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## A Look at the World Productivity Puzzle

A comparative growth analysis of ten major industrial countries by NBER Research Associate **Michael Bruno** indicates that the productivity slowdown of the 1970s was caused by sharp increases (shocks) in energy and raw materials prices coupled with contractionary macroeconomic (that is, monetary and fiscal) policies in response to these shocks. In *NBER Working Paper No. 942,* **World Shocks, Macroeconomic Response, and the Productivity Puzzle,** Bruno finds that raw materials explain about 60 percent of the world productivity slowdown in manufacturing, and the resulting "demand squeeze" explains the remaining 40 percent.

Bruno's study focuses on the United States, United Kingdom, Belgium, France, Germany, Italy, the Netherlands, Sweden, Canada, and Japan. All of these countries experienced a slowdown in output and productivity during the 1970s; the slowdown was widespread both across sectors of production and among industrial countries. The dominant characteristic of this slowdown, unexplained by such typical factors as changes in R and D efforts or environmental regulations, is that it began in most countries around 1973; Bruno chooses that year as the turning point in his analysis.

He begins by comparing average productivity growth rates in the manufacturing sector of the ten countries from 1955–73 and from 1974–80. The mean decline between the periods was 2.2 percent, with a low in Germany of 0.9 percent and a high in Sweden and Japan of 3.3 percent. The mean slowdown in the aggregate business sector of these economies was 2.6 percent, with a low in Germany of 1.1 percent and a high in Japan of 4.7 percent.

In addition to absolute declines in growth rates, there were changes in the variability of average growth rates in the 1970s. In the manufacturing sector, except in Denmark and Japan, the variability of growth rates increased after 1973, even though output growth in total dropped substantially. The coefficient of variation, Bruno finds, grew on average by a factor of five. That is, the standard deviation relative to mean output growth in manufacturing, a measure of variability, went from 0.6 in 1955–73 to 3.4 in 1974–80.

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While changes were taking place on the supply side of the industrial countries' economies, significant shifts in demand were also occurring. There was a deterioration in these countries' terms-of-trade that, in turn, reduced both real income and consumption. Further, higher input prices created a profit squeeze that resulted in reduced investment demand. Fears of escalating inflation and current account deficits led to a deflationary bias in these countries' management of demand. Moreover, the combination of depressed demand and greater variability of output hampered the necessary reallocation of factors of production in response to shocks in raw materials and energy prices. According to Bruno, "A large part of the 1970s slowdown in output

and productivity growth can be ascribed to the combined effect of these demand-side factors."

A final section of Bruno's paper provides an overview of the pre- and post-slowdown periods. While there may have been some deceleration in productivity growth by the end of the 1960s, he writes, the dominant role in the slowdown was played by the commodity price shocks of the early 1970s. Until then, real prices of energy and raw materials were falling. The turning point was in 1971–72: prices rose, culminating in the great shock of 1973–74. By the end of 1981, earlier low price levels, even for raw materials, had not been recovered.

This price shock affected (material) input-intensive sectors directly; more than half of the manufacturing slowdown can be ascribed to this direct effect. In other sectors, such as services, a dominant role was played by the demand side: the terms-of-trade deterioration, the investment squeeze, and the contractionary fiscal (and monetary) measures that kept economic activity growing more slowly than it had prior to 1973.

In the middle-income developing countries, by contrast, output and productivity continued to grow with more expansionary policies after 1973 but at the cost of large current account deficits and higher persistent inflation. "This provides further evidence," Bruno concludes, "that productivity growth is closely linked to macro[economic] response."

# Stock Price Reactions to Money-Supply Changes

A new NBER study by **Douglas K. Pearce** and **V. Vance Roley** has found that stock prices react negatively to unexpected increases in the weekly money-supply figures. The study shows that stock prices usually fall when M-1 is higher than anticipated and rise when M-1 is lower than expected. In **The Reaction of Stock Prices to Unanticipated Changes in Money,** NBER Working Paper No. 958, Pearce and Roley also find some evidence that the stock market became more sensitive to large money-supply surprises after the Fed changed its operating procedures in October 1979.

The relationship between stock prices and the money supply has long been noted by economists. Early research suggested that movements in the money supply could be used to forecast the stock market. However, that finding contradicted the efficient market hypothesis, which holds that stock prices immediately reflect all public information. Later studies showed, in fact, that publicly available

money-supply data cannot be used to construct a profitable trading rule. To beat the market, an investor would need to know the money-supply figures before they were announced.

Unlike earlier studies, Pearce and Roley's work focuses on the reaction of the stock market to the unanticipated component of money-supply changes. It strongly suggests that only the unanticipated component affects stocks and provides further confirmation of the efficient market theory. That is, the effect of a money-supply change is fully reflected in opening prices on the Monday morning after the Fed announces its money-supply figures. (The figures are published after the market closes on Friday.)

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A number of factors could explain an inverse relationship between money-supply growth and stock prices. When money increases faster than anticipated, investors raise their inflation expectations. That, in turn, could depress stock prices for several reasons. Inflation tends to reduce real, aftertax profits because of the nonindexation of inventory gains and depreciation allowances. Higher inflation might also reduce stock prices by raising the expected return on competing assets such as owner-occupied housing.

Alternatively, the response of stock prices could reflect investors' expectations about how the Fed will react to money surprises. Market participants might expect the Fed to act quickly to offset a surge in money growth, thereby driving short-term interest rates higher and making stocks less attractive. With lagged reserve requirements, short-term rates could move up even without Fed action if market participants raise their assessment of the demand for excess reserves in the current statement week.

In their study Pearce and Roley focus on stock market reactions to the weekly announcements of the money supply from September 29, 1977, through January 1, 1982. The money-supply measure they use is transaction balances, defined as M-1, M-1B, or "new" M-1 at various times. Their measure of the expected change in money is the median forecast of about sixty market watchers surveyed weekly by Money Market Services Inc. Pearce and Roley use the Dow Jones industrial average as a proxy for the stock market as a whole.

Using a simple model, they find that an unanticipated increase in M-1 of $1 billion causes a 0.7-point drop in the Dow. When Pearce and Roley modify the model to take account of the fact that weekly announcements include revisions of the prior week's

M-1 level, the results are still consistent with market efficiency and show that the stock market also reacts to the revisions.

Next, the two researchers modify their initial assumptions about the relationship between money surprises and stock prices. They then find that the effect on stock prices declines as the size of a money surprise increases. That is, the effect of a $3 billion surprise is less than three times the effect of a $1 billion surprise.

Pearce and Roley then examine three special aspects of the money–stock market relationship. First, they look at the responses of stock prices before and after the October 1979 change in Fed operating procedures. It appears that the stock market became comparatively less sensitive to small money surprises and more sensitive to large ones after that date. Second, they test whether the effect of money surprises on stock prices is complete within one trading day. The results support the view that virtually all of the response is reflected in the first opening prices after the money-supply announcement. Finally, Pearce and Roley test whether stock prices move in anticipation of money-supply announcements. In other words, is the market's final anticipation of M-1 levels just before the announcement any better than the forecasters' opinions, which are collected three days earlier? It appears that M-1 changes that are unanticipated on Tuesday are still unanticipated on Friday.                                    AE

# Pension Theory and Evidence

In *NBER Working Paper No. 902,* **Private Pensions and Public Pensions: Theory and Fact,** Research Associate **Alan S.Blinder** uses economic theory and empirical evidence to address a number of difficult questions about pensions. For example, he asks, why do private pensions exist?

The answer, he explains, is that there are tax advantages for the individuals covered, and pensions help employers to reduce labor turnover. In effect, the worker can defer paying taxes on a portion of his total compensation until the pension fund money is withdrawn at retirement. When the tax is finally paid, the worker will not owe any payroll tax (Social Security tax) and it is likely that he will be in a lower tax bracket than during his major earning years. The tax advantages can be "quite impressive," notes Blinder. For instance, $1 saved in a pension fund at 8 percent will, after 40 years, be worth 3.89 times more than the $1 saved but subject to taxes, if the individual is in a

40 percent tax bracket; it will be worth 2.05 times more if the person is in a 20 percent tax bracket.

Moreover, firms have strong incentives to discourage labor turnover, especially among experienced workers. It is expensive to recruit and hire replacements and difficult to judge the ability of the replacement in advance. Also, the firm may have invested a considerable sum in teaching an employee specific skills or knowledge. So the firm provides a financial incentive for the employee to remain by structuring a pension plan in such a way that the worker loses his pension rights if he leaves before a certain vesting time. (The vesting period is now set by law at five or ten years.)

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Why have pension plans grown so much in recent decades? Because, says Blinder, the tax advantages have become highly significant since World War II with the rise in income tax levels. The income tax was negligible prior to that war. In addition, the rise in nominal interest rates has added to the tax advantages. When a person saves outside of a tax-deferred pension plan, he pays tax on the interest earnings even though a portion of those earnings is the result of higher inflation. Finally, the greater stability of the postwar economy, with its milder recessions, has reduced the chance that a pension plan will go bankrupt because of the failure of the sponsoring company.

Why do private pension plans have the features that they do? If the plan is considered as a long-term labor contract in an uncertain world, it is easier to understand certain common features. For example, the pension plan may be designed to encourage retirement prior to age 65 in order to get workers with lower skills off the job. Alternatively, it may require workers to retire at age 65 (although the compulsory retirement age has been set by law at a minimum of 70 for most jobs), also to remove less productive workers.

How can private pensions "affect" other economic decisions? Workers and firms are different in their desires for pension plans. Some workers may want to set aside more money for their old age than others. Some companies may be reluctant to set aside as much money into a pension fund, because of cash needs, as others. In addition, it takes real resources to set up a pension plan. There are both administrative and transaction costs, and pension funds must be of substantial size to take advantage of portfolio

diversification and economies of scale in purchasing annuities.

Further, a pension plan is only one of many attributes of a job, and it may not be the most important to employees, Blinder notes. Workers are concerned about wages, fringe benefits, the nature of the tasks to be performed, flexibility of hours, geographical location, and many other factors.

All of these elements mean that individual workers have difficulty choosing the pension scheme that is most suitable for them. Nonetheless, Blinder does offer some evidence of workers altering their saving or job choices as a result of pensions.

What are the effects of pensions on savings and retirement? Blinder finds that the theory does not indicate decisively that pensions encourage early retirement. Evidence shows that a worker with a pension (but no mandatory retirement clause) is very slightly less likely to be retired at age 58–60, slightly more likely to be retired at age 62–64, and much more likely to be retired at age 65–67.

He finds little evidence that either public or private pensions significantly displace private, nonpension savings. It may be, he suggests, that people save not only to provide income at retirement, but also as insurance against unforeseen health problems or other contingencies, and to make bequests to relatives, friends, or charities.

Social Security wealth, notes Blinder, is quite large for the typical individual. For a white man aged 60–65 in 1971, it amounted to 7 percent of lifetime earnings. By comparison, private pension wealth amounted to only about 1¼ percent of lifetime earnings.

What effects have recent public policy interventions had in private pension systems? The pension funding requirements of the Employee Retirement Income Security Act (ERISA) can be seen as a type of consumer protection legislation. Prior to the legislation, a number of firms had either gone bankrupt, leaving insufficient assets to pay off their unfunded pension liabilities, or had otherwise reneged on the pension obligations. Firms that adequately fund their pension schemes, notes Blinder, therefore will find the law costless. As for the ban on long vesting periods and mandatory retirement at age 65 (the latter imposed by the Age Discrimination in Employment Act of 1977), Blinder says that this may impede the ability of workers and firms to formulate optimal labor contracts.

Why does the United States have a mandatory Social Security system? First, states Blinder, because the unfunded system transfers income to the generations severely damaged financially by the Great Depression. They have paid into the system far less than they will take out. Second, because the system redistributes income from the well paid to the more poorly paid within each age cohort. These lower-income people tend to have higher mortality rates, which may lessen this redistribution. Third, because the system provides a safe vehicle for retirement savings, one guaranteed by the government that is indexed against inflation and removes some of the risk of outliving one's income. And fourth, because Congress decided that people were not saving enough for their own retirement.          DF