



Inflation's Economic Cost: How Large? How Certain?

BY RICHARD G. ANDERSON

Among central bankers, the maintenance of low and stable inflation is widely regarded as a sign of overall good economic management. Economists today agree that economic growth, in and of itself, does not cause inflation—so long as the central bank adopts appropriate policy in a timely way to limit inflation.

Former Federal Reserve Chairman William McChesney Martin quipped that it was his job to remove the punch bowl before the party got out of hand—but, of course, not to prevent the party in the first place. But, what are the costs of failing to do so? That is, how strong is the evidence that inflation more rapid than price stability significantly reduces economic growth?

For policymakers, the measure of their success is price stability, often defined as an inflation rate that is sufficiently low, stable and predictable so as not to be a factor in private decisions. Policymakers usually equate low inflation to annual increases of 1 to 2 percent in a broad index of consumer prices, excluding food and energy, a rate that the current Fed chairman, Ben Bernanke, once dubbed the “optimal long-run inflation rate.” Such a rate, in part, acknowledges imperfections in adjustments to the prices of existing goods for quality improvements and to the prices of new goods not previously included in the price index. The rate also reflects, in part, a cushion against the risk that an adverse economic shock might corner policymakers against the zero lower bound on nominal interest rates.

The idea that price stability is a necessary condition for maximum sustained economic growth is a common theme among Federal Reserve officials. At the 2005 Federal Reserve Bank of Kansas City policy conference honoring his service and retirement, then-Chairman Alan Greenspan said, “I presume maximum sustainable economic growth will continue to be our goal, with price stability pursued as a necessary condition to promote that goal.” Bernanke has expressed similar views. At an October 2004 Federal Reserve Bank of

St. Louis conference, Bernanke, then a Federal Reserve governor, said, “The low-inflation era of the past two decades has seen not only significant improvements in economic growth and productivity but also a marked reduction in economic volatility, both in the United States and abroad.” He went on to say, “There is evidence for the view that improved control of inflation has contributed in important measure to this welcome change in the economy.”

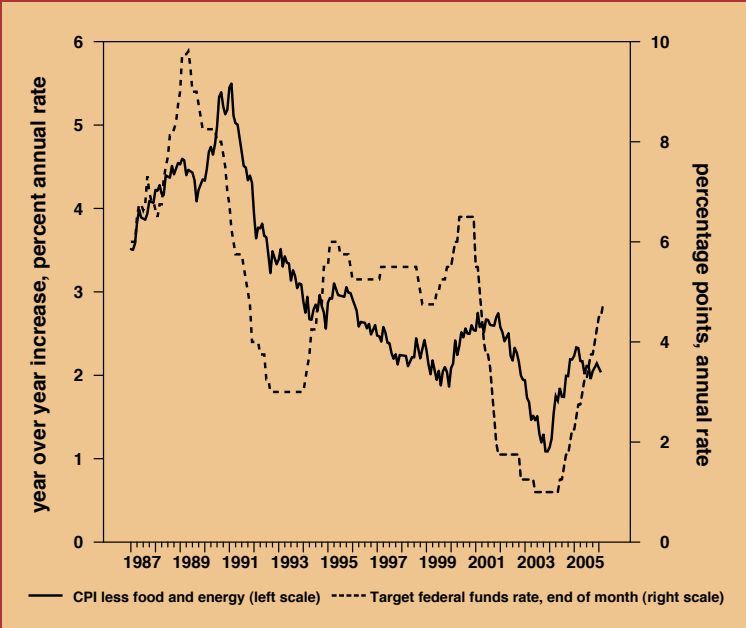
How Might Sustained Inflation Reduce Output Growth?

There are a number of mechanisms through which sustained inflation at a rate

inflation are fragile because they depend on the specifications of individual models.² Inflation, he argues as an example, confuses households and firms as they seek to disentangle changes in relative prices from movements in the overall price level and to distinguish temporary from permanent price changes—but models seldom include such costs. Two additional channels through which inflation is costly are the tax system and uncertainty regarding future interest rates. Former Federal Reserve Bank of St. Louis President Thomas Melzer aptly summarized the problem: “Higher inflation ... interacts with our nominally based tax system, especially with taxes on capital, to create large distortions. And higher

Fig. 1 The FOMC’s Target Federal Funds Rate and Core Inflation

Because it wishes to head off inflation before it takes hold, the Federal Open Market Committee (FOMC) tends to tighten monetary policy by increasing short-term interest rates during economic expansions even before incoming data suggest an increased rate of inflation. Through May of this year, the FOMC had increased its target level for the federal funds rate at 16 consecutive meetings. The figure at right compares the FOMC’s target level for the federal funds rate and the core inflation rate (measured as the year-over-year increase in the consumer price index [CPI] less food and energy) since 1987, the first year of Alan Greenspan’s tenure as chairman of the Federal Reserve. Both have trended downward, with changes in the FOMC’s federal funds target tending to precede changes in inflation. Further, the size of changes in the rate target (right scale) are much larger than changes in the inflation rate (left scale), a result of the FOMC’s seeking to temper inflationary pressures in advance of actual changes in inflation.



higher than Bernanke’s optimal long-run inflation rate can hamper economic growth. One is the *monetary cost of inflation*, which arises because inflation, by eroding the purchasing power of money, causes households and firms to incur additional costs to manage their money balances. Many authors have argued that such costs are small. Michael Dotsey and Peter Ireland, however, construct an example where the combined impact of a number of costs, each individually small, is large.¹ Other analysts have argued that inflation’s costs appear small only because traditional models are not rich enough to capture many of the costs of inflation. Otmar Issing, a member of the executive board of the European Central Bank and a former officer at the German central bank (the Bundesbank), has argued that economists’ estimates of the costs of sustained

inflation causes people and businesses to waste resources in trying to economize on their money holdings. A good deal of research suggests that these costs are substantial. To make matters worse, the risk of higher inflation creates uncertainty, which also exacts costs, including an inflation risk premium in interest rates.” A number of empirical studies have sought to measure the interactions between inflation and the nominal nature of the U.S. tax system. Most find the costs are large. Authors James Bullard and Steven Russell, for example, suggest approximately a 1 percent output loss for each 1 percent increase in inflation above price stability.³ Martin Feldstein has examined how interactions between inflation and the tax system discourage saving while increasing housing demand.⁴

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BEFORE ANALYZING INFLATION, UNDERSTAND MONETARY THEORY

The starting point for evaluating the long-run costs and benefits of sustained low inflation is the quantity theory of money. The essence of the quantity theory is the concept of the long-run *neutrality* of money. This concept says that the behavior of households and firms depends entirely on the values of real, not nominal, variables. That is, it depends on variables from which the effects of inflation have been removed. If households and firms behave in this way, then their demands for all goods, services and assets (physical and monetary) must be functions only of real variables, including real income, real prices and real rates of return—all after removing the illusory effects of inflation.

Certainly, in the short-term, it can be difficult to separate real from nominal changes. A 3 percent increase in a person's hourly wage might be perceived as a real increase when anticipated inflation is 1 percent. But if actual inflation ends up being 3 percent or more, the person's real wage will not have increased at all. Modern economic analysis rests heavily, however, on the assertion that, in the long run, households' and firms' decisions are not tricked by inflation.

The long-run neutrality of money plays a very important role in the analysis of inflation. For simplicity, assume that there is no change over time in the amount of money that people wish to hold to make transactions (that is, to receive income from others and to purchase goods and services from others). If long-run neutrality holds, then the economy's long-run sustained inflation rate will be equal to the long-run growth rate of the money supply. In this case, the economy's long-run inflation rate will increase and decrease one-to-one with the growth rate of the supply of money.

It seems, therefore, that, according to the long-run neutrality of money, monetary policy is pretty straightforward: Pick a desired inflation rate and set the appropriate level of money growth to achieve it. Neutrality, alas, has proved of little use as a guide for the conduct of monetary policy because the quantity of money that the public desires to hold varies through time in ways that are difficult to capture in economic models. That is, the demand for money is simply too variable to permit the use of money as an operating policy variable. Today, few if any central banks seek to control inflation by forecasting and targeting the growth of money. But, for longer-term analyses of inflation and its costs, concepts of the quantity theory and the neutrality of money remain important.

A second important aspect of the quantity theory is the idea of the *superneutrality* of money and inflation. If long-run real output growth would be the same under two different sustained inflation rates, then the economy is said to display superneutrality. Superneutrality requires that short- and long-term real interest rates (that is, nominal interest rates minus expected inflation) be invariant to changes in the rate of inflation. Although stringent, this requirement seems consistent with U.S. economic data; a common estimate is that an increase in the inflation rate from zero to 5 percent would perhaps reduce U.S. real rates of interest by four-hundredths of one percentage point, a trivial amount.

The third important concept is the natural-rate hypothesis (NRH). The NRH argues that there is no path for the growth rate of inflation—even if it were to increase indefinitely and approach infinity—that can permanently keep output (or employment) above the “natural” values determined by the economy's human and physical resources.

Although sometimes confused, the concepts of neutrality, superneutrality and the NRH are separate and distinct aspects of the way inflation and money growth affect an economy.¹⁰ In the short run, the independence of the *level* of real GDP from the quantity of money is the concept of the neutrality of money. In terms of the long-run trend growth of the real economy, the independence of growth and the rate of inflation (and the growth rate of money) is the concept of superneutrality. The inability of inflation at any rate to sustain real output above some fundamental level is the NRH, often also referred to as the concept of a vertical long-run Phillips curve.

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Our tax system imposes taxes on nominal earnings net of nominal deductions, rather than on real earnings net of real deductions. Similarly, nominal interest payments are tax deductible by businesses and taxable income by investors without adjustment for the effects of inflation. In these and other aspects, our tax system violates the quantity theory's requirements necessary for real output to be unaffected by the rate of inflation, that is, for money to be neutral. (See sidebar on the neutrality of money.)

Feldstein calculates that a one-time reduction in the inflation rate from 2 percentage points above price stability to price stability would cause the level of gross domestic product (GDP) to increase by approximately 1 percent. He concludes that the present value of the costs over time from the interaction of inflation and the nominal tax system equals approximately 30 percent of current-period GDP.

Darrel Cohen, Kevin Hassett and R. Glenn Hubbard have examined the interaction of inflation and taxes by examining the effect of inflation on businesses' cost of capital.⁵ They argue that inflation, even at very low levels, can significantly increase the cost of capital. A decrease in expected future inflation will reduce expected future user costs for capital and stimulate investment spending. Surprisingly, their

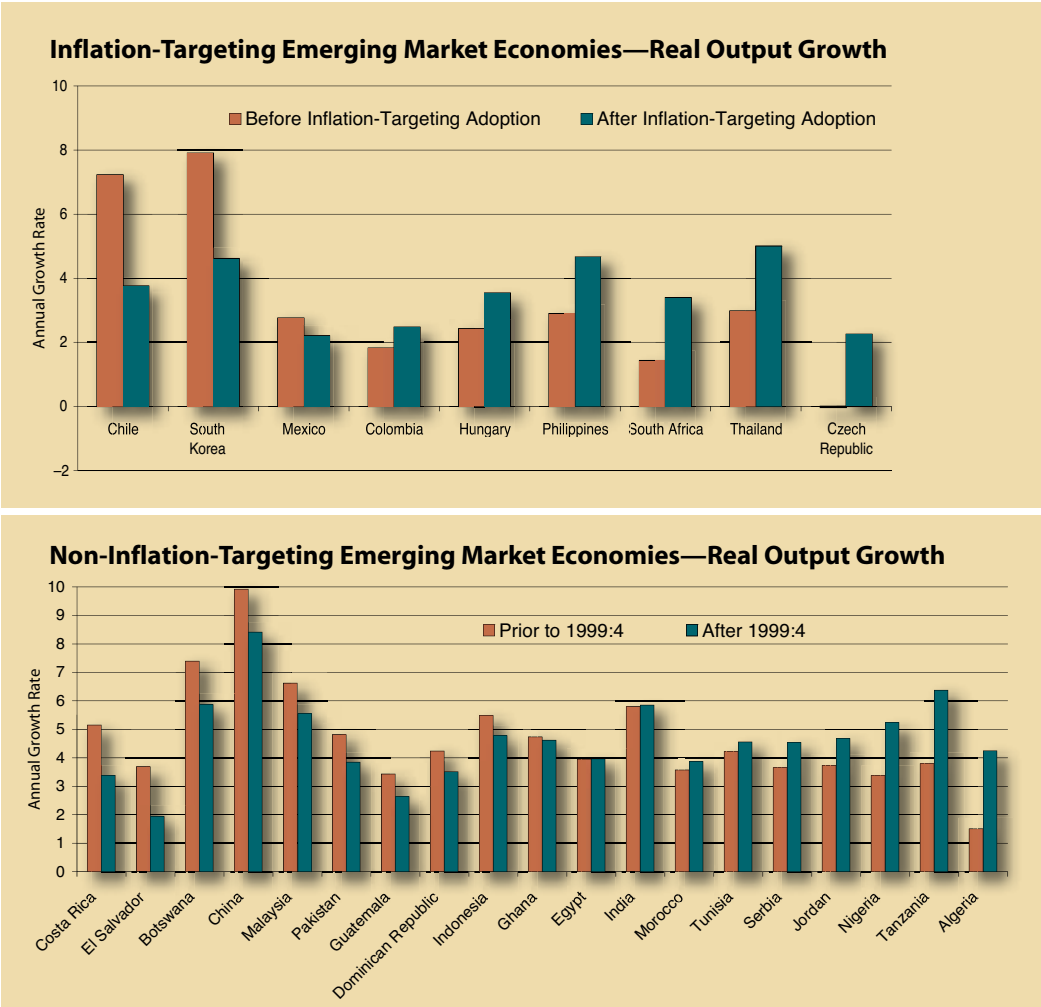
estimates suggest that this effect is most important at low inflation rates, that is, at the margin between inflation consistent with price stability and moderately higher inflation.

At high inflation rates, the tax benefit to the firm of depreciating capital equipment already has been greatly reduced, such that small changes in the inflation rate matter little. At moderately low inflation rates, however, the tax value of depreciation is substantial—and a small further reduction in inflation can significantly change the firm's cost of capital. Moreover, they find that this effect is larger for modern capital goods with rapid depreciation rates and shorter usable lifetimes, such as information and communications equipment.

Quantitative impacts from their model are substantial. In one version of their model, if the annual inflation rate were to be reduced from 4 percent to zero, the user cost of capital would decline by 8 percent. This decrease would increase business fixed investment by approximately 6.5 percent. In addition, output per worker would increase by approximately 2.2 percent, and consumption per worker by about 1.3 percent. Hence, the lower sustained inflation rate increases both aggregate output and productivity.

The studies above focus on distortions caused by higher inflation in the United

Fig. 2



SOURCE: International Monetary Fund

States. Do empirical studies find similar effects in other countries that may have very different financial structures, including different tax systems? In general, no. Two studies, one written by Robert Barro and the other by Michael Bruno and William Easterly, report no significant difference in growth rates across countries with annual inflation rates as rapid as 40 percent.⁶ Similarly, a recent study by the International Monetary Fund that examined the impact of inflation on economic growth in emerging-market economies (EME) reached a similar conclusion.⁷

The IMF study compares inflation and economic growth in 13 EMEs that adopted inflation targeting (IT) between 1998 and 2002 to a control group of 29 countries that did not. Countries that adopted IT subsequently experienced both a lower rate of inflation and reduced inflation volatility. The report suggests, however, that IT countries experienced only a modest boost in economic growth relative to the control group. Figure 2 compares the experience of the IT countries (upper panel) that had annual inflation rates below 40 percent when they adopted IT (9 of the 13), and the control-group countries (lower panel) that had annual inflation rates below 40 percent at the end of 1999 (19 of the 29).⁸ For the IT countries, 6 of 9 experienced more rapid growth after adopting IT; the median annual growth rate increased to 3.5 percent from 2.8 percent. For the control-group countries, 8 of 19 experienced more rapid growth; the median annual growth rate increased to 4.5 percent from 4.2 percent.

Is Higher Inflation Costless?

The empirical studies reviewed above suggest that little or no increase in economic output tends to follow reductions in inflation from a moderate, sustained pace to a slower pace near the rate defined as price stability. Does this imply that higher inflation is costless? No, not at all. First, as mentioned earlier, empirical studies often omit some of the more subtle and difficult-to-measure impacts of inflation. In the United States, tax-related distortions are relatively straightforward to measure while other distortions are less so. Other nations' tax systems may react quite differently to higher inflation, and, ironically, extensive tax evasion tends to blunt the interaction of a nominal tax system with inflation. Second, maintaining low, stable inflation tends to anchor the public's inflationary expectations. When inflation expectations are well-anchored, policymakers gain additional latitude to adopt aggressive policies when needed to offset large shocks to the economy without the risk of destabilizing the financial

system. Finally, a policy of maintaining low, stable inflation enhances both the government's credibility and the confidence of household and businesses in the economy, tending to boost investment and growth. This "insurance" aspect also often is omitted from models.

By itself, low and stable inflation cannot *cause* more rapid economic growth. An essential additional aspect is an institutional structure consistent with maintaining low, stable inflation. For most countries, fiscal discipline is the key. In their recent survey of inflation, Stanley Fischer, Ratna Sahay and Carlos Vegh note that Milton Friedman's dictum—inflation always and everywhere is a monetary phenomenon—while true, is only the "beginning of wisdom."⁹ Unsustainable fiscal policies—that is, the need of the government to borrow large sums—almost always is the fuel for increased sustained inflation. Excessive government deficits generate pressure on the central bank to create more money so as to provide to purchasers the wherewithal to buy increasing government debt. If the central bank refuses to do so—perhaps because of an inflation target—a fiscal and foreign-exchange crisis is likely to follow; examples include Mexico, Argentina, Turkey, Brazil, Thailand, South Korea, Indonesia and Russia. Absent public confidence in fiscal discipline, the adoption of inflation targeting (and subsequent lower inflation) should not be *expected* to increase growth. Despite lower current inflation, the costs associated with the older, more rapid inflation will continue until confidence in long-term fiscal responsibility is widespread.

The Answer Is Uncertain —or Is It Faith?

Among economists, the benefit of sustained low inflation as a precursor to maximum long-run economic growth is taken as an article of faith. Certainly, inflation can be costly, and creating lists of the ways in which inflation-related distortions can reduce growth is straightforward. Measuring the distortions has proved far more difficult, however; estimates of the costs of more rapid inflation remain highly uncertain. Despite the uncertainty, central bankers almost uniformly agree that sustained low inflation—at a rate no greater than that defined as price stability plus a small cushion to avoid the zero lower bound on nominal interest rates—is a prerequisite to sustaining the public's confidence in policymakers and, hence, to achieving maximum long-run economic growth.

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ENDNOTES

- ¹ See Dotsey and Ireland (1996).
- ² See Issing (2004).
- ³ See Bullard and Russell (2004).
- ⁴ See Feldstein (1997 and 1999).
- ⁵ See Cohen, Hassett and Hubbard (1999).
- ⁶ See Barro (1996); Bruno and Easterly (1996).
- ⁷ See International Monetary Fund (2005).
- ⁸ These countries correspond to those shown in Figure 4.2, p. 169, of International Monetary Fund (2005).
- ⁹ See Fischer, Sahay and Vegh (2002).
- ¹⁰ McCallum (2004) provides a clear discussion.

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