

Overview

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The most important question about the information economy for the Federal Reserve is whether productivity growth will continue at the relatively high level of the past six years, i.e., at roughly 2.5 percent, or will retreat to the 1.5 percent rate of the previous twenty-five years. If the higher productivity growth rate does continue, the overall growth of the economy can be faster than it was in the past, without increasing inflation. With the labor force increasing at about 1 percent a year, continued strong productivity growth implies that the Fed should be ready to provide enough liquidity to finance real GDP growth of about 3.5 percent. But if productivity growth will now go back to the earlier rate, the Fed must try to limit GDP growth to the sum of productivity plus labor force or about 2.5 percent per year.

Although there is substantial uncertainty about the future of productivity, I believe that the new developments in information technology will continue to provide faster productivity growth in the coming years. That conclusion cannot be based on the recent statistical record of strong productivity growth alone. I am persuaded also by the numerous studies that have now shown that the increased productivity is not just cyclical or reflective of the high rate of investment in plant and equipment. Rather, it is based on changes in technology that are quite palpable if one looks at the actual behavior of individual firms.

Businesses are learning to use existing hardware and software in ways that raise the productivity of their existing labor force. We will, no doubt, continue to see increasing productivity as firms make better and more extensive use of the existing information technology. At the same time, the companies that make computers and write software will continue to offer ever more powerful options geared to the business market.

How does the new information technology increase productivity? Not just, or even primarily, by improving the production process. Production workers are a small part of the labor force. The gains in productivity come primarily from reducing the number of non-production workers per unit of output.

During the past few years, the National Bureau of Economic Research has organized visits to a substantial number of manufacturing firms as part of a project aimed at understanding the link between technology change and productivity. The most striking thing that we saw on these site visits was the small number of workers actually involved in the manufacturing process itself— i.e., actually “touching” the product as it was being made.

This scarcity of workers on the actual production floor stands in sharp contrast to the well-known fact that, for the economy as a whole, employee compensation represents about 70 percent of total national income. This puzzle is resolved by recognizing that most employees in a modern manufacturing firm are not engaged in production but rather in such non-production activities as sales, accounting, purchasing, etc.

These non-production jobs are the activities that can benefit most from the new IT, especially from the Internet, the intranet within companies, and the new generations of user-friendly personal computers. These new technologies are allowing the elimination of middle management jobs and the reorganization of the production process. I believe that there is great scope for further changes of these types in the future.

It is important to remember, as we think about the future, that an increase in productivity growth from the historic 1.5 percent a year to 2.5 percent represents an annual reduction of only one employee in 100—i.e., doing the work with ninety-nine employees that would have been done with 100 the year before. There are many opportunities for such progress to continue in the future.

Productivity in the United States, Europe, and Japan

In thinking about the productivity change in the United States, it is useful to compare our experience with that of Europe, where productivity growth has not increased. Europe does not lack access to the new technology or to funds with which to finance investment in the new technology. Why then has there been the difference in productivity performance?

I believe that there are three reasons why Europe has not experienced the same rise in productivity as the United States.

First, the rigidities in labor and product markets in Europe make it difficult for companies to lay off redundant workers and to reorganize production and support staff activities. And if a firm cannot make such cost-cutting changes, why bother to adopt the new technologies?

Second, there is less pressure in Europe and Japan to adopt new technologies because their domestic product markets are less competitive than those in the United States.

Third, European and Japanese managers have less personal incentive to adopt the new information technology. The United States is unusual in its emphasis on bonuses and stock options as ways of motivating managers and of tying compensation to the level of company profits.

Unless Europe modifies the “European model” of product and labor markets, the difference in productivity growth is likely to continue, with significant long-term effects. The same is true for Japan, although

the Japanese situation is made worse by the weakness of its financial system.

Emerging-market economies

I turn now to a different international aspect of our subject, the effect of information technology on emerging-market economies. Nick Stern and Don Johnston have commented at this meeting on the way that investment technology may help even the village economies in those countries. I won't comment further on that potentially positive aspect.

Instead, I want to emphasize the way that those emerging-market countries (EMCs) that are already open to the rest of the world will be the ones that benefit most from the improvements in information technology and communications. I see this happening in at least three ways.

First, these improvements will facilitate exports by linking EMC suppliers more easily to buyers in the industrial countries.

Second, it will facilitate foreign direct investment by easing long-distance communication and management.

And third, the Internet is giving scientists and engineers in EMCs much more rapid access to new developments in science and technology, facilitating the development of high-tech and research-based activities.

The information-technology improvements that raise growth prospects in the EMCs may also increase inequality within those countries, raising incomes substantially for those individuals who are part of the international IT economy. The Indian software engineers are one very obvious example of this since their skills are very valuable in India to firms that are exporting software to the rest of the world and the engineers themselves have the opportunity to emigrate to the United States or other countries where their skills make them welcome

and where their incomes would be a significant multiple of those typically paid in India.

How should we think about this increase in inequality? First, the increase in real incomes of the high-tech workers will spill over to the rest of the local economies as the demand for services rises, thereby raising real incomes more generally. Second, even if inequality increases, it would be an increase in which some people are made better off and none are made worse off. While those who look at the Gini coefficient or other measures of inequality per se will see the increase in inequality as bad news, I believe that any change that makes some people better off while making no one worse off is a clear improvement even if it increases measured inequality.

Anti-globalization

I want to comment on one way in which the great expansion of the Internet may have a serious adverse effect on the global economy in the future. The Internet is the primary tool that has facilitated the anti-globalization movement that has led to the destructive demonstrations from Seattle to Genoa and that are planned for the IMF-World Bank meetings in Washington later this month.

The anti-globalization movement will change the domestic political agenda in many countries, putting barriers in the way of a new global trade round. If the current attempt to achieve such a new WTO trade round fails and we slip into regional rather than multilateral trade agreements, I think the primary blame will rest on the anti-globalization non-government organizations whose work has been facilitated by the global Internet.

Macroeconomic performance and policy

Here in the United States, the IT revolution has important implications for macroeconomic performance and policy. I'll start with budget and tax policy, and then turn to monetary policy.

If the productivity growth rate remains at the 2.5 percent rate of past six years, the U.S. budget outlook for the next decade looks very good. That kind of productivity increase would translate into a GDP growth rate of about 3.5 percent. The Congressional Budget Office's recent report says that a 3.2 percent rate of real GDP growth from 2003 through 2011 would lead to budget surpluses over the next decade that total more than \$3.3 trillion, of which nearly \$1 trillion will be in the "on-budget" category—i.e., not due to the Social Security surpluses.

The Bush tax cut has, therefore, left a margin of safety of nearly \$1 trillion (over and above the Social Security surpluses) to allow for the uncertainty in the outlook and for temporary economic slowdowns. If the productivity growth is 2.5 percent and the GDP growth is, therefore, about 3.5 percent, the future budget surpluses would be substantially larger.

I turn finally to monetary policy. I agree with Michael Woodford that the innovations in information technology do not diminish the ability (and, therefore, the responsibility) of the Fed to make monetary policy and to pursue price stability.

As I have commented at several previous Jackson Hole conferences, the decline of the unemployment rate after 1995 led to a rise in the rate of total compensation per employee hour from about 2 percent to about 5 percent. This accelerating increase in employee compensation did not lead to higher inflation because the more rapid increase in productivity has balanced the faster increase in compensation, preventing an inflationary rise in unit labor costs. And it has been the improvements in information technology that have been the major source of that acceleration of productivity.

Although wages were rising at an increasing rate, productivity gains were so strong that the profit share also increased. The higher profits led to increased investment in business plant and equipment, reinforcing the pro-investment effect of the declining real price of high-tech investment goods. The rise in the relative share of business investment in the economy further increased the rise in productivity.

Note, however, that the rising profit share implies that the increases in real wages in the past half-dozen years were not as rapid as the gains in productivity. That lag in real wages is likely to prove to be transitory and unsustainable. Looking ahead, wages are likely to rise more rapidly, at least in line with productivity, and maybe faster as wages make up for past lags.

I believe that the current 4.5 percent unemployment rate is not consistent with a continuation of stable low inflation. No one can be sure of what the unemployment rate has to be to reflect labor market equilibrium, but I believe that rate has to exceed 5 percent.

It is noteworthy that the Congressional Budget Office's economic outlook for 2002 and beyond includes an unemployment rate of 5.2 percent. If this rise in unemployment occurs, we may still avoid a recessionary decline of personal incomes and aggregate sales of the type that has characterized past recessions, because the strong growth of productivity can keep real incomes and aggregate sales increasing.

Looking ahead, if the private and official forecasts are correct and GDP grows at $2\frac{1}{2}$ percent next year, the unemployment rate will still be rising if the productivity continues to rise at $2\frac{1}{2}$ percent. If this occurs, monetary policy can and should continue to pursue an expansionary course, helping to bring demand growth after 2002 in line with the potential GDP increases of 3 to $3\frac{1}{2}$ percent.

In short, if the IT revolution is real—and I believe that it is—and if it implies future productivity gains of 2.5 percent a year, we are in a temporary transition to a sustainable period of low inflation and strong economic growth.