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ECONOMIC COMMENTARY

Federal Reserve Bank of Cleveland

Inflation and Growth: Working More vs. Working Better

by Michael F. Bryan

Alice looked round her in great surprise. "Why, I do believe we've been under this tree the whole time! Everything's just as it was!"

"Of course it is," said the Queen. "What would you have it?"

"Well, in ***our*** *country," said Alice, still panting a little, "you'd generally get to somewhere else—if you ran very fast for a long time as we've been doing."*

"A slow sort of country!" said the Queen. "Now, ***here,*** *you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"*

from *Through the Looking-Glass,* Lewis Carroll.

Economic growth springs from two sources: either we work more or we improve our productivity. It is important to distinguish between the two origins of growth because they have different implications for public welfare. Economic growth that stems from productivity is unquestionably beneficial; it creates both wealth and leisure time. Growth derived from effort creates wealth at the expense of leisure time, the welfare implications of which are uncertain.

This *Economic Commentary* examines trends in the sources of growth and argues that inflation alters the long-term composition of growth in a detrimental way. Inflationary periods are shown to correspond with periods of relatively lower productivity growth and greater work effort.

The record of recent economic expansions shows that work effort has supplanted productivity as a source of growth. Inflation may be one of the prominent causes of this trend, because it promotes errors in resource allocation and discourages capital development, eventually leading to loss of wealth in the economy. Instead of producing a faster rate of economic growth, then, higher rates of inflation reduce economic welfare by causing us to work harder rather than better.

■ Taking a Look Around

Growth in the current economic expansion, at an inflation-adjusted or *real* rate of just under 4 percent per year, has been comparable to the 4.4 percent average of the previous five expansions since 1955 (figure 1).[1] But by how much has the current expansion benefited the typical U.S. worker? Regrettably, the record here has been below par. Real income per worker, for instance, has grown relatively slowly during the current expansion (0.7 percent annually vs. 1.7 percent for the previous five expansions). Likewise, the growth rate of real hourly compensation in this expansion has been about 1 percent less per year than the average of other expansions of the past 35 years. Indeed, in terms of the growth rate of real GNP, expansions since 1955 have been remarkably similar, deviating from the average rate by no more than 1 percent per year and showing no clear trend. However, the record of recent expansions clearly shows a *decreasing* propensity to generate real gains per worker, or per hour of work.

In a competitive environment, workers' income is commensurate with their contribution to the economy. Simply put, workers take from the economy a sum equal to the value of their output; over time, their hourly earnings should reflect their hourly output, or productivity. It follows, then, that the downward trend in the growth of real hourly earnings stems from a decline in the growth of productivity, a pattern that is strongly supported by the data (figure 2). Similarly, the failure of compensation to keep pace with total output suggests that recent expansions have been associated with slower productivity growth and a rise in the growth of total hours worked, or "work effort."

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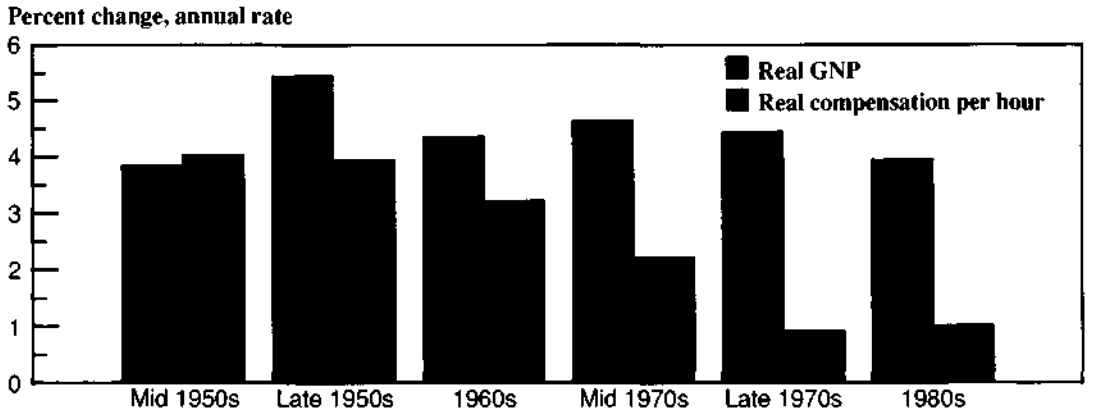
FIGURE 1 EXPANSION COMPARISONS



SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis, and U.S. Department of Labor, Bureau of Labor Statistics.

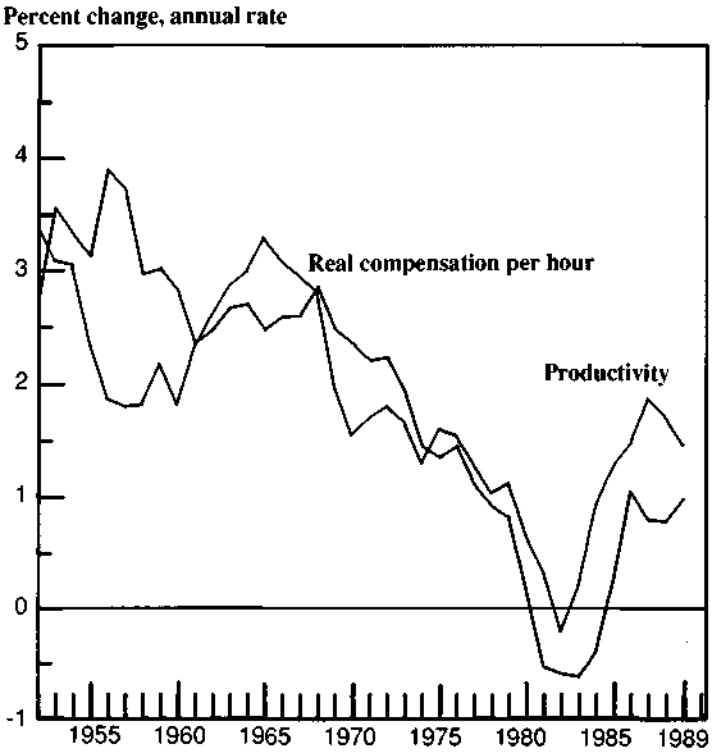
Examination of the relative contributions of work effort and productivity to the trend growth rate of real private output, shown in figure 3, reveals that a striking shift has occurred in the origin of growth.[2] In the early 1960s, nearly all of the trend growth in the economy came from improved productivity. During the 20 years that followed, the role of productivity diminished and work effort became an increasingly important source of growth; by the late 1970s, virtually all of the private growth trend was the result of greater work effort.

■ You'd Generally Get to Somewhere Else

The trend decline in productivity growth is one of the more puzzling and, admittedly, more controversial issues in the analysis of recent business cycles. But there seems to be sufficient evidence to claim that inflation may be one of its more prominent causes.[3] To understand how inflation affects productivity, we need to appreciate the damage that inflation inflicts on an economy.

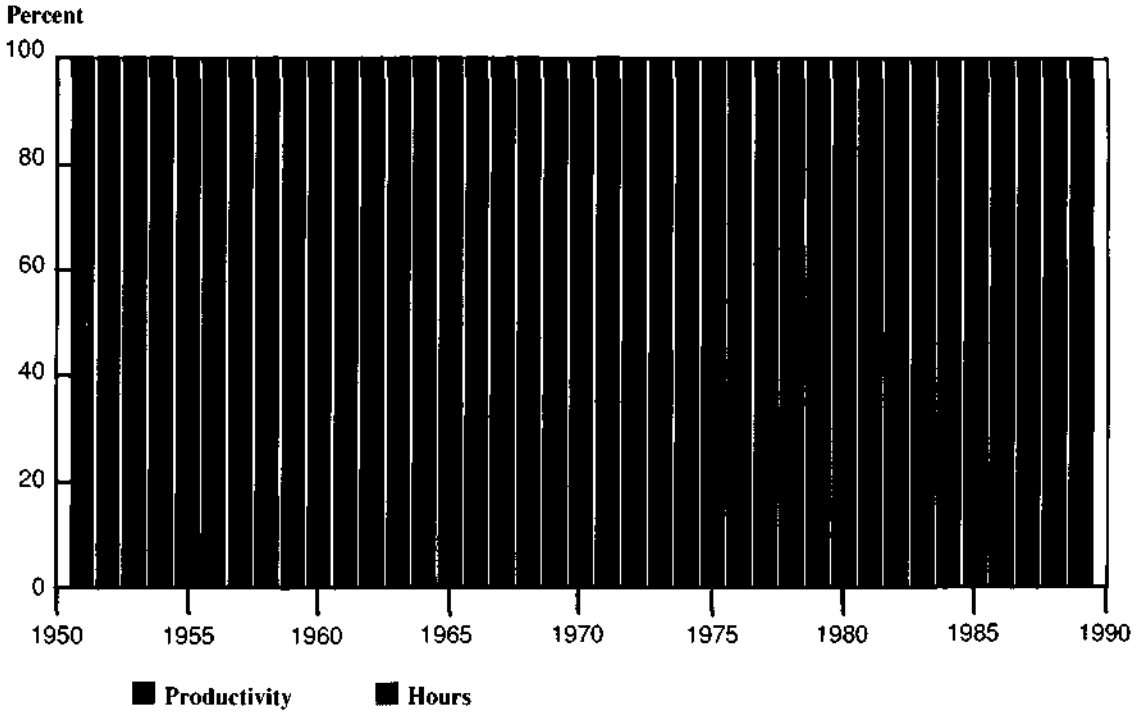
Prices are the mechanism by which markets allocate an economy's resources. Specifically, price increases guide additional resources to markets, while price decreases direct resources away from markets. These market signals, or relative price movements, are the primary channel through which market information is transmitted and are therefore

FIGURE 2 REAL COMPENSATION AND PRODUCTIVITY TRENDS IN NONFARM BUSINESS



NOTE: Data are trends in real compensation per hour and productivity in nonfarm business. Trends are calculated over a five-year period, corresponding roughly to the length of the average postwar business cycle.
SOURCE: U.S. Department of Labor, Bureau of Labor Statistics.

FIGURE 3 EFFICIENCY VS. EFFORT
Shares of Trend Growth, 1951-1989



NOTE: Data are for nonfarm business. Trends are calculated over a five-year period to correspond roughly to the average length of the business cycle. Shares were constrained to a minimum of 0 percent and a maximum of 100 percent.
SOURCE: U.S. Department of Labor, Bureau of Labor Statistics.

vitally important to the operation of markets. Inflation, however, has nothing to do with the transmission of market information, but is instead a general reduction in the purchasing power of money.

If unanticipated, inflation can be misinterpreted as a relative price signal, making the transmission of market information less accurate and leading to errors in the allocation of resources. Inefficiency is compounded as time and other resources are redirected into the wasteful enterprise of filtering inflationary noise from prices. Even if anticipated, inflation may impede productivity growth as households and firms are forced into various protective maneuvers.[4]

There may also be a link between inflation and productivity growth through the tax code. A recent study indicates that fully anticipated inflation reduces the after-tax rate of return on human and physical capital in a substantial way and thus discourages capital development.[5]

These linkages between inflation and productivity suggest that inflation reduces an economy's potential output by reducing its accumulation of resources—its wealth. One possible implication is that the inflation-induced reduction in wealth may be compensated for by an increase in work effort. In this way, we might think of the growth implications from inflation in the same light as we do a natural disaster. When Hurricane Hugo swept through the Southeast last fall, it caused losses of billions of dollars in property damage and in lost work time. According to many estimates, though, the hurricane actually had a small net positive impact on real GNP growth. How does a natural disaster produce growth?

One response is that the economy is called upon to repair buildings and other damaged structures. But this answer isn't particularly appealing, because it assumes surplus resources are ready and waiting for a disaster to call them into service (not to mention the frightful policy implications). A more sensible explanation is that the substantial wealth loss caused by the catastrophe prompts people to work harder than they otherwise would. That is, households are motivated to sacrifice some of their leisure in order to rebuild. It follows, then, that as inflation lowers the trend in productivity growth, it diminishes the nation's wealth potential, part of which will be compensated for by an increase in work effort.[6]

■ It Takes All the Running You Can Do

The rate of inflation and the growth rates of output, productivity, and hours for the expansionary years between 1951 and 1989 are shown in figures 4a to 4c. Over this period, no statistically

FIGURES 4A TO 4C INFLATION AND GROWTH RATES OF OUTPUT, PRODUCTIVITY, AND HOURS

FIGURE 4A
Output

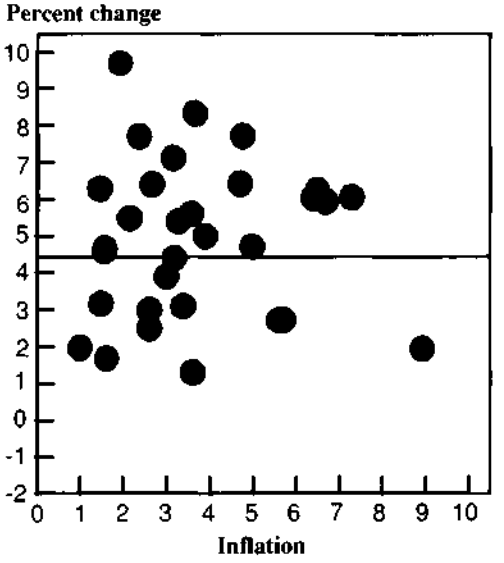


FIGURE 4B
Productivity

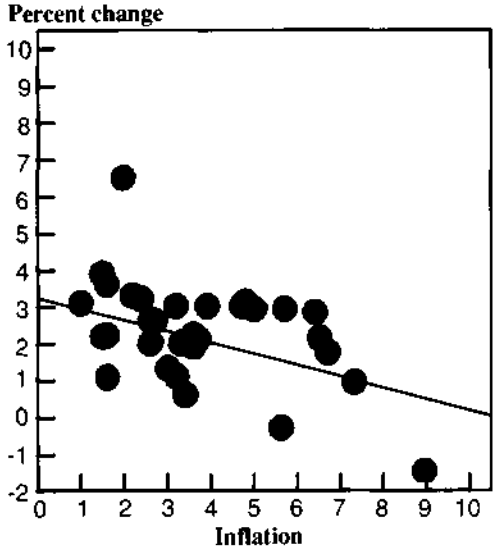
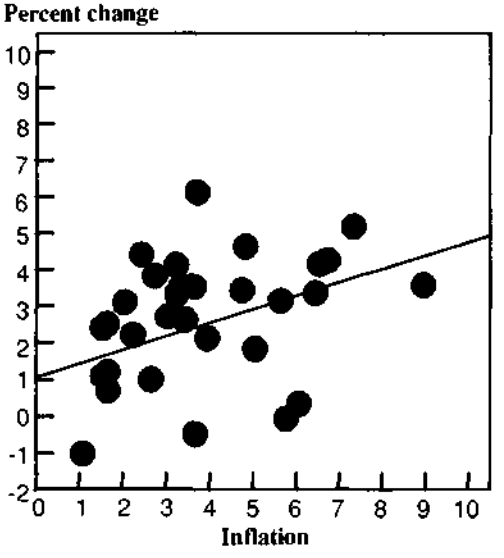


FIGURE 4C
Hours



NOTE: Data are for expansion years only, 1951 to 1989. Inflation is measured by the change in the GNP implicit price deflator. Output, productivity, and hours are measured for nonfarm business. Solid line represents tendency implied by an ordinary least squares regression.

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis, and U.S. Department of Labor, Bureau of Labor Statistics.

significant relationship between inflation and output can be detected, a result that seems broadly consistent with previous research on the impact of inflation on trend real GNP growth. Yet a significant, negative correlation can be found between inflation and productivity growth. Specifically, for every 1 percentage point of inflation, productivity growth in expansions has tended to decline by 0.3 percent. Further, the inflation-induced drop in productivity growth seems to have been offset by an equal rise in work effort.

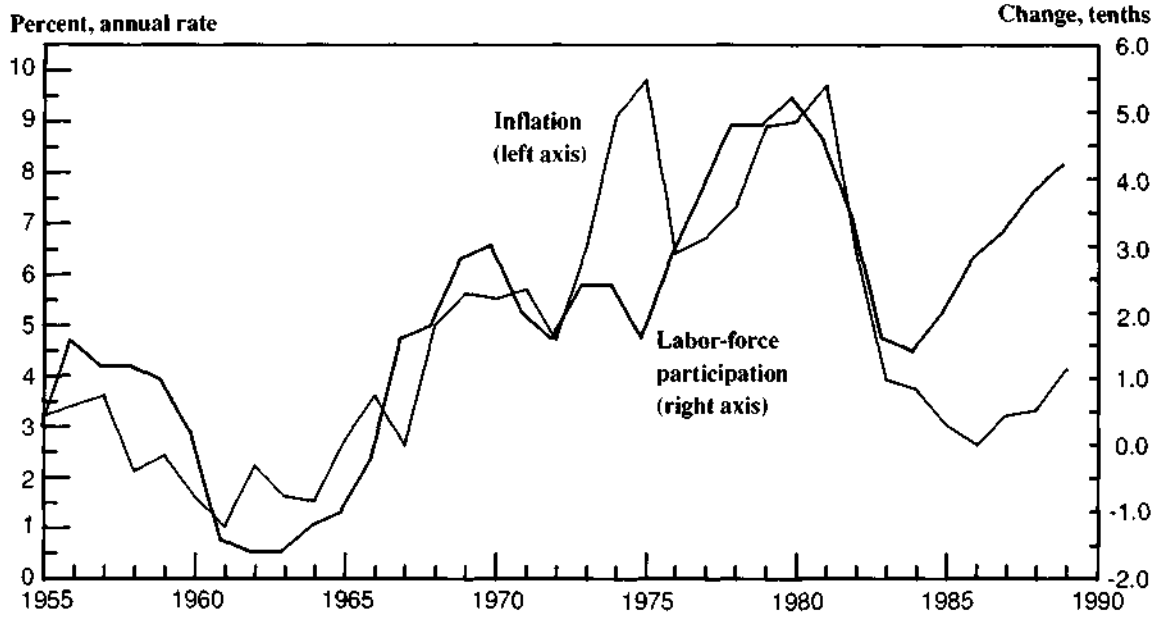
If we separate work effort into four components—the length of the workweek, the rate of labor-force participation, the size of the working-age population, and the level of surplus unemployment—we can identify more clearly the source of the additional effort.[7] While the association is somewhat crude, there has been a strong tendency for the rate of labor-force participation to rise and fall with the rate of inflation (figure 5). Linkages between the rate of inflation and the other sources of work effort were unsubstantiated by the data.[8]

■ Correlation, Causality, and Other Caveats

The patterns outlined in the previous section show correlation between inflation and the origins of growth, but in all fairness, there has been no demonstration of causality. Thus, we must ask whether the increase in effort or the slowdown in productivity growth could be "causing" inflation. One way to address these issues is through a simple supply-and-demand framework. An increase in aggregate spending could explain rising hours, lower productivity, and higher prices if resource markets respond sluggishly to changes in aggregate conditions. But if aggregate spending is driving hours growth and reducing the marginal productivity of labor, the growth rate of output would tend to rise with the rate of inflation. No such relationship was found.

Alternatively, it could be that the decline in productivity resulting from other factors might cause a rise in infla-

FIGURE 5 INFLATION AND TREND LABOR-FORCE PARTICIPATION



NOTE: Inflation is measured by the implicit price deflator (annual changes). The trend in the labor-force participation rate is for civilian workers. Trend changes are calculated over a five-year period.

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis, and U.S. Department of Labor, Bureau of Labor Statistics.

tion. Certainly a drop in the rate of productivity growth would put upward pressure on the price level if aggregate supply fails to keep pace with aggregate demand. However, a study of the Canadian economy indicated that a 1 percent increase in inflation produced a 0.3 percent *net* decline in the rate of productivity growth from 1963 to 1979, the same magnitude as the results presented here.[9] Similar conclusions were later drawn on U.S. data.[10]

Another issue is whether inflation per se or inflation *uncertainty* underlies the growth shift from efficiency to effort. While this is a critical issue for policymakers, it is less important for the relationships being examined here, because both types of inflation phenomena can explain the observed trends in labor markets. Note, though, that many of the theoretical linkages between inflation and productivity growth hold even when inflation is fully anticipated. This conclusion is supported by the evidence on the Canadian economy, where more than 80 percent of the inflation-induced decline in productivity growth was attributed to inflation that was probably anticipated.[11]

Finally, it must be admitted that the connections between inflation and the growth rates of productivity and work effort depicted earlier show considerable variation around trend.[12] Other factors are obviously influencing these variables. One noteworthy consideration is that the impact of aggregate price movements on work effort most likely depends on the perceived permanence of the price movements. If the rate of price increase is believed to be transitory, its impact on trend productivity should be marginal and have little effect on the work effort of households. However, if the price rise is thought to be a permanent feature of the economy, such as in the case of a monetary inflation, its influence on wealth and work effort should be considerably greater.

■ If You Want to Get to Somewhere Else

The pace of the longest peacetime expansion in U.S. history has slowed recently. According to preliminary estimates, real GNP grew at a sluggish 1.2 percent annual rate in the second quarter, and several prominent economists see a continued flatness in the economy over the next several quarters. The slowdown in business activity has brought forth calls for the Federal Reserve to promote stronger growth by easing the monetary reins; reducing interest rates to stimulate spending. This prescription reflects a traditionally accepted short-run exchange of more growth today at the risk of higher inflation tomorrow. Correct or not, the implications of inflation on future economic growth should also be considered.

Experience has shown that there are no quick fixes in the promotion of growth. There is no evidence that a faster trend rate of economic growth can be bought with a higher rate of inflation. Indeed, it seems likely that inflation reduces the welfare implied by growth by altering the origin of growth from productivity to effort. Viewed in this light, a monetary policy designed to eliminate inflation may also be a policy that best encourages productivity and so best promotes welfare-enhancing growth.

■ Footnotes

1. This excludes the disputable two-quarter mini-expansion of 1982.

2. Work effort is defined as total hours worked in nonfarm business, and productivity is defined as output per hour in nonfarm business.

3. For a discussion of the linkages between inflation and efficiency, see A. Leijonhufvud, "Costs and Consequences of Inflation," in G.C. Harcourt, ed., *The Microeconomic Foundations of Macroeconomics*, proceedings of a conference held by the International Economic Association at S'Agaro, Spain, Boulder, Colo.: Westview Press, 1977, pp. 265-98. The impact of inflation on productivity is discussed at length in Michael J. Boskin, Mark Gertler, and Charles Taylor, "The Impact of Inflation on U.S. Productivity and International Competitiveness," NPA Report #182, Washington, D.C.: National Planning Association Committee on Changing International Realities, September 1980. For a partial listing of articles linking inflation to productivity, see J. Peter Jarrett and Jack G. Selody, "The Productivity-Inflation Nexus in Canada, 1963-1979," *Review of Economics and Statistics*, vol. 64 (August 1982), pp. 361-67.

4. Some examples of protective maneuvers include the redistribution of assets from debt to equity, increased costs of cash management, greater business inventory investment, and increased contracting costs.

5. See David Altig and Charles T. Carlstrom, "Inflation and the Personal Tax Code: Assessing Indexation," *Working Paper* 9006, Federal Reserve Bank of Cleveland, July 1990. This result is similar to that discussed in Boskin et al., "The Impact of Inflation on U.S. Productivity," p. 29, and in Martin Feldstein, Jerry Green, and Eytan Sheshinski, "Inflation and Taxes in a Growing Economy with Debt and Equity Finance," *Journal of Political Economy*, vol. 86 (April 1978), pp. 553-70.

6. It has been suggested by a colleague that inflation also reduces the rate of return on physical capital *relative* to human capital, and so causes a substitution between productivity and effort in production.

7. Surplus unemployment is defined as the residual between the growth rate of total hours and the growth of the workweek, the working-age population, and the participation rate.

8. This effect was also documented by Browne, who found that the labor-force participation rate of women is positively correlated to the rate of inflation. See Lynne E. Browne, "Why Do New Englanders Work So Much?" *New England Economic Review*, Federal Reserve Bank of Boston, March/April 1990, pp. 33-46. New entrants into the labor force in recent years have predominantly been adult women. There are many possible explanations for the rise of women in the labor force, such as important legislative changes and higher education levels, to name but a few. These "causes" need not be competing views to the inflation hypothesis presented here. This hypothesis would seek only to include inflation as one important catalyst to these other explanations.

9. See Jarrett and Selody, "The Productivity-Inflation Nexus in Canada."

10. See Rati Ram, "Causal Ordering Across Inflation and Productivity Growth in the Postwar United States," *Review of Economics and Statistics*, vol. 66 (August 1984), pp. 472-77; and A. Aydin Cecen, "X-Inefficiency, Productivity, and Inflation: An Empirical Investigation," *Atlantic Economic Journal*, vol. 17 (March 1989), pp. 43-46.

11. See footnote 9.

12. This is borne out by the statistical evidence. Changes in the inflation rate are associated with only about 19 percent of the variation in hours growth and 24 percent of the variation in productivity growth.

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