

ECONOMIC COMMENTARY

Federal Reserve Bank of Cleveland

Uncertain Inflation and Price-Level Rules

by Jeffrey J. Hallman

Nearly all economists believe that the sole cause of long-run inflation is excessive money growth. In analyzing the economy, it has long been standard practice to employ models in which only *unexpected* variations in the quantity of money affect real activities and decisions, while *anticipated* variations affect only the price level. This property is known as neutrality.¹ If inflation comes from money, and money is neutral, there may be little to gain by pursuing policies that reduce inflation.

On the other hand, the depth of the recession in the early 1980s reaffirmed the widely held belief that lowering inflation is quite costly in terms of reduced output and increased social distress. The inflation rate has been close to 4 percent for several years now. If this is what the public expects, why make any effort to reduce inflation further?

There are at least two ways to answer this. One is to deny that anticipated inflation is costless. The public finance approach points out the inefficiencies that result from both depreciation inflicted on money holders and the interaction of inflation with the tax code. Measurements of these inefficiencies range from fairly simple money-demand calculations ("shoe-leather" costs) to more elaborate models incorporating such rigidities as bracket creep and the taxation of nominal capital gains. Some recent estimates of money-demand costs range from 3 to 29 percent of one year's GNP, while costs stemming

from our unindexed tax code may reach 3 to 5 percent of output per year.²

This article presents a second rebuttal to the "leave well enough alone" argument. To the extent that anticipated inflation is costless, it is also costless to eliminate. Reducing inflation has not been costless in the past, because the price level under the existing monetary regime has been highly unpredictable. While the inflation costs derived from the public finance perspective generally depend on the rate of inflation, the present system imposes additional costs due to the unpredictability of future prices. This uncertainty could be largely eliminated and macroeconomic performance improved by requiring the central bank to announce a long-run target path for the price level and to take actions as necessary to keep actual prices on course.

■ Leijonhufvud's Blueback Scheme

In what sort of world would inflation be both predictable and neutral? Imagine an economy in which the inflation rate has hovered around 4 percent per year for a long time. The central bank is required, as a matter of law, to do whatever is necessary to maintain that rate forever. For all practical purposes, there is no price-level uncertainty. Inflation always was, is now, and forever shall be 4 percent. Furthermore, the tax code and all contracts are fully indexed, and the entire population is highly proficient at multiplying and dividing by powers of 1.04. Although some of these conditions sound a bit

Some of the adverse effects of inflation stem from the long-run unpredictability of the price level engendered by our current monetary policy process. Merely bringing inflation down to an "acceptable" level will not eliminate these costs. One simple way to reduce both inflation and the uncertainty associated with it would be for the Federal Reserve to target a long-run path for the price level, to announce this goal publicly, and to take whatever steps are required to ensure that actual prices remain on course.

silly, they are all needed to ensure that inflation is truly neutral.

Now suppose that, for whatever reason, the denizens of this economy decide they want an inflation rate of zero. The central bank is directed to pursue this goal as assiduously as it previously strove to maintain 4 percent. How should the bank react?

It may elect to cut the monetary growth rate by 4 percent, thus creating money at a rate consistent with no inflation. Even if the central bank is fully credible and the reduction is phased in gradually, however, the disinflation will create problems. People who borrowed money under the old regime will see a 4 percent increase in the effective rate of interest on their old contracts. They may default as a result. Also in distress will be employers who previously agreed to multiyear labor contracts calling for annual 4 percent wage increases. Some workers will have to be let go. Throughout the economy, expectations will be upset and resources redirected; a recession of several quarters' duration may ensue. Eventually, the economy will adjust to the new inflation rate and grow as before, but the transition will be costly.

There is no need for all this pain. Axel Leijonhufvud has described a scheme that can eliminate inflation with no transition costs at all.³ The central bank creates a new currency, the blueback, to circulate alongside the existing currency, known as greenbacks. The bank has absolute control over the blueback-greenback exchange rate by virtue of its willingness to trade unlimited quantities of one for the other. It uses this control to appreciate the blueback against the greenback continuously at a 4 percent annual rate. Since the inflation rate in greenbacks is 4 percent, inflation in terms of bluebacks is zero. The courts cooperate by interpreting dollar amounts as referring to greenbacks in existing contracts and to bluebacks in new contracts, so people continue to receive the real value they bargained for. Eventually, the greater convenience and lower opportunity costs of dealing in bluebacks result

in the withering away of greenbacks. Unlike the first disinflation scenario, however, the transition is costless.

It may be argued that a blueback scheme could not be implemented so easily in a complex, real-world economy like our own. Indeed it could not, but the reasons why are grounds for doubting that our current 4 percent inflation is costless. We have not indexed contracts, the tax code, or the legal system. And, most important, the constraints on monetary policy that would be needed to give people confidence in a stable inflation rate have not been implemented.

■ Peppermint Patty Price Prognostication

The monetary policy process we actually have makes it virtually impossible to predict the price level several years hence. Leijonhufvud makes this point with a mischievous metaphor:

In a memorable Peanuts cartoon of quite some years ago, Peppermint Patty was shown in school struggling with a true-false examination. Her efforts to divine the malicious intent of capricious authority went something like this: "Let's see, last time he had the first one False, so this time it should be True." "He wouldn't have just one False, after a single true, so False. False." "Ok, now we've got True, False, False, True," "Looks reasonable so far," she says with a contented smile.

If this sounds vaguely familiar, it may be because you read the business and financial pages. "This quarter should be Go, because they want interest rates down before the election." "Next quarter will be Stop again, though, because otherwise we risk a revival of inflationary psychology." "Quarter after that is probably Stop too, but then it is bound to be Go because something will have to be done about unemployment." "So, now we've got Go, Stop, Stop, Go." "Looks reasonable so far."

But not much further. It is possible sometimes to muster considerable confidence in Peppermint Patty divination for the first few steps into the future. But a few more steps and it falters and then disappears altogether. You cannot build up a firm expectation of the price level three years hence this way.

... The price level 10 years into the future is a subject for joking, not for rational discussion. Yet, of course, in an economy such as ours *people are forced to bet on it all the time.*⁴

To get a feel for how unpredictable the price level has been, try the following experiment. Using a sheet of paper, cover everything in figure 1 to the right of the vertical line at 1920, so that only the data from 1913 to 1920 are visible. Based on this information, guess where the price level will be 10 years later and mark it on the figure. Repeat this for each decade. Believe it or not, your decade-ahead forecasts are probably very similar to the ones made by professional forecasters operating in real time. When it comes to long-range economic forecasts, it's hard to beat simple trend extrapolation.

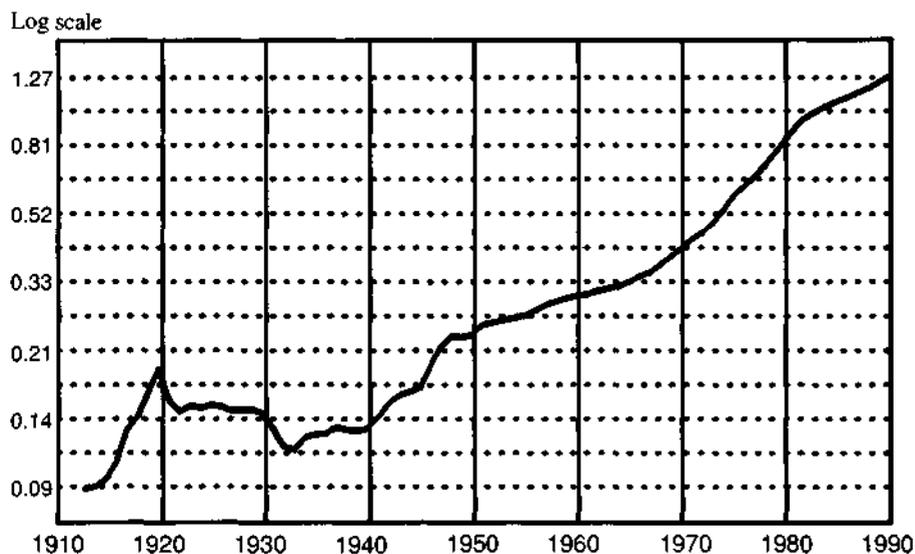
To help assess how far you were off, figure 1 also contains horizontal lines spaced 25 percent apart. Thus, if one of your guesses missed by the space of two lines (as my forecast of the 1980 price level did), it was off by 56 percent ($1.25 \times 1.25 = 1.5625$). When I tried this experiment, only once (in forecasting the 1940 price level) did I err by less than 25 percent. My average error appears to be about 40 percent.

■ The Costs of Price-Level Uncertainty

It is widely believed that uncertainty about the future path of prices adversely affects the economy, although there is no consensus on the extent of the harm. Arguments about the detrimental effects are handicapped by the lack of a direct measure of how unsure the public really is. Indirect indicators have been derived from surveys that ask people to forecast inflation over the coming year, but to the extent that longer-run uncertainty is also important, studies using these measures may be expected to understate the impact of price-level unpredictability.

Despite this and other limitations, investigators have found substantial initial effects on employment and output that are partially offset over time. For

FIGURE 1 GNP IMPLICIT PRICE DEFLATOR, 1913-1990



NOTE: The distance between two dotted horizontal lines represents a 25 percent change in the price level.
SOURCES: Board of Governors of the Federal Reserve System; and U.S. Department of Commerce, Bureau of Economic Analysis.

example, the average level of inflation uncertainty approximately doubled over the 1973-83 period from the level prevailing in 1961-72.⁵ A permanent change of this magnitude is estimated to increase the unemployment rate by 2 to 3 percent during the first five years, but by only 1/4 to 1 1/4 percent after 20 years have passed.

Investment may be a primary channel through which inflation uncertainty harms the economy. Imagine that you are considering a million-dollar investment in a new plant, technology, or research effort whose major benefits will not be felt for 10 years. You may borrow the million for 10 years, but the experiment above shows that this is a risky proposition. The best guesses of borrowers and lenders about the real value of the loan principal a decade later may be off by 40 percent or more. The lender can demand a higher interest rate to cover his risk, but this does nothing to cover your exposure. Instead, you are left with price-level risk and a higher cost of capital to boot. These risks can be avoided if the investment is financed by incorporating and selling equity in the project, but then any profits will be subject to double

taxation, first as corporate income, then as dividend income or capital gains. Given these alternatives, some otherwise worthwhile projects—perhaps many—will not be undertaken. Further difficulties will result from the fact that many of the projects that are pursued will have been based on incorrect price-level predictions.

The effects of inflation uncertainty on investment are only part of the story. The mix of goods and services the economy produces can also be affected. It may be impossible to measure how many resources are devoted to protecting individuals and businesses against unexpected price-level changes. What is clear is that such hedging can become more important to firms' survival than other managerial skills.⁶ This increases the demand for the specialized financial skills of lawyers, accountants, and economists, and leads some bright young people to make careers in these professions rather than in engineering or production management. Inflation hedging is a diversion of valuable human resources that would be unnecessary if long-run inflation were highly predictable.

Finally, price-level uncertainty is a contributing factor to the growth of government. As Leijonhufvud explains:

In [this] environment, the real outcome of private contractual agreements becomes more uncertain. Contracting becomes a less effective, less reliable method for reducing the risks particularly of long-term ventures to manageable proportions. When contracting increasingly fails, political lobbying becomes a substitute strategy for many groups.... Monetary mismanagement will bring in its wake efforts by all sorts of groups to obtain by public compulsion what private cooperation failed to achieve.⁷

The miserable economic performances of the former Soviet Union and the Eastern European states are clear demonstrations of the futility of replacing market mechanisms with political ones.

Though the costs of inflation uncertainty are hard, perhaps impossible, to measure, that does not make them any less real.

■ Inflation Uncertainty and Price-Level Targets

Besides demonstrating the magnitude of price-level uncertainty, the forecasting experiment above also shows that erratic inflation is not new. This fact, coupled with the costs of unpredictable inflation, raises the question of why we have so much uncertainty. The length of the record suggests that the instability is due less to the individuals who have filled Federal Reserve policymaking positions than to the process by which policy is made. This view holds that unstable prices are endemic to the current regime due to the lack of appropriate constraints on monetary policy.

The notion that imposing constraints on policymakers enables them to achieve superior outcomes may seem counterintuitive; it is most easily understood by way of example. Consider the classic case of a flood control agency that warns people not to build houses in a floodplain, though it lacks the legal authority to keep them from doing so. The best outcome for society is that houses are built on high ground. But suppose people do build in the low-lying area. Once

houses are in place, preventing floods is less costly than cleaning up afterward. Now, the agency will find it optimal to undertake the costly flood control measures necessary to protect the homeowners. Realizing that the agency will have to protect them, people ignore the warnings and build in the floodplain.

Under current arrangements, the Federal Open Market Committee (FOMC) often finds itself in a position similar to that of the flood control agency.⁸ The Committee meets approximately every six weeks. At any meeting, it can modify or reverse decisions made at previous sessions. For instance, suppose that in January of a particular year the FOMC sets its policy instruments in a manner it believes will yield 3 percent inflation over the coming year. Between January and July, events unfold in an unexpectedly inflationary manner, so that by the time of the July meeting, inflation for the year to date is running at a 5 percent annual rate.

The Committee is faced with a difficult decision. It can try to achieve the 3 percent goal by drastically tightening policy. At the other extreme, it can accommodate the shock (the surprise inflation) by not changing policy at all, in effect deciding to live with 5 percent inflation. The first course of action is likely to increase unemployment, at least for a time. The second option will not only cause inflation to rise, but will also increase uncertainty about the future price level. Balancing these costs, the FOMC is likely to find that the optimal response is a partial accommodation. Policy will be tightened a little, and the Committee will hope for better luck next year.

This is not the end of the story, however. If the public has some understanding of the FOMC's decisionmaking process, it realizes that the Committee will often partially accommodate unexpected changes in the price level. The mere fact that the central bank can do so results in heightened uncertainty. Because uncertainty already exists, accommodating a particular shock will not increase it by much. Furthermore, standard economic theory predicts that

the public's expectation of an accommodative policy will increase the costs (in terms of unemployment and reduced output) on those occasions when the Committee unexpectedly takes a hard line. In a vicious circle, then, the lessened costs of particular accommodations lead the public to expect more of them, further lowering their costs, and so on. The uncertainty is further compounded by the lack of any reliable method for predicting to what degree the FOMC will accommodate any given shock. Under this system, Peppermint Patty price predictions are about the best that one can hope for.⁹

The decisions of both the flood control agency and the FOMC are thus governed by what the public expects them to do. Just as the agency is forced to build dams and levees because the public expects that it will, the FOMC accommodates inflation shocks because people expect that such action is forthcoming. The FOMC and the flood controllers could better serve the public interest if constraints on their actions led to changed expectations. In the flood control example, society would benefit if the agency could be constrained in advance from protecting the homes of those who build in the floodplain. Without the guaranteed protection, people would build elsewhere, making costly flood control measures unnecessary.

Similarly, the costs of long-run inflation uncertainty outlined above could be sharply reduced by imposing a price-level rule on the Federal Reserve System. How might this work? Initially, say in 1992, Congress would decide on a target path for the price level (as measured by the Consumer Price Index [CPI]) for each of the next 10 years; that is, from 1992 until 2001. In 1993, the legislature would extend the path by adding a target for 2002, leaving unchanged the targets for 1993–2001. A 2003 target would be appended the next year, and so on. The central bank would be instructed to take whatever action it deemed necessary to keep the CPI within 5 percent of the target. If it turned out that simply setting the target and instructing the Federal Reserve to

achieve it was not restrictive enough, Congress could then specify a specific interest rate or monetary base rule to further constrain the FOMC.

While operating with a price-level target would greatly reduce uncertainty about future prices, it would have little effect on the System's day-to-day operations. In particular, it would not prevent the Fed from responding to concerns about financial market liquidity, as it did following the stock market crash of October 1987. Nor would it disallow partial accommodation of unexpected changes in the price level. It would require, however, that any such accommodations be temporary. Inflation above the target rate in one year would have to be offset in subsequent years by inflating at less than the target rate.

■ Conclusion

The point made by the blueback scheme is that it takes just as much monetary discipline to achieve a stable 4 percent inflation rate as it does to achieve a stable rate of zero.¹⁰ In principle, it is possible to reduce the costs of inflation greatly by indexing the tax code and paying interest on currency and demand deposits. But such reforms would do little or nothing to alleviate the many harms emanating from the long-run price-level uncertainty inherent in a regime that lacks appropriate constraints on the monetary authority. By making it possible to predict the price level a decade ahead with confidence, effective long-run targeting of a broad price index would sharply reduce these costs.

■ Footnotes

1. Some models go even further and feature superneutrality, in which the growth rate of money is also irrelevant.
2. See Charles T. Carlstrom and William T. Gavin, "Zero Inflation: Transition Costs and Shoe-Leather Benefits," Working Paper 9113, Federal Reserve Bank of Cleveland, October 1991; and David Altig and Charles T. Carlstrom, "Inflation, Personal Taxes, and Real Output: A Dynamic Analysis," *Journal of Money, Credit, and Banking* vol. 23, no. 3, part 2 (August 1991), pp. 547-71.
3. See Axel Leijonhufvud, "Inflation and Economic Performance," in Barry N. Siegel, ed., *Money in Crisis: The Federal Reserve, the Economy, and Monetary Reform*. Cambridge, Mass.: Ballinger Publishing Company, 1984, pp. 19-36.
4. See Axel Leijonhufvud, "Constitutional Constraints on the Monetary Powers of Government," in James A. Dom and Anna J. Schwartz, eds., *The Search for Stable Money*. Chicago: University of Chicago Press, 1987, pp. 129-44.
5. See A. Steven Holland, "Wage Indexation and the Effect of Inflation Uncertainty on Employment: An Empirical Analysis," *American Economic Review*, vol. 76, no. 1 (March 1986), pp. 235-43. Holland measures inflation uncertainty as the standard deviation of the inflation forecast errors made by survey participants.
6. For example, both borrowers and lenders at many savings and loan institutions in the early 1980s expected the high inflation rates of the previous decade to continue. The unexpected disinflation that followed played a large part in creating the industry's current crisis.

7. See Leijonhufvud, "Constitutional Constraints on the Monetary Powers of Government."

8. The FOMC is the policymaking arm of the Federal Reserve System. It consists of the seven members of the Board of Governors and five of the 12 regional Reserve Bank presidents.

9. There is a substantial literature on the problem of time consistency in monetary policy. The flood control example appears in the seminal article by Finn E. Kydland and Edward C. Prescott, "Rules Rather than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy*, vol. 85, no. 3 (June 1977), pp. 473-91. My argument is novel in that it applies similar reasoning to explain why inflation uncertainty is too high, while the existing literature aims at explaining the level of inflation.

10. This is also the reason why comparisons across countries show a high correlation between the level and the variability of inflation. Stable low inflation is better than stable high inflation, so countries with the political will to accomplish either invariably choose the former.

Jeffrey J. Hallman is an economist at the Federal Reserve Bank of Cleveland.

The views stated herein are those of the author and not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System.

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The papers in this special issue of the *Journal of Money, Credit, and Banking* were presented and discussed at a conference on "Price Stability" held at the Federal Reserve Bank of Cleveland on November 9-10, 1990. The purpose of the conference was to encourage research and discussion on the costs and benefits of adopting a policy to achieve and maintain price stability.

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