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Is Noninflationary Growth an Oxymoron?

by David Altig, Terry Fitzgerald, and Peter Rupert

Just before the Federal Open Market Committee's (FOMC) May 20 meeting, popular opinion about the near-term future of U.S. monetary policy was summarized by John O. Wilson, chief economist at BankAmerica Corp.:

> *Mr. Wilson views the economy as continuing to expand too fast for the Fed's comfort and anticipates that a series of central bank moves will be needed to bring the economy back onto what economists call the sustainable non-inflationary growth path.*[1]

The FOMC did not choose to alter the average level of the federal funds rate at its May meeting. A typical interpretation of this decision appeared in the May 21 *Los Angeles Times:*

> *The decision by the ... Federal Open Market Committee was designed to provide time for analysts to determine whether the economy is slowing down on its own ... or will require additional reining in.*[2]

These observations underlie one of the most widely held and persistent beliefs about the "theory" of inflation; that is, inflationary pressures will inevitably result from high levels of economic activity, defined as real GDP growth that exceeds some "natural," or normal, rate. The obvious consequence of such a belief—duly expressed in the quotations above—is that if the Fed desires to contain inflation, it must also contain economic growth.

This is indeed a predicament for a central bank that by its own pronouncements desires to conduct monetary policy to maximize the well-being of the average citizen. There is, of course, a distinction between a policy aimed at stabilizing output growth near its long-term trend and one designed to "fight growth" more generally. But the distinction is a subtle one, and the casual observer might be forgiven for not understanding why the goal of long-term economic growth appears to require periodic policy actions that seem aimed at slowing growth.

This confusion is unnecessary and unproductive, because much of the popular commentary about monetary policy, inflation, and the pace of real economic activity is based on a none-too-accurate portrayal of economic theory and evidence. Economic growth is not the enemy of low inflation, and expanding employment and income do not, in and of themselves, threaten the Federal Reserve's legitimate role in protecting the purchasing power of money.

The contrary perception is, at least in part, due to a failure to communicate (for which those of us in the business of central banking are not blameless). In particular, the long-established and widely held theory of money, prices, and income does not suggest an obvious linkage between high levels of economic activity and high rates of inflation (or, more specifically, between accelerating inflation and growth in excess of "potential").[3] Just the opposite, in fact: Higher GDP growth should put *downward,* not upward, pressure on prices.

This *Economic Commentary* reviews the theoretical and empirical case for disinflationary economic growth. The basic story line is as follows: Rising prices follow from nominal money supply growth in "excess" of its demand.[4] More rapid GDP growth, however, implies an increase in the growth of money demand.

One question on the minds of policymakers and economic analysts alike is, "When will the bill come due for the robust economic growth the United States has been enjoying?" That is, when will inflation begin to pick up? But a better question might be, "Just because inflation and above-trend growth have coincided in the past, does that mean that they must do so in the future?" Contrary to popular wisdom, it *is* quite possible to have a booming economy without an acceleration in the price level.

Thus, everything else being equal, an uptick in GDP growth should lead to disinflation, not rising inflation.

The tricky step between theory and reality, of course, is that all else is rarely equal. Inflation and above-trend growth have tended to coincide in the past. But it is important to recognize that this can arise because growth is sometimes associated with other changes that exert upward pressure on prices, not because growth per se is inflationary. This message has been lost as the correlation between "excessive" output growth and changes in the inflation rate has become enshrined in the "Phillips curve" (discussed below). However, the stability of this relationship and the statistical regularities that underlie it are as much apparent as real. Appreciating this goes a long way toward explaining why the U.S. economy can safely buck the conventional wisdom and experience substantial noninflationary economic growth.

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Some Simple Theory[5]

At the most basic level, the average price level—let's call it P—is the total units of money required to purchase one unit of a hypothetical, representative real good or service. Holding the growth rate of money fixed, a positive productivity shock that raises production in the economy increases the private sector's desire to hold monetary assets. This requires the purchasing power of money in terms of goods and services to rise (that is, disinflation results) in order to maintain equality between demand and supply. Conversely, when there is an increase in the supply of money that does not directly affect money demand, the purchasing power of money will fall (that is, inflation occurs).

This is the essence of the theory of inflation: When the (nominal) money supply grows faster than the demand for (real) money balances, P grows, which is to say inflation occurs.[6] Thus, given the growth rate of money (which is ultimately controlled by the central bank), the rate of inflation is dependent on the growth rate of money demand.[7]

What, then, determines money demand? According to accepted economic theory, part of the answer is income, which for practical purposes can be measured by real GDP. Because income is related to spending, and money is held precisely because of its usefulness in facilitating transactions, higher income (GDP) translates into higher money demand (all else equal).

Thus, the simple theory of money, growth, and inflation yields the following syllogism:

1. The price level rises less rapidly (inflation falls) when the demand for money rises more rapidly than its supply.

2. Money demand rises when GDP rises, all else equal.

3. Thus, holding the growth rate of money fixed, inflation falls when GDP rises.

Inflation that persists when output is growing at its long-run average rate is thus attributable to monetary growth in excess of its demand, which, as an empirical matter, also increases at about the long-run average rate of GDP growth. Temporary accelerations of output growth beyond the normal rate will therefore cause inflation to deviate from its trend. However, holding all else constant, prices in this circumstance should grow *more slowly* than normal, not *more quickly,* as is often asserted.

Is Everyone Crazy?

If theory speaks so clearly on the relationship between growth and inflation, why do so many people think that rapidly rising GDP is inflationary? Part of the answer can be found by expanding on the simple theory developed thus far. In addition to income, the theory on the determination of money demand identifies a second key variable: "the" nominal interest rate.

The nominal interest rate determines the opportunity cost of holding monetary assets. The higher the interest rate, the greater is the loss from holding wealth in the form of money instead of alternative, higher-yielding nonmonetary assets.[8] Thus, an increase in market interest rates will tend to reduce the demand for money which, all else equal, will put upward pressure on prices.

There is one more piece to the puzzle. If, at a time of expanding output, the demand for goods and services grows even faster—as might happen if businesses and consumers expect times to be even better in the future—interest rates will rise. Holding monetary policy (money growth) constant, inflation will tend to increase (at least in the short run) if the negative impact on money demand from rising interest rates dominates the positive influence of more rapid GDP growth. Rising prices in this event are not the result of growth per se, but rather of demand-driven interest rate pressures that are correlated with expanding economic activity, which in turn reduces the demand for money relative to its supply.[9]

Two related and important lessons are suggested by this discussion. First, the "fact" that a high level of economic activity causes inflation is not a fact at all. To the extent that price pressures and accelerations of short-run growth are positively correlated, this relationship results from the tendency for goods and services demand and market interest rates to accelerate along with output, and for money demand to decline as a consequence.

Second, the "inevitability" of inflationary pressures when GDP growth rises substantially above trend is critically dependent on the stability of these historical correlations. In other words, the prediction that growth "causes" inflation

FIGURE 1 ACTUAL AND PREDICTED INFLATION

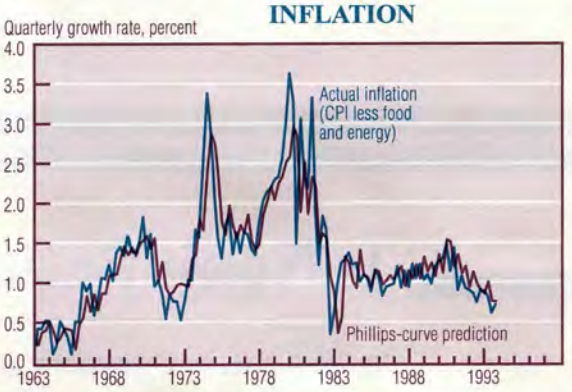
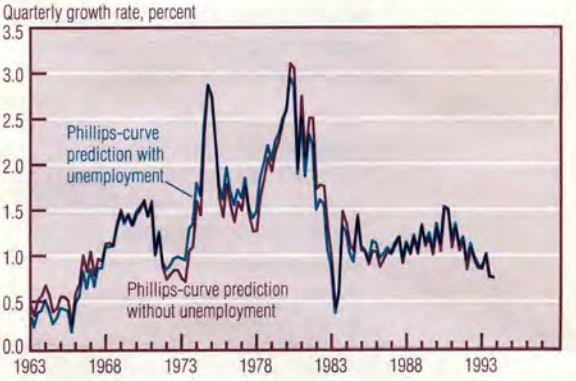


FIGURE 2 PREDICTED INFLATION WITH AND WITHOUT UNEMPLOYMENT



SOURCES: U.S. Department of Labor, Bureau of Labor Statistics; and authors' calculations.

can rest securely only on the presumption that the impulse for growth in the final demand for goods and services will always outpace that for supply in periods of rapidly expanding GDP.

This scenario, however, suggests a different perspective than the one offered by the conventional wisdom. Although it may be appropriate to "tighten" monetary policy in periods of high demand, this need not be construed as an attempt to rein in output growth. An equally plausible interpretation is that the intent of such a policy is to slow money growth to match the realities of the changing demand for monetary assets.

The Phillips Curve: A Reliable Rule of Thumb?

"So what?" might be a reasonable response to the discussion above. As long as there is a stable and predictable relationship between changes in the inflation rate and GDP growth in excess of its long-run average, theoretical niceties are

just that: Nice stories that, although intellectually interesting, have little practical importance for the appropriate conduct of monetary policy. As long as above-normal growth ultimately yields higher inflation, the policy implication—restrain money growth—is the same whether you surround the observation with a simple story or a complicated one. And, the argument goes, the case that "above-normal" GDP growth is inevitably associated with inflationary pressures is strongly supported by two well-known empirical propositions known as Okun's law and the Phillips curve.

Okun's law, named after the late economist Arthur Okun, is a rule-of-thumb relationship between output and unemployment. In its simple form, it is no more than a statement about the negative correlation between output growth and changes in the unemployment rate.[10] From Okun's law, one might divine the relationship between inflation and output growth via the so-called Phillips curve. The Phillips curve is yet another statistical rule of thumb that posits a negative relationship between changes in inflation and changes in the unemployment rate. Because output rises as the unemployment rate falls (from Okun's law), the Phillips-curve relationship suggests a predictable (positive) connection between changes in GDP growth and changes in price-level growth.

Although the high-inflation, high-unemployment experience of the 1970s had caused older representations of the Phillips curve to fall into some disrepute, the incorporation of inflation expectations and subsequent statistical refinements have resulted in its resurrection as a widely used tool for thinking about policy. It is common now to hear the Phillips-curve and Okun's-law relationships referred to as among the most reliable in macroeconomics. Because they form the foundation for arguing that overly robust GDP growth creates inflationary pressures, it is clear that this opinion is widely held.

We argue that the implicit message of modern versions of the Phillips curve—"too rapid growth causes accelerating inflation"—deserves further scrutiny. Figure 1 compares actual quarterly inflation rates from 1963 to the present with rates predicted by one variant of the Phillips curve (based on Jeff Fuhrer's "The Phillips Curve Is Alive and Well," which appeared in the March/April 1995 edition of the Federal Reserve Bank of Boston's *New England Economic Review*). This particular model was chosen because it represents a particularly careful, thoughtful, and presumably successful variant of the Phillips curve.

As figure 1 shows, the model appears to conform quite well to the actual inflationary experience of the U.S. economy over the past 30 years. The fact that it was estimated for this entire period is one of its particularly important features, because the most common criticism of the Phillips curve is its reputed instability as a forecasting tool. However, another important feature of the model is little appreciated: The success of this version of the Phillips curve appears, at least in recent years, to result in large part from the inclusion of very long lags of the inflation rate. Figure 2 shows inflation predictions with and without unemployment included in the specification. Over the 1963–93 period, unemployment rate changes—which through Okun's law relate inflation to output growth—do add to the model's predictive power. Since the late 1980s, however, the predictive value of changes in the unemployment rate is virtually zero. (Estimates are calculated through 1993:IVQ, reflecting the last available observation of the unemployment series before the survey redesign.)

Is It Time to Rethink the Conventional Wisdom?

In light of our earlier discussion, it is not particularly surprising that a rule of thumb relating changes in GDP growth relative to some notion of potential (sometimes called an "output gap") and changes in the inflation rate might, at least periodically, fail to capture the dynamics of price-level growth. The statistical relationship between output gaps and accelerating inflation is several steps removed from the direct determinant of price-level pressures, which is the relationship between the growth rates of money demand and supply. The notion that growth causes inflation—even growth in excess of normal levels—never was complete because it critically omits the "money part" of the story, and accepted theories of money demand and price-level determination clearly predict that rising GDP should cause the inflation rate to fall rather than rise.

This is not to say that the popular view of growth and inflation is utterly without foundation. However, the case for a positive connection between expanding GDP and inflationary pressures was always contingent on the presumption that demand pressures inevitably arise as a normal characteristic of the rapid expansion phases of a business cycle. The operationalization of this presumption has traditionally come from reportedly reliable and stable relationships between changes in inflation and measures of real activity. But the reliability and stability of these relationships are sufficiently suspect to draw into question their usefulness in thinking about policy today.

The recent economic environment of rapid growth and nonaccelerating inflation has left many people puzzled. But such a scenario is clearly possible from a theoretical standpoint: If accelerating inflation and presumed output gaps went together in the past, that is certainly no guarantee they must do so now or in the future. Furthermore, the simple statistical framework underlying the conclusion that an acceleration of price-level growth must follow from an acceleration of output growth "beyond capacity" is not as compelling as is often assumed.

It is an opportune time to reevaluate the language of monetary policy discussions. As with the inflationary episode in the 1970s, conventional rules of thumb have been hard-pressed to account for recent events. Perhaps the information revolution brought on by rapid advances in computer technology has broken down many of the traditional macroeconomic regularities that have informed our thinking about economic policy, resulting in an absence of money demand pressures that once may have accompanied output growth above levels considered normal. (Perhaps the answer is as simple as a significant change in the "normal" rate of GDP expansion.)

In any event, it is incumbent upon economists and policymakers alike to strive to communicate a deeper understanding of how various shocks to our economy affect output, unemployment, and inflation. Rules of thumb that equate rapid output growth with accelerating inflation do more than create bad advertising for monetary policies aimed at pursuing price stability. They enshrine as theory statistical connections that are, at best, indirectly connected to the ultimate determinant of price-level growth, which is to say the demand and supply of money. As such, they retard a more informed public discussion of monetary policy and make the job of the policymaker that much more difficult.

Footnotes

1. Gordon Matthews, "Brace Yourself: 10 Out of 10 Economists Expect Fed Hike," *American Banker,* May 19, 1997.

2. Art Pine, "Wary Fed Decides against Interest Rate Hike for Now," *Los Angeles Times,* May 21, 1997.

3. "Potential" GDP growth is typically taken to be synonymous with "long-run average" GDP growth. Economists often refer to this as the "steady-state" rate.

4. In equilibrium, supply equals demand. More specifically, we are describing a condition in which prices rise precisely because money would be in excess supply if they didn't.

5. More detailed accounts of the simple, and thoroughly standard, theory discussed in this section can be found in almost any introductory economics textbook. See, for example, Alan Stockman, *Introduction to Economics,* Fort Worth: Dryden Press, 1996, chapter 27.

6. A simple example clarifies the distinction between nominal and real variables. Suppose that the money supply consists solely of dollar bills. The nominal supply of money would then just be the number of dollar bills in circulation. The real money supply would be the nominal stock expressed in terms of "purchasing power": How many units of goods and services can be purchased with the stock of money? For example, suppose that the stock of money, M, is $5 million, and the price level, P, is 2. Because the price level is the number of units of money required to purchase one unit of output, the real stock of money (in units of output) is $5/2 = 2.5$.

7. This statement—which implicitly invokes the economist's standard "all-else-equal" clause—is not meant to minimize the difficulties inherent in controlling the money supply.

8. To be a bit more precise, opportunity cost is typically measured as the difference between the return on short-term Treasury securities and a measure of the return on a particular monetary aggregate, such as M2. For a recent discussion of the operational relationship between money and opportunity cost, see John B. Carlson and Benjamin D. Keen, "M2 Growth in 1995: A Return to Normalcy?" Federal Reserve Bank of Cleveland, *Economic Commentary,* December 1995.

9. There is another possible source for rising interest rates: rising expectations of inflation. The role of inflation expectations can significantly complicate the simple theory presented here and make things difficult indeed for monetary policymakers.

10. For a more complete discussion of Okun's law, see David Altig, Terry Fitzgerald, and Peter Rupert, "Okun's Law Revisited: Should We Worry about Low Unemployment?" Federal Reserve Bank of Cleveland, *Economic Commentary,* May 15, 1997.

David Altig is a vice president and economist, and Terry Fitzgerald and Peter Rupert are economists, at the Federal Reserve Bank of Cleveland.

Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
Cleveland, OH 44101

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