this expansion as well. Firms today truly see workers as human resources, and are creating work environments that foster problem solving. Some of the more inspired developments in human resources that have taken hold during this expansion include: work teams, flexible job assignments, and cross-training.

Research suggests that these new practices can make a significant difference in productivity and product quality. One study looked at the human resource practices of steel finishing lines in the U.S. and Japan. The finding? While individual human resource changes don't make a big difference in productivity, the right bundle of these innovations can make a substantial difference. This points to

the importance of proper implementation. And that's why managers at all levels make such a difference in productivity and the success of individual companies over the long haul.

This brings me to the process of "creative destruction." An important part of productivity growth comes from firms that are innovative replacing those that are less so. Obviously, over time, productive firms tend to prosper, while less productive firms lose market share and eventually shut down. The resulting resource allocation leads to productivity improvements for the whole economy. So although some firms disappear, the process of creative destruction helps increase overall productivity in the long run.

I discussed earlier how Midwest businesses embraced innovation in order to revitalize our economy over the last 20 years. This period is full of episodes of creative destruction. For example, the steel industry used to be dominated by enormous plants employing tens of thousands of workers. Then a general downturn in the industry put pressure on all but the most innovative firms. These large mills became the poster-children of the Midwest's rustbelt days: mass layoffs, unrelenting plant shutdowns and devastating financial losses ensued. Mini-mills thrived, however, and are playing a key role in the industry — running efficiently with only several hundred persons per plant. The erosion of markets served by integrated mills and their replacement with mini-mills is a classic example of creative destruction.

One of the strengths of the U.S. economy is the way we let the process of creative destruction function relatively unimpeded. In much of the world, government regulations make it difficult for firms to reduce their workforces. Such regulations result in slower introduction of innovations. Indeed, I believe the regulatory structure in the U.S. is an important reason why the acceleration in productivity growth has been so much larger here than in Europe and Japan.

Collectively, the direct gains in productivity due to innovation — the multifactor productivity gains — have been the biggest factor in the better performance of productivity since 1995. According to data from the Bureau of Labor Statistics, multifactor productivity growth averaged only 0.6 percent between 1990 and 1995. For the period 1995 to 1998, it jumped to 1.3 percent, a dramatic improvement that has likely continued over the last two years. This jump in the pace of innovation explains the majority of the increase in labor productivity growth relative to earlier in the 1990s, with the rest attributable to more rapid capital deepening. Improvements in labor quality held about steady.

These considerations leave me feeling cautiously optimistic about the future pace of productivity growth and the implications for our economy.

The post-1995 productivity boom appears to owe little to cyclical factors. Rather, it seems we're looking at underlying changes that should persist at least for the next couple of years. Both capital deepening and innovation deserve credit for the improved labor productivity growth of recent years. The clip at which firms continue to invest, especially in high-tech equipment and software, suggests that intense capital deepening continues. Moreover, this heavy investment must reflect managers' beliefs that technology continues to advance rapidly. This gives us some reason to expect that the pace of innovation has not slackened either.

It's difficult to say precisely how fast productivity can grow in the current environment. We'd all love to have another ten years of data on which to base our judgements. But despite the inevitable uncertainty, our best estimate at the Chicago Fed at this time is that the pace of productivity growth during the next couple of years will be similar to what we had in the 1950s and 1960s. In that period, produc-

tivity growth averaged about 3 percent per year, but it's important to emphasize that this was an overall average, and actual productivity growth will vary from quarter to quarter and year to year. Indeed, with the economy slowing from the frenetic pace of 1999 and early 2000, productivity growth in some quarters may be somewhat slower. Even so, we can expect productivity growth will be higher than in the early 1990s.

Despite improved prospects for productivity growth, the Federal Reserve still faces challenges. It is possible for growth in demand to exceed even our higher sustainable growth rates. Indeed, it is worth recalling that while we had a high rate of productivity growth in the 1960s, it did not prevent a significant increase in inflation toward the end of the decade. This high inflation, and the associated instability, were very damaging to our economy — particularly here in the Midwest.

If we continue to keep inflation in check, we will have much to look forward to. Rapid productivity growth means rapid gains in real incomes. Our living standards can increase at a faster rate, bringing higher levels of prosperity. We all have important roles to play here. Yours is to be innovative in ways that will make us more productive in the future. And as a society, we must continue to facilitate the development of the talents and skills of America's workforce, so that every individual has the opportunity to become more productive.

As for the Fed, we will continue to foster an environment of price stability that allows all participants in the economy to make informed, and productivity-enhancing choices.