

The Productivity Perplex: A Concern for the Supply Side

By Timothy Hannan*

Worrying about the appropriate level of aggregate demand has been a full-time occupation for many economists. Their concern stems from a belief, long dominant in the economics profession, that changes in aggregate economic activity are brought about primarily by changes in the level of aggregate demand. But every market comes complete with both a demand side and a supply side. The level of output is determined not only by demand but also by cost, which affects the amount producers are willing to supply at any given price.

Thus the supply side can be important, and in no case is this more evident than in the

nation's anemic productivity performance. The trend in labor productivity has not been very cheering of late, and aggregate demand considerations don't seem to go very far in explaining this trend. Increasingly, economists are looking at some rather fundamental supply-side considerations in an attempt to diagnose the illness and to prescribe the appropriate remedy.

PRODUCTIVITY IN THE DOLDRUMS

Productivity usually is defined as output per hour of labor. Sometimes this notion of labor productivity is replaced with the more comprehensive notion of total input productivity, which considers the efficiency of both labor and capital (Figure 1 overleaf). No matter how it's measured, though, the history of productivity in the past few years does not make pleasant reading. During most of the

*The author, who holds a Ph.D. from the University of Wisconsin, specializes in banking and urban economics. He joined the Philadelphia Fed's Department of Research in 1974.

FIGURE 1

**TOTAL INPUT PRODUCTIVITY
VS. LABOR PRODUCTIVITY**

Differences between the two concepts are illustrated in the following table. The growth in labor productivity is calculated as the growth in real gross product minus the growth in labor input, while the growth in total input productivity is calculated as the growth in real gross product minus the growth in total input. The growth in total input is defined as the growth in labor plus the growth in capital expressed in terms of its labor equivalent (capital/labor substitution).

GROWTH IN LABOR PRODUCTIVITY AND TOTAL INPUT PRODUCTIVITY

	Average Annual Rates of Change	
	1948-1966	1966-1973
Real Gross Product	3.9%	3.5%
— Labor Input	.4	1.4
= Labor Productivity	3.5	2.1
Real Gross Product	3.9	3.5
— Total Input	1.2	1.9
= Total Input Productivity	2.7	1.6

SOURCE: "Sources of Productivity Growth and of the Recent Slow Down," *Reaching a Higher Standard of Living* (New York: New York Stock Exchange, Inc., 1979), pp. 14-20.

early postwar period, labor productivity grew by more than three percent a year. Starting in the mid-1960s, however, things started to deteriorate, and the record of the 1970s was downright dismal (Figure 2). Productivity gains from 1973 to 1977 averaged only around one percent, and preliminary evidence for 1978 indicates an even poorer performance.

Some of the slippage can be blamed on the ups and downs of the business cycle. It's well known that when the economy heads into a recession, productivity growth begins to de-

cline. During such times, output usually is cut more sharply than employment. Productivity growth can decline during recessions also because of the loss of economies of scale as capacity utilization drops. The 1974-75 recession was particularly sharp and can explain some of the productivity loss, but most economists are agreed that this disturbing news cannot be blamed on the business cycle alone. There are many ways to adjust productivity figures to account for changes in the business cycle. One of the easiest is simply to compare productivity during peri-

FIGURE 2
GROWTH IN U.S. LABOR PRODUCTIVITY SLACKS OFF, 1948-1978*

Sector	Percent Change per Year				
	1949-1955	1955-1965	1965-1973	1973-1977	1977-1978†
Private business economy	3.4%	3.1%	2.3%	1.0%	0.4%
Nonfarm	2.7	2.6	2.0	.9	.6
Manufacturing	3.3	2.9	2.4	1.5	2.5
Nonmanufacturing	2.4	2.4	1.7	.6	-.3

*Data relate to the annual percent change in output per hour paid for, all persons.

† Preliminary.

SOURCE: *Economic Report of the President 1979*, p. 68.

ods that are at roughly the same stage in the business cycle. No matter how it's done, though, the results seem to point to one thing—a long-term decline in U.S. productivity growth.

Another way to look at the issue is to compare America's productivity performance with that of other countries. But this isn't too encouraging, either (Figure 3 overleaf). In the race for overall productivity growth, the U.S. routinely has been coming in twelfth in a field of twelve. The gap between U.S. gains and those of the first-place finishers is striking indeed, with Japan, Denmark, and Belgium achieving roughly four times the productivity gains of the U.S.

It would be hard to argue that this productivity weakness stems directly from deficiencies in demand management. Changes in aggregate demand through monetary and fiscal policy can alter economic activity over the business cycle; but the nation's anemic productivity performance is decidedly a longer term phenomenon. Gains in productivity seem to vary cyclically, but those gains

on the whole have been discouraging in good times as well as bad.

WHY WORRY?

Why should we be concerned with reduced productivity growth? The primary benefits of faster productivity growth are pretty well known—more can be produced in the future and living standards can be raised. The future's economic pie will be bigger, allowing a bigger slice for each member of society. Expanding the future economic pie can bring benefits beyond those that usually are classified as economic. It can help to avoid or diminish the strident clashes that can result as contending groups fight over smaller pieces of a smaller pie. Given macroeconomic policy, it can help lessen the severity of inflation. It may even make for sounder policy, to the extent that clashes among interest groups distort the policymaking process.

These achievements, however, usually come at some cost. If increased productivity is to be achieved through increased invest-

FIGURE 3
AMERICA TRAILS OTHER INDUSTRIALIZED COUNTRIES
IN MANUFACTURING PRODUCTIVITY GROWTH*

Country	Average Annual Percent Change			Percentage Change
	1960-1976	1960-1966	1966-1976	1966-1976 vs. 1960-1966
United States	2.9%	4.0%	2.2%	-45%
United Kingdom	3.3	3.7	3.1	-16
Canada	3.8	4.3	3.5	-19
Switzerland	4.3	2.9	5.1	+76
France	5.7	5.5	5.8	+ 5
Sweden	5.7	6.5	5.2	-20
Italy	5.8	6.7	5.3	-21
Germany	5.9	6.0	5.8	- 3
Netherlands †	6.7	5.6	7.4	+32
Belgium †	6.8	5.0	8.1	+62
Denmark	7.0	5.4	8.0	+48
Japan	8.9	8.8	8.9	+ 1

*Data for 1976 are preliminary estimates.

†1960-1975.

SOURCE: *Reaching a Higher Standard of Living*, p. 11.

ment in capital equipment or through increased expenditures on research and development, then fewer resources are available to devote to current consumption, and present living standards must suffer, at least temporarily, as a result. And if it is to be achieved by relaxing regulations on occupational safety and environmental protection, then more accidents and more pollution may be the price paid. Other ways of achieving higher productivity may involve other types of costs.

Concern over lower productivity, coupled with the observation that the business cycle cannot account for all of the drop, has led

economists to search a little deeper for clues to the whys and wherefores. Changes in the economy that affect production decisions from the demand side apparently don't provide all the answers.

THINKING ABOUT THE CAUSES

If it's not demand considerations that are responsible for the present state of affairs, then what are the causes? Economists who have pondered this question seem to feel that several different changes in the economy in recent years have contributed to the problem. Some even have made estimates of the contribution of each of these factors to the

overall decline.

Slower Growth in the Amount of Capital per Laborer. One commonly cited reason for the slowdown has been lackluster growth in the amount of capital that each worker has to work with. Labor, after all, is not the only input into the production process. In order to produce something, capital—in the form of buildings, tools, or machines—also must be employed, and the amount of capital that each worker has to work with has a lot to do with what he can produce. A man operating a million-dollar steam shovel, for example, can move more dirt than he could with a simple hand shovel, and he can do more with a hand shovel than he could with his bare hands. Thus a lower rate of growth in the amount of capital that he has to work with clearly can retard his productivity gains.

The amount of capital that each laborer has to work with (the capital-labor ratio) hasn't been growing as fast during recent

years as it did during the past two decades. The capital-labor ratio grew at a rate that was never less than two percent during the 1950s and 1960s, but in the 1970s (based on statistics currently available) it exceeded two percent in only one year (Figure 4).

What might be the cause of this decline? The rate of growth in the capital-labor ratio can fall either because the growth in the nation's stock of capital declines or because the number of employees grows faster than the capital stock. Thus anything that retards capital growth or increases the growth of the labor force might be the cause.

Among recent changes in the economy that have been suggested as causes of reduction in the rate of capital growth is the impact of taxation, which because of the inflationary environment of recent years may have made capital investment less attractive. Consider, for example, the overstatement of profits, and hence the over-

FIGURE 4

ANNUAL PERCENTAGE CHANGES IN HOURS OF LABOR,
STOCKS OF FIXED CAPITAL, AND CAPITAL-LABOR RATIO
SIGNAL LOWER PRODUCTIVITY GROWTH IN 1970s*

Year	Labor	Capital	Capital-Labor
1970	1.9%	3.2%	1.3%
1971	1.9	3.4	1.5
1972	2.1	4.0	1.9
1973	1.8	4.2	2.4
1974	1.7	2.9	1.2
1975	1.6	1.4	-2

*The labor time series (historical and projected) is a full-employment labor hours series developed as part of the Council of Economic Advisors potential output studies. The capital stock series for the historical period is the sum of the Department of Commerce constant (1972) dollar net stocks of business and residential fixed capital.

SOURCE: Michael D. McCarthy, "The U.S. Productivity Growth Recession: History and Prospects for the Future," *The Journal of Finance* 33 (June 1978), p. 980.

assessment of corporate taxes, that can result in an inflationary environment. Traditional accounting methods base the value of a firm's inventory and capital stock on the amount that the firm actually paid for them. This accounting approach is perfectly adequate during periods of no inflation, but it may produce incorrect measurements during inflationary periods. When inflation rates are high, such procedures substantially underestimate the true replacement cost of the firm's machines and inventory. The cost of the firm's inventories and the depreciation on the firm's capital are understated, leaving corporate profits overstated and corporate taxes overpaid. According to Harvard economist Martin Feldstein, "Taxes now take about 65 percent of the income of nonfinancial corporations, compared to 54 percent in the mid-1960s. The after-tax return has been cut by a third."¹ The result is a reduction in the financial incentives for capital investment.

Inflation may tend to discourage capital investment also through its effects on the capital gains tax. The capital gains tax is a tax on the appreciation in value of a capital asset. For tax purposes, the appreciation is calculated as the difference of what the asset was bought for from what it was sold for. Suppose that a capital asset appreciates in dollar terms by 20 percent, but half of the increase (10 percent) comes from inflation. The capital gains tax, which until recently was at the 50-percent rate, would be levied not only on the 10-percent real appreciation but also on the 10-percent increase that is caused solely by inflation. Thus capital gains taxes tend to be overassessed in a time of rampant inflation, since much of the so-called appreciation is not real but is caused by inflation. The result is less incentive to invest in new capital equipment.

¹Martin S. Feldstein, *U.S. News & World Report*, October 1, 1979, p. 60.

Uncertainty over the level of inflation, which tends to be more pronounced when inflation rates are high, also can affect investment and savings decisions. Much uncertainty can discourage capital investments by making them more risky. Savings also may become less attractive relative to current consumption as a result of the added risk that inflation brings, and this too can limit capital formation. These are but some of the supply-side considerations which may have been operating in recent years to lessen incentives for capital formation.

Major increases in the labor force also may have contributed to some reduction in growth in the capital-labor ratio—a possibility not often considered in popular accounts of the issue. Growth in labor hours has been running at historically high levels since the early 1960s. This phenomenon often is ascribed to demographic and sociological factors. Whatever the reasons for it, it's important to note the kind of economic changes that it can be expected to bring about. When the supply of an input such as labor increases, economic forces are brought into play which make labor less costly to use relative to capital. Thus producers, after a time, may be led to shift their production processes to take advantage of this increased supply of labor by using less capital for each unit of labor. This also may be a cause of the declining growth in the capital-labor ratio.

Unfortunately, the list of reasons offered to explain the labor productivity decline is not limited to these. Other explanations relate to the sluggish growth in the capital-labor ratio, and estimates such as those of Edward Denison suggest that a relatively small part of productivity growth comes from changes in the amount of capital that each laborer has to work with.² Clearly,

²Edward F. Denison, "Explanations of Declining Productivity Growth," *Survey of Current Business* 59, 8 (August 1979), Part II, pp. 1-24.

many causes may be at work, and the net must be cast even wider in the search for the full story.

Decline in Research and Development. Another supply-side phenomenon which may have helped to put productivity in the doldrums is the decline in capital expenditures on research and development (R&D) programs. These expenditures accounted for about 3.09 percent of GNP in the mid-1960s but then declined to about 2.2 percent of GNP by 1978. Most of this drop was brought about by reductions in military and space-related research rather than in the type of research that private industry typically pursues. For this reason, many say that the overall decline in R&D expenditures has not had much of an impact. Others maintain, however, that the decline in military and space-related research can affect technological progress in other areas as well and that industry R&D has been shifting away from basic research and new product development as a result of the changed regulatory environment. On the whole, available estimates suggest that the decline in R&D expenditures does not explain a large share of the total decline.

Increase in Regulation. Another supply-side obstacle has been increasing economic and social regulation. Economic regulation such as that found in the transportation industry retards productivity by promoting inefficient operations and keeping labor and capital from being employed in their most valued uses. But it's primarily social regulation of the type concerned with safety and the environment that has increased markedly in recent years. Such regulation clearly can produce benefits in the form of increased safety and reduced pollution. But it also can be quite costly. One economist has calculated that approximately \$10 billion of capital spending each year is devoted to meeting requirements imposed by this kind of regulation.³ When increasing amounts of capital are diverted to these ends, measured produc-

tivity growth is retarded. Such regulation also can discourage investment and innovation by adding to uncertainty and compounding costs. Attempts to estimate the impact of regulation on productivity suggest that it is not a minor consideration, but it still leaves much of the productivity decline to be explained.

Changes in the Composition of the Work Force. Still another supply-side factor is the changing nature of the work force. Productivity tends to decline when the percentage of inexperienced workers in the labor force increases, because new entrants into the work force lack work experience and therefore are not as efficient as those who have been at it longer.

From the late 1960s on into the 1970s, the percentage of new entrants in the ranks of the employed increased for two different reasons. First, the postwar baby boom contributed significantly to the number of young people entering the work force. Second, women during this period started seeking and obtaining employment outside the home in record numbers. The combination of these two forces has made for a large increase in the percentage of new, inexperienced workers. According to many, this too has contributed to our declining productivity.

Other Causes. Other changes have been taking place in recent years which some think may have played a role in bringing down productivity. One such change is the enormous increase in oil prices. High energy prices could reduce productivity by inducing firms to invest in capital which is efficient from the standpoint of energy use but less attractive from the standpoint of labor productivity. Some economists question, however, whether this actually happens. It's worth noting also that other countries experi-

³Testimony by Murray Weidenbaum in Hearings of the Joint Economic Committee, April 11 and 13, 1978, p. 22.

enced even sharper rises in oil prices during the same period but did not register productivity declines as large as those in the U.S.

Another change sometimes offered as a reason for the productivity decline is the shift in the industrial mix. Overall productivity growth can decline if sectors of the economy which traditionally show high productivity growth become less important. Industries differ considerably in terms of their productivity growth and in terms of their weight in the overall economy (Figure 5). Hence substantial changes in the importance of the different industries over time could make substantial differences in the

overall measure of productivity. The shift of labor away from the farm and into manufacturing in earlier years, for example, produced sizeable productivity bonuses. More recently, however, the growing sectors of the economy have registered pretty much the same productivity performance as the declining ones. Thus on the whole the changing industrial mix, while of some importance in recent years, does not seem to compete as a major explanation of today's performance.

Edward Denison has estimated the impact of a number of these potential causes of the nation's productivity decline (Figure 6). These estimates indicate that the decline in produc-

FIGURE 5
PRODUCTIVITY GROWTH DIFFERS ACROSS INDUSTRIES, 1950-1977*

Industry	Percent	Percentage Change per Year		
	1977 Output Share	1950-1965	1965-1973	1973-1977
Agriculture	2.9%	4.9%	3.6%	3.0%
Mining	1.5	4.3	1.9	-6.1
Construction	4.3	3.4	-2.1	.3
Manufacturing:				
Nondurable	9.9	3.2	3.3	2.2
Durable	14.4	2.5	2.2	1.2
Transportation	3.9	3.0	2.9	1.0
Communication	3.2	5.3	4.6	6.7
Utilities	2.3	6.1	3.5	.2
Trade:				
Wholesale	7.3	2.6	3.4	-.8
Retail	10.0	2.3	2.1	.8
Finance, insurance and real estate	15.4	1.6	.2	2.3
Service	12.0	1.2	1.7	-.3
Government	12.5	.4	.5	.1

*Growth data relate to output per hour worked for all persons. Detail may not add up to 100 percent because of rounding.

SOURCES: Department of Commerce (Bureau of Economic Analysis) and Council of Economic Advisers.

FIGURE 6

SLOWER PRODUCTIVITY GROWTH MAY HAVE MANY CAUSES
 Growth Rate and Sources of Growth, 1948-1973 and 1973-1976

	1948-1973	1973-1976	Change
CONTRIBUTIONS TO GROWTH RATE IN PERCENTAGE POINTS			
TOTAL FACTOR INPUT:			
Changes in Workers' Hours and Attributes:			
Hours	-.24%	-.54%	-.30%
Age-sex composition	-.17	-.25	-.08
Education	.52	.88	.36
Changes in Capital and Land Per Person Employed:			
Inventories	.10	.02	-.08
Nonresidential structures and equipment	.29	.25	-.04
Land	-.04	-.03	.01
OUTPUT PER UNIT OF INPUT:*			
Improved Allocation of Resources †	.37	-.01	-.38
Changes in the Legal and Human Environment ‡	-.04	-.44	-.40
Economics of Sale	.41	.24	-.17
Irregular Factors	-.18	.09	.27
Advances in Knowledge and Miscellaneous Determinants §	1.41	-.75	-2.16
GROWTH RATE	2.43	-0.54	-2.97

*Contributions to the growth rate shown in subsequent lines are restricted to effects upon output per unit of input.

†Includes only gains resulting from the reallocation of labor out of farming and out of self-employment and unpaid family labor in small nonfarm enterprises.

‡Includes only the effects on output per unit of input of costs incurred to protect the physical environment and the safety and health of workers, and of costs of dishonesty and crime.

§Obtained as a residual.

SOURCE: Edward F. Denison, *Accounting for Slower Economic Growth: The United States in the 1970s* (Washington: The Brookings Institution, 1979).

tivity may have a large number of different causes. They suggest also that some of the most important of these causes are still unknown.

GAZING INTO THE FUTURE

Almost all of the possible explanations, however, are basically supply-side phe-

nomena. For the most part, they operate by changing the relative cost of labor saving innovations and capital investments rather than by altering final demand for the firm's products. This tells us something about what to look at in predicting future trends, but the array of different explanations does not make this an easy task. In assessing our

productivity future, it is useful to divide up those different explanations in terms of their dependence on policy. Fortunately, some of the productivity reducing conditions of recent years can be expected to go away by themselves, but many of the others will depend crucially on what is done in the policy arena.

Conditions that May Just Go Away. Of changes that in all likelihood will not be significant in future years there are at least two, and both come under the heading of demographics. The first concerns the overall growth in the labor force. Rapid labor force growth can set economic forces in motion which induce firms to shift away from the more capital-intensive means of production that enhance labor productivity. There is nothing wrong with this response. It is part of what an efficient economy should do in making use of its resources. But it is one explanation for the decline in labor productivity in recent years, and it is not expected to be important in the future. The reason is that the postwar baby boom, which contributed significantly to labor force growth in recent years, cannot be expected to do the same from here on out.

A related but distinct difficulty which also may be alleviated in the future concerns the percentage of inexperienced employees in the work force. Many writers have tended to place a great deal of emphasis on this as a contributor to productivity slippage. Fortunately, this condition too seems destined to go away eventually because of the substantial decline in the rate at which new workers are expected to enter the work force in future years.

Together, these two forces will help the economy regain some, but probably not all, of its earlier productivity performance. Whether or not the nation actually achieves a high level of productivity growth will depend on other forces which affect productivity gains, and they in turn will depend on what we collectively choose to do in the way

of policy.

Issues that Await the Policymaker. Clearly, one of the reasons for the slower growth in the amount of capital that each worker has to work with is the reduced rate at which new capital is being formed. In the past few years, an unfortunate combination of taxes and inflation has discouraged capital investment and innovation by making them more costly. If significantly more capital formation is desired, either tax rates will have to be reduced or inflation, which has exacerbated the tax problem, will have to be brought under control. Inflation may discourage investment decisions by introducing uncertainty as well as by raising the tax burden. What policymakers decide to do in these areas will have a great deal to do with the kind of capital formation that will be seen in the future.

The future impact of government regulation on productivity also will be decided in the policy arena. Here the issue is not whether government regulation has reduced measured productivity. It clearly has. But it may not be undesirable for all that. After all, better water, cleaner air, and fewer accidents are desirable outputs, even though they aren't measured in the productivity calculus. Regulation, however, is very expensive in terms of the material well-being that must be given up as a result. If regulation is not to become too burdensome, policymakers will have to pay particular attention to both the benefits and the often considerable costs of regulation.

Still another issue which awaits the policymaker is that of government-supported research and development, which has been reduced in recent years. Opinion varies about how important this reduction has been in the recent productivity decline. Undoubtedly it is not the main cause. Over the long haul, though, research and development clearly do affect productivity. They are an integral part of the innovation process, and the new technology that results stimulates investment in new plant and equipment. But how

much R&D is appropriate? Here too the benefits and costs must be weighed. R&D can be expensive, but the long-run benefits can be great.

These are supply-side issues. They cannot be addressed through aggregate demand management alone. On the contrary, they reflect more fundamental issues of costs and incentive structures. Choosing the appropriate policy to deal with them will make the difference between a sluggish slow-growth economy and a rapidly growing one that offers ever higher standards of living for its citizens.

CONCLUSION

The nation has been in the productivity

doldrums for several years now, and there's growing concern about the reasons for it. Increasingly, attention is being focused on some fundamental supply-side issues. Identifying these issues is crucial both to diagnosing the illness and taking policy actions to remedy it. As it turns out, the demographics will be an ally in future efforts to improve productivity. But many other likely causes of the nation's productivity growth anemia will not be countered without direct policy actions. The return of higher rates of growth in American living standards awaits the actions of policymakers in these areas.

READINGS ON PRODUCTIVITY

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