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# Is There an Output–Inflation Trade-Off?

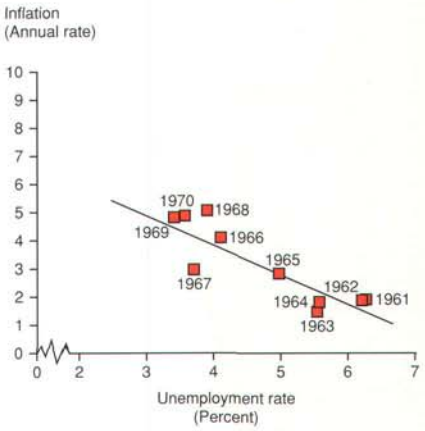
*"During the 1960s, many economists believed that policymakers could choose any point along the Phillips curve and hold the economy there indefinitely."*

Critics of recent monetary policy have suggested that the Federal Reserve ought to run the economy a little hotter, meaning that the Fed should risk higher inflation down the road in exchange for greater output and lower unemployment today. Is there a connection between inflation and the level of output? Is an attempt to buy the economy more output by risking inflation a good bet? Not according to our analysis of the historical relationship between output and inflation. We compare the output gains from a more stimulatory monetary policy with its inflationary costs and show that the costs of permanently higher inflation substantially outweigh any potential short-term benefits.

## The Output–Inflation Relationship: 1961–70

The negative relationship between unemployment and inflation shown in Chart 1 is called the Phillips curve, after New Zealand economist Alban W. Phillips, who showed that a similar curve could be fit to almost 100 years of British data. During the 1960s, many economists believed that policymakers could choose any point along the Phillips curve and hold the economy there indefinitely. In the opinion of two of the more illustrious advocates of this view,

**Chart 1**
The Unemployment–Inflation Relationship, 1961–70




the Phillips curve presented policymakers with a menu of policy choices.[1] By accepting higher inflation, according to this view, it was possible to obtain a permanently lower rate of unemployment. Conversely, lower inflation could only be attained at the cost of higher unemployment.

Because of shifts in the composition of the labor force and changes in minimum-wage legislation and unemployment insurance benefits, 5-percent unemployment has substantially different

INSIDE

Help Wanted: A Look At America's Changing Job Market

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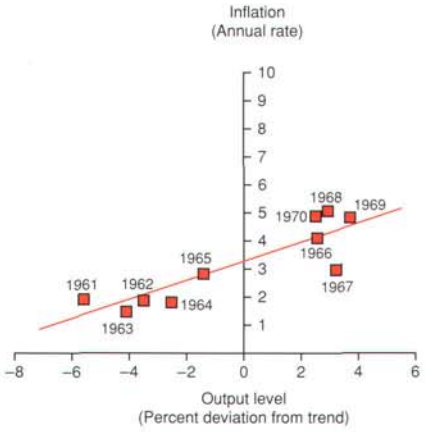
*"If the Fed unexpectedly increases the rate of growth of the money stock, the economy will initially experience an increase in the level of output, accompanied by a relatively small rise in inflation.... As wages and prices catch up to the money supply, the stimulus to output fades away. The higher inflation continues."*

**Chart 2**
The Output–Inflation Relationship, 1961–70




economic implications today than it did during the 1960s. To facilitate comparisons across time periods, we focus on a slightly different version of the Phillips curve. Each point in Chart 2 represents a combination of output and inflation rather than unemployment and inflation. Output is measured relative to a long-term growth trend that takes into account the demographic and other changes that complicate interpretation of the traditional Phillips curve. Note that the *negative* unemployment–inflation relationship of the traditional Phillips curve translates into a *positive* output–inflation relationship in Chart 2. This difference simply reflects the fact that when output is high, unemployment tends to be low, and vice versa. Chart 2 shows that in 1961, for example, the level of output was about 5.5 percent below trend, and prices rose just under 2 percent. By 1970, output was 2.5 percent *above* trend, and inflation was running at just under a 5-percent annual rate.

Looking at this chart, it's easy to understand why many people thought that an increase in the inflation rate would permanently increase the level of output.

## The Phillips Curve Breaks Down

During the 1970s, however, inflation rose past 5 percent to rates above 9 percent, yet output did not expand by nearly the expected amount. The output–inflation experience of the late 1970s and early 1980s effectively destroyed economists' belief in a stable Phillips curve.

If we fit a line through the output–inflation combinations observed during the late 1970s and early 1980s, as in Chart 3, we can see that the Phillips curve of this period was about 4 percentage points higher than the Phillips curve of the 1960s. Thus, a level of output equal to trend, which had been associated with 3-percent inflation, was now associated with 7-percent inflation.

What explains the shift in the Phillips curve? It's useful to think of stimulatory monetary policy as a drug for which the economy can build up a tolerance, so that larger and larger doses are required to achieve a given effect. If the Fed unexpectedly increases the rate of growth of the money stock, the economy will initially experience an increase in the level of output, accompanied by a relatively small rise in inflation.

Such was the U.S. experience during the 1960s. If rapid money growth continues, however, the economy begins to adapt to it. The inflation rate catches up with the faster rate of growth of the money stock. Workers find that they have increased bargaining leverage and

**Chart 3**
The Effect of Inflation Expectations on the Phillips Curve

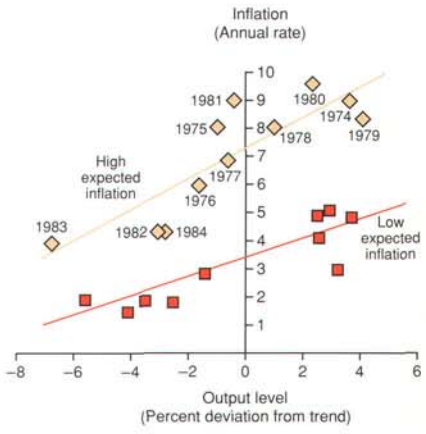





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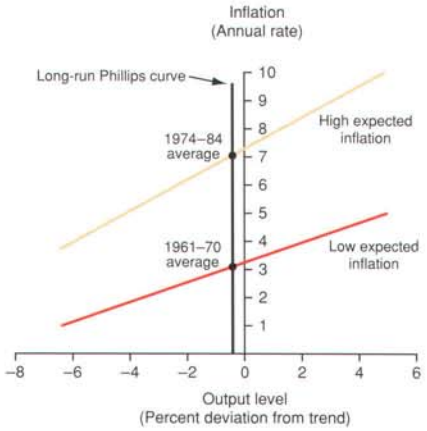
**Chart 4**
The Long-Run Phillips Curve




are successful in raising wages. They come to expect that rapid wage increases will continue. Similarly, firms find that they can pass on higher costs to their customers and expect continued rapid price increases. As wages and prices catch up to the money supply, the stimulus to output fades away. The higher inflation continues.

Milton Friedman emphasized this point in a 1967 address to the American Economic Association, in which he correctly predicted—many years before the event—the breakdown of the Phillips curve:

> [T]he monetary authority controls nominal quantities—directly [only] the quantity of its own liabilities. In principle, it can use this control to peg a nominal quantity—an exchange rate, the price level, the nominal level of national income, the quantity of money by one or another definition. …It cannot use its control over nominal quantities to peg a real quantity….[2]

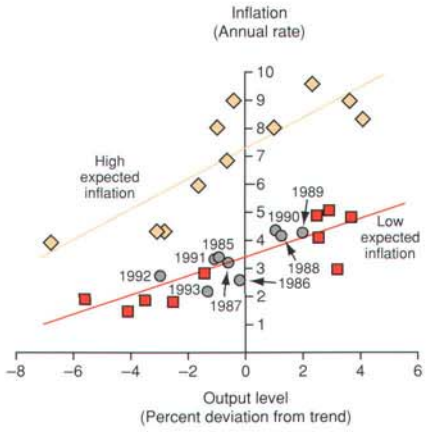
In other words, the Fed's control of the money stock gives it no more than an ephemeral influence on real variables such as the level of output or unemployment.

The hard truth is that there is no lasting output–inflation trade-off in the U.S. economy. Chart 4 shows that, despite an average annual inflation rate of 7 percent, output in the late 1970s and early 1980s was on average no higher relative to trend than it was during the 1960s, when inflation averaged 3 percent a year. Graphically, the Phillips curve is vertical in the long run: over any extended period of time, output is no greater with a high inflation rate than with a low inflation rate. In fact, a case can be made that when properly measured, output may in fact be lower when inflation is high.

## Recent Output–Inflation Experience

The problem with easy money is that the economy will not just adapt to rapid money growth and inflation but actually come to depend on it—just as the human body can become dependent on a narcotic. To reduce inflation may then require a painful process of withdrawal, during which output is temporarily depressed. In the early 1980s, the U.S. economy went through just such a withdrawal process. Judging by the output–inflation realizations displayed in Chart 5, that process succeeded in lowering inflation expectations back to 1960s levels. Still, expectations remain at levels nearly twice those consistent with price stability. That is, if we define price stability as inflation in the zero- to 2-percent range, recent output–

**Chart 5**
Recent Output–Inflation:
A Return to the Pattern of the 1960s




*"To reduce inflation may then require a painful process of withdrawal, during which output is temporarily depressed."*

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inflation performance lies on a Phillips curve consistent with expected inflation nearly twice this rate.

If the Fed followed its critics' advice, it would now abandon the pursuit of price stability. Far from trying to overcome the addiction to easy money, the Fed would seek yet another easy-money high. Would a little more inflation really be so bad? Inflation distorts the economy in many ways; here we consider only the most fundamental of these distortions.[3]

At the most basic level, inflation is a tax on the use of money. If inflation is running at, say, 5 percent a year, $100 today will be worth only $95 in a year's time. Inflation erodes the purchasing power of money in much the same way as the purchasing power of an individual's income is eroded by having to pay income taxes or sales taxes.

Just as individuals try to come up with ways to avoid paying, or at least minimizing their liability for, regular taxes, so, too, will they try to find ways of minimizing the inflation tax they pay. The more rapidly prices increase, the less people hold money. Each dollar changes hands more frequently. In economists' jargon, the velocity of money rises.

This increased attention to financial management consumes real resources. In any one year, the cost is small—on the order of 0.1 percent of gross domestic product (GDP) for each percentage point of inflation. But the cost is incurred year after year after year and grows over time in proportion to the volume of transactions.

Unfortunately, the costs of inflation are not captured fully in the national income accounts, which are the data statisticians compile each year and use to calculate GDP. To the contrary, some of the spending on financial services that is caused by inflation but contributes nothing to people's well-being is counted as real output in the GDP statistics. In much the same way, the additional military spending that accompanied the cold war boosted real GDP, although the threat of nuclear annihilation was hardly welfare-enhancing.

If the benefits of inflation exceeded the costs, Argentina would be an economic powerhouse. Formal analysis confirms the verdict of common sense. Estimates of the total amount of output to be gained from a permanent 1-percentage-point increase in U.S. inflation range from 2.5 percent to 5 percent of GDP.[4] The gains are short-lived, dissipating entirely within a few years.

In contrast, the cash-management costs that accompany higher inflation are small in any single year but grow along with the economy and continue indefinitely. Estimates that take the recurrent nature of these costs into account place their size between 6.5 percent and 10 percent of GDP.[5] Thus, the costs of higher inflation are roughly twice the benefits. The governors of the Federal Reserve System were given 14-year terms precisely so that they would be farsighted in their policy deliberations and not ignore the costs that inflation imposes on society in future years.

## Conclusion

In short, although higher inflation may be associated with increased output in the short run, there is no lasting output–inflation trade-off. Furthermore, inflation distorts the composition of output, encouraging excessive spending on cash management. The welfare cost of this distortion is small in any single year. Over time, however, the cumulative costs of inflation far outweigh its short-term benefits. If inflation also lowers the economy's growth rate, as some suspect, this would tilt the results of the cost–benefit calculus even more against inflation.[6]

The lesson to be learned from the breakdown of the Phillips curve is that monetary policy cannot have more than a fleeting effect on real variables, such as output and employment. Therefore, the proper focus of the Federal Reserve is not on these variables but, rather, on the variables over which it *does* exert lasting influence—*nominal* variables such as prices and spending.

—Evan F. Koenig
Mark A. Wynne

[1] Paul A. Samuelson and Robert M. Solow, "Analytical Aspects of Anti-Inflation Policy," *American Economic Review: Papers and Proceedings* 50 (May 1960): 177–94.

[2] Milton Friedman, "The Role of Monetary Policy," *American Economic Review* 58 (March 1968): 1–17.

[3] For a comprehensive discussion of the costs of inflation, see Stanley Fischer and Franco Modigliani, "Toward an Understanding of the Real Effects and Costs of Inflation," in Stanley Fischer, ed., *Indexing, Inflation and Economic Policy* (Cambridge, Mass.: MIT Press), 7–33.

[4] These figures are based on calculations in Dean Croushore, "What Are the Costs of Disinflation?" Federal Reserve Bank of Philadelphia *Business Review*, May/June 1992, 3–16; Laurence Ball, "How Costly Is Disinflation? The Historical Evidence," Federal Reserve Bank of Philadelphia *Business Review*, November/December 1993, 17–28; and Charles Carlstrom and William Gavin, "Zero Inflation: Transition Costs and Shoe Leather Benefits," *Contemporary Policy Issues* 11 (January 1993): 9–17.

[5] These figures are based on estimates presented in Charles Carlstrom and William Gavin, "Zero Inflation: Transition Costs and Shoe Leather Benefits," *Contemporary Policy Issues* 11 (January 1993): 9–17, and Robert E. Lucas, "On the Welfare Cost of Inflation," mimeo, February 1994.

[6] Some of the evidence on the relationship between inflation and economic growth is reviewed in Glenn D. Rudebusch and David W. Wilcox, "Productivity and Inflation: Evidence and Interpretation," mimeo, Board of Governors of the Federal Reserve System, May 1994, and Mark A. Wynne, "Price Stability and Economic Growth," *Southwest Economy*, May/June 1993.



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