A Report to the FOMC

The Price Objective for Monetary Policy: An Outline of the Issues

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I. Introduction

A. In this outline, evidence bearing on some of the key considerations in the establishment of an operational definition of effective price stability and in the development of strategies for achieving that objective is reviewed and evaluated. Because this subject is so broad, the review is confined to only the central issues. Consequently, this outline should be viewed as a starting point for discussion rather than an exhaustive summary.

B. A road map to the outline

1. In the next section, evidence is presented on the costs of inflation, including:

    a. the direct relationship between inflation and the growth of real output;

    b. the effect of inflation on the allocative signals provided by relative prices;

    c. the relationship between the level of inflation and inflation uncertainty;

    d. and, the influence of inflation through its interaction with the tax code on the level and composition of economic activity.

2. Two possible benefits of operating the economy with positive inflation are evaluated in the third section.

    a. Inflation may facilitate the downward adjustment of some real wages, thus improving the efficiency of labor markets.

    b. Because there is a floor at zero on nominal interest rates, a positive rate of inflation that is reflected in nominal interest

rates provides greater scope for the pursuit of counter–recessionary monetary policy. Moreover, positive inflation provides a greater cushion against shocks that could lead to price deflation, with potential ramifications for the stability of the financial system.

3. Some of the issues involved with defining price stability on the basis of published price indexes are discussed in section four.

4. Questions surrounding the costs of disinflation are explored in a final section.

    a. How large are the traditional Phillips curve estimates of the costs of moving inflation to zero and what are the key assumptions underlying these calculations?

    b. How might the credibility of the monetary authority affect these costs?

    c. In the absence of complete and immediate credibility, how quickly would agents learn about changes in the objectives of monetary policy and how would this learning affect the costs of disinflation?

    d. Do output losses associated with inflation reductions depend on the speed of disinflation?

    e. How do deliberate strategies of inflation reduction compare with opportunistic strategies? Might there be different output losses if these strategies have different implications for credibility?

II. The costs of inflation

A. There is a large literature examining the relationship of inflation to measures of macroeconomic performance. The results of this research are mixed.

B. Cross–country evidence on inflation and real output

1. Using a simplified growth model as the underlying specification, Fischer (1991), Cozier and Selody (1992), and Englander (1992) find cross–country evidence in favor of the hypothesis that inflation reduces the growth of real output.

2. Sarel (1996) and Judson and Orphanides (1996) also find negative effects on the growth of output, but only at higher rates of inflation (8 to 10 percent).

3. The econometric reliability of these types of cross–country regressions explaining economic growth has been questioned by some researchers (Levine and Renelt, 1992).

4. For the most part, work prepared for a Federal Reserve research meeting in 1993 also found that, looking across countries, inflation seems to have negative effects on real output. But most participants viewed the findings as inconclusive, owing to the sensitivity of results to: the subset of countries included in the analysis; the sample period chosen; and the choice of other explanatory variables included in the regressions.

5. The results of the cross–country research establish a reasonably firm basis for believing that high inflation inhibits trend economic growth, but the effects of low inflation are less clear.

C. The time–series evidence

1. Rudebusch and Wilcox (1994) present time–series evidence of a negative relationship between inflation and productivity growth in the United States. This relationship survives most tests of robustness. However, as the authors note, fundamental identification of causality running from inflation to productivity probably is not resolved.

2. Bullard and Keating (1995) find little evidence that a permanent increase in inflation has a statistically significant negative effect on the level of real output using time–series data for a wide variety of countries, including the United States.

3. Ericsson, Irons, and Tryon (1993) report a finding that goes in the opposite direction: inflation has a positive effect on the level of output.

4. All told, the time–series results do not appear to be sufficiently consistent to support any firm conclusions.

D. There is a large literature relating inflation to the variability of relative prices.

1. This relationship arises, in part, because inflation disturbs the structure of relative prices.

    a. Inflation may make it difficult for firms to sort out real from nominal changes in demand, creating noise in the price system and reducing the information content of changes in relative prices.

    b. Because of varying speeds of price adjustment, inflation disturbances may be transmitted unevenly across the structure of relative prices.

2. John Golob (1993) prepared a comprehensive inventory of studies relating inflation and the variability of relative prices. Although some of the statistical relationship reflects the influence of relative price shocks on aggregate price movement, much of the causality appears to run from inflation to relative prices. In addition to interfering with relative prices across sectors, inflation even has been shown to affect the dispersion of relative prices within narrowly defined markets (Domberger, 1987; Danzinger, 1987; and Van Hoomissen, 1988). Taken together, these studies reveal substantial agreement—though not unanimity—for the view that inflation raises the variability of relative prices.

E. The available literature also provides strong evidence of a positive link between inflation and inflation uncertainty. These results appear to hold for a wide variety of econometric and survey–based measures of uncertainty (Golob, 1993).

F. Some of these studies have attempted to relate relative price variability and inflation uncertainty to the growth of real output. For the most part, these studies find that relative price variability and inflation uncertainty adversely affect real output. Judson and Orphanidies (1996) find that inflation variability depresses economic growth, even when the level of inflation is low. Much like the results relating the level of inflation to real output, most of these findings suffer from econometric fragility.

G. It may not be surprising that it is difficult to find strong empirical evidence of a direct link between inflation (or inflation variability) and real output. Although even small effects on the growth of real output would be economically meaningful as they cumulate over time, such effects are likely to be difficult to detect given the imprecision of our statistical techniques and the considerable noise in our measures of output and prices. Moreover, many of the costs of inflation involve a redirection of resources away from activities that contribute directly to economic well–being toward activities to cope with inflation, such as cash management, finance, and accounting. However, all of these activities show up in measured real GDP. Along these lines, English (1996) finds evidence that inflation is positively related to the size of a country's financial sector.

H. Inflation and the tax code.

1. The tax code of the United States is not neutral with respect to inflation and has particularly pronounced effects on the taxation of capital income.

2. Feldstein (1996) estimates that large welfare gains would accompany a reduction in the rate of inflation. There are several channels through which inflation interacts with the tax code to affect welfare.

a. Inflation affects welfare through its influence on the after–tax return to saving and, hence, on the level of saving and capital accumulation. These effects work through the value of depreciation allowances, the taxation of nominal interest income and the deductibility of nominal interest payments, and the taxation of nominal capital gains. Because, even in the absence of inflation, the tax system reduces the return on saving, the additional distortions created by inflation are of first–order importance.

b. The tax structure favors investment in housing because mortgage interest payments and property taxes are deductible from income, while the implicit rental income from housing goes untaxed. Inflation acts to amplify this distortion by raising the value of the interest deductions and by reducing the returns available on alternative investments.

c. Inflation results in a suboptimal economization on cash balances. This welfare cost is generally regarded as small.

d. These effects are partially offset by the revenues raised from the inflation tax on money balances and tax revenue received on interest payments on government debt, which lessen the need for other distortionary taxes.

e. Depending on the choice of key parameters, Feldstein estimates that reducing inflation by 2 percentage points ultimately increases the level of real GDP by between zero to $1–1/2$ percentage points per year, with 1 percentage point as his preferred estimate. The upper end of his range depends on a relatively large value for the real interest elasticity of saving, and thus is open to debate. Although the point estimate is subject to uncertainty, the effect is almost certainly positive.

f. Using conventional Phillips curve calculations and his preferred estimate for the effects of inflation on tax distortions, Feldstein reports that the transitional output losses associated with disinflation are far outweighed—by a factor of about 35 to 1—by the present discounted value of the permanent benefits of lower inflation.

3. Abel (1996) uses a general equilibrium growth model to calculate the output effects of tax distortions created by inflation. Using this alternative approach, he comes to roughly the same conclusion as Feldstein; his estimates of the welfare gain from reducing inflation by 2 percentage points are about $1-\frac{1}{2}$ percentage points of real consumption per year.

III. The benefits of positive inflation

A. Does inflation grease the wheels of the labor market by facilitating the downward adjustment real wages?

1. Attitudinal surveys tend to support the view that there is an aversion to cutting nominal wages (Kahneman, Knetsch, and Thaler, 1986; Blinder and Choi, 1990; Bewley and Brainard, 1993). Many employers prefer to have inflation reduce real wages, rather than initiating nominal wage cuts. We do not know whether these attitudes would change if inflation moved closer to zero.

2. Surveys also reveal that, although there is a reluctance to cut wages, employers will do so when necessary.

a. Blinder and Choi (1990) report that one-quarter of the firms in their sample had recently cut wages.

b. Bewley and Brainard (1993) report for a sample of firms with stable workforces that 8 percent had recently cut nominal wages and 18 percent had cut nominal wages at one time or

another. They report a much higher incidence of nominal wage cuts for firms with less stable workforces.

3. Industry and state–level wage data.

    a. Lebow, Roberts, and Stockton (1992) used data for 255 three–digit industries from the BLS establishment survey and find no evidence of a pervasive downward nominal wage rigidity that worsens at lower rates of inflation.

    b. Crawford and Dupasquier (1993) produce similar results using industry wage data for Canada.

    c. Card and Hyslop (1996) examine the adjustment of average wages of workers by state for evidence of the asymmetric adjustment that would be symptomatic of downward nominal wage rigidity. These data do not provide statistically significant support for the hypothesis.

    d. Wage changes measured at the industry and state level can be influenced by shifts within and across firms and industries and thus are not ideal for addressing this issue.

4. Evidence from the wages of individuals

    a. Card and Hyslop (1996) use data from the CPS to measure the wage changes of individuals. The study finds evidence of downward nominal wage rigidity. But overall the effects are rather small; a 2 percentage point reduction in inflation would, by their estimates, raise the fraction of workers with downwardly rigid wages by $1–1/2$ percent.

    b. Lebow, Stockton, and Wascher (1995), Kahn (1994), and Card and Hyslop (1996) use the Panel Study of Income Dynamics

(PSID), a longitudinal dataset that allows the computation of wage changes for an individual's primary job—measured as straight–time hourly wages or salary. These studies also find evidence of some downward nominal wage rigidity. But, like the CPS results, the PSID findings suggest that elimination of inflation would not result in a substantial increase in the extent to which downward rigidities would bind.

c. In a recent paper, Akerlof, Dickens, and Perry (1996) argue that the evidence of only limited downward rigidity from the CPS and PSID may result from measurement error in these surveys. Validation studies are available for the CPS data, and Card and Hyslop demonstrate that measurement error does bias down estimates of nominal wage rigidity. Validation studies are not available for the wage measures used in the PSID; owing to long–term participation in the survey and explicit instructions to report straight–time wages on the primary job (rather than various measures of earnings), there is reason to believe that there will be less measurement error in the PSID (McLaughlin, 1994).

5. An ad hoc survey and union contract data.

a. Akerlof, Dickens, and Perry conducted a telephone survey of 500 residents of the District of Columbia area and found only a small percentage—about 3 percent—had received nominal wage cuts. These figures are much smaller than those reported in the studies cited above. However, as with the other datasets, there are reasons to be concerned that these results likely involve measurement error and that their sample is not representative of the U.S. labor market.

b. Union contract data covering major collective bargaining agreements reveal relatively few instances of nominal wage reductions outside of the mid–1980s (Mitchell, 1993). Fortin (1995) reports similar results for union contracts in Canada. These data show fewer nominal wage cuts than are reported for unionized workers in the CPS and PSID, suggesting the possibility of measurement error for these workers in the surveys.

6. It is important to note that none of these studies addresses labor compensation—the variable of most relevance to a firm's labor costs and employment decisions. There may be greater scope for employers to adjust down some elements of the benefits package of employees, rather than cut nominal wages, in response to adverse shocks. Thus, estimates of nominal *wage* rigidity may overstate nominal *compensation* rigidity.

7. Estimates of the economic consequences of downward nominal wage rigidity vary considerably.

a. Lebow, Stockton, and Wascher estimate that the welfare cost associated with the increased incidence of downward rigidity accompanying a 4 percentage point reduction in steady–state inflation would be between 0.02 and 0.09 percent of real GDP per year.

b. By contrast, Akerlof, Dickens, and Perry estimate that, because of downward rigidity, permanently reducing inflation from 4 percent to zero would raise the equilibrium unemployment rate from $5–3/4$ percent to $7–1/2$ percent.

c. Neither set of calculations incorporates the welfare gains or the transition costs of lowering inflation.

8. A balanced reading of the evidence would recognize that virtually all of the results are subject to some unknown degree of measurement error. Faced with that uncertainty and given the widely varying estimates of the effects of downward nominal wage rigidity, what symptoms would one look for that wage rigidity was becoming a major problem as inflation moved lower?

    a. The most prominent symptom would be signs that hourly compensation was growing more rapidly than would be expected for a given unemployment rate; correspondingly, estimates of the natural rate of unemployment would be revised up over time. Downward inflexibility of nominal wages also likely would coincide with a squeeze on profit margins, as lower real wages would not cushion adverse shocks.

    b. A notable feature of the U.S. economy as inflation has ratcheted down in this cycle has been surprises in the opposite direction for both hourly compensation and profits. More generally, over the postwar period, estimates of the natural rate drifted up as inflation increased and have drifted down as inflation has declined. To be sure, other factors may have masked the effect of labor market inflexibilities in the past, and downward rigidity could become a problem if inflation was reduced further. But the evidence is mixed, and the current macroeconomic environment does not yet provide much support for the view that lower inflation raises the equilibrium unemployment rate.

9. The money illusion that lies behind downward nominal wage rigidity, to the extent that it exists, implies that inflation is almost certain to have other distortionary effects on economic behavior. These distortions could

be particularly pronounced for activities requiring longer–term planning, such as saving, investment, and retirement decisions.

B. The floor on nominal interest rates at zero also has been cited as a reason to avoid very low inflation (Summers, 1991). More generally, there is concern that at very low inflation financial markets may be more susceptible to deflationary shocks that would have broad systemic implications.

1. At zero expected inflation, real and nominal short–term interest rates would be equal. Because nominal interest rates cannot be negative, real interest rates cannot be negative with zero expected inflation. Thus, the Fed might not have enough scope to lower real interest rates to offset the effects of adverse shocks to aggregate demand.

2. Fuhrer and Madigan (1996) have explored this issue using a small–scale empirical rational expectations model of the U.S. economy. Given the specific structure of their model and starting from zero inflation, they report that real output in a recession could fall by one percentage point more than would be the case in a high–inflation environment.

3. As a practical matter, the economy operated for fifteen years in the 1950s and first half of the 1960s with an annual inflation rate of $1–{}^{1}/_{2}$ percent and, during that period, monetary policy does not appear to have been seriously hampered in efforts to smooth the business cycle.

4. Aside from the difficulties that might be posed for counter–recessionary monetary policy by zero inflation, history suggests that a generalized price deflation amplifies macroeconomic risks associated with financial crises (Mishkin, 1991 and 1996). An unanticipated decline in the price level can lead to a deterioration in firms' net worth, a drop in the value of collateral, and a heightening of informational asymmetries in credit markets that can constrict lending and deepen economic contractions. Many of these same problems would arise in the context of an unanticipated disinflation, and

thus provide an argument for gradual—and hence largely anticipated—adjustments of inflation to a desired long-run objective.

IV. Measuring price stability

A. Existing biases in the major price measures suggest that zero true inflation would correspond to a positive rate of measured inflation.

B. Lebow, Roberts, and Stockton (1994) placed the estimated bias in the CPI at between roughly $1/2$ and $1-1/2$ percentage points per annum. This range is higher than that estimated by the CBO (1994)—$1/4$ to 1 percentage point—but below that of the Advisory Commission to the Senate Finance Committee (1995), which estimated the historical bias at between 1 and $2-3/4$ percentage points per year in a preliminary report.

C. Shapiro and Wilcox (1996) updated and reevaluated the evidence on the measurement error in the CPI. Their analysis suggests that an 80 percent confidence interval of the bias in the CPI spans 0.6 to 1.5 percentage points per year. This is probably the most thorough and authoritative study available.

D. Are other price measures more appropriate as a monetary policy objective than the CPI?

1. To an important degree, the choice of an appropriate index should depend on one's view about the sources of the costs of inflation. If interference with the allocative signal of relative prices is viewed as a principal cost of inflation, a price index that encompasses all monetary transactions might be desirable (Wynne and Sigalla, 1993). However, there are no broad-based transaction measures of inflation, and creating these measures would be complicated and expensive. A reasonable substitute might be the use of the chain-weight indexes for gross domestic product and gross domestic purchases, which include prices of investment goods and government output. The difference between these two measures

reflects movements in our international terms of trade. Although these two indexes have deviated by noticeable amounts over five–year periods, their long movements have been broadly similar.

2. If price stability is deemed desirable in order to stabilize the purchasing power of money and provide for a stable store of value for households, then a consumption–based price measure, such as the CPI or the PCE price index, would be appropriate.

3. Theory does not provide a compelling argument for a definitive choice from among these price measures.

4. Are broad measures other than the CPI less prone to measurement error than the CPI? For the most part, the answer appears to be no.

    a. Work by Gordon (1990), Lichtenberg and Griliches (1986), and Trajtenberg (1990) find overstatement in the PPI.

    b. The use of GDP price measures does not avoid these problems because CPI and PPI series are used as inputs in the construction of these measures. And, for those items that are not CPI and PPI components, the statistical quality of the price indexes used by the BEA in construction of the GDP price measures often is suspect.

    c. If the preferred focus of policy was on consumer prices, both the CPI and PCE chain–weight index would be candidates. Until recently, differences in the rate of change of these indexes were small and mostly reflected different weighting schemes. However, for the construction of PCE prices, the BEA now is making use of PPI price indexes for medical care, which better capture quality improvements and transaction prices compared with the CPI. Because PPI medical services

have slowed more than CPI medical services, a gap recently has opened up between PCE and CPI inflation. The BLS intends to incorporate the methodology used in the PPI medical care prices into the CPI in January 1997.

5. Prices at earlier stages of processing probably are measured with less error because quality adjustment is somewhat less complicated for the prices of raw materials than for finished goods and services. However, Lebow, Roberts, and Stockton (1994) show that stabilizing a measure of crude materials prices does not result in the stabilization of broad measures of inflation, such as the CPI and GDP prices, with the differences cumulating to economically meaningful amounts over a period as short as 5 to 10 years.

6. Even for broad price aggregates, such as the CPI and GDP price measures, stabilizing one would not stabilize the others in the long run. But in this case, the divergence between these price measures likely would not be large over relevant planning periods—say 10 to 20 years.

E. Although "price stability" and "zero inflation" often are used interchangeably, they are not the same; zero inflation forgives past changes in the price level, while price stability would require reversing those changes. In that regard, price-level uncertainty would appear to be more relevant than inflation uncertainty for long-term decisions, such as saving and investment. As a practical matter, how much price-level uncertainty would remain if the Fed targeted a rate of inflation? The answer depends on how aggressively the Fed targets inflation (Lebow, Roberts, and Stockton, 1992). The more aggressive the targeting of the inflation rate, the smaller will be the potential drift in the price level over time. Of course, this reduced price-level uncertainty comes at the cost of increased output variability.

V. The costs of disinflation

A. In principle, the costs of disinflation depend on a variety of factors, including the structural and institutional features of the wage and price setting process, the speed of adjustment of inflation expectations, and the clarity and credibility of the monetary authority's commitment to lower inflation.

B. Conventional estimates of the costs of disinflation in the United States are derived from a linear Phillips curve that, in essence, relates current inflation to lagged inflation, a measure of the gap between actual and potential output, and supply–shock variables. The estimated cost of disinflation varies depending on the precise specification of the model used, but a reasonable estimate of the range using this paradigm suggests that a 1 percentage point reduction in the rate of inflation would entail an output loss of roughly 3 to 6 percentage points of real GDP.

1. The Phillips curve model, as typically estimated, is a convolution of structural features of the economy that might impart some inertia in wages and prices—for example, implicit or explicit contracts—and adaptive, or backward–looking, inflation expectations.

2. Undoubtedly, the formation of expectations is a more complicated process than embodied in this type of specification. However, because inflation has not shown a tendency to revert to any fixed value over the postwar period, it is quite reasonable for people to form expectations of future inflation by observing the historical performance of inflation. This accounts, in part, for the empirical success of this model.

3. Some have argued that the costs of disinflation may be even greater than suggested by the linear Phillips curve. If some of the cyclical unemployment necessary to reduce inflation becomes structural—perhaps because skills deteriorate or attachments to the labor force lessen—then lowering inflation might involve a permanent increase in the NAIRU.

Ball (1996) and Blanchard and Summers (1986) present evidence of this so–called hysteresis effect for European economies, related, in part, to structural features of these labor markets and to government income support policies. However, there is no evidence of hysteresis in U.S. labor markets.

4. Questions also have been raised about the linearity of the Phillips curve. Eisner (1996) estimates a Phillips curve that is nonlinear, with economic slack providing greater downward pressure on inflation than an equal amount of tightness would produce upward pressure on inflation. He argues that this result implies that the Fed could push the unemployment rate lower with little cost in terms of higher inflation. Clark, Laxton, and Rose (1996) estimate an inflation model with the opposite nonlinearity; the Phillips curve is steep when output is above potential and shallow when output is below potential. This analysis leads them to argue that the Fed should be cautious about overshooting the economy's potential because the temporary output gains from added inflation are smaller than the temporary output losses that will be required to reduce inflation. The empirical results upon which both of these views rest are shaky. The postwar data appear to be most consistent with a linear Phillips curve.

C. The costs of disinflation in models that allow the possibility of a credible monetary policy are lower than those estimated from a traditional Phillips curve. Indeed, if wages and prices are perfectly flexible, then a credible monetary policy can produce a virtually costless disinflation. Although there is no professional consensus on the point, the empirical evidence suggests that wage and price inflation may be sticky for a wide variety of structural reasons. The Board staff's new quarterly econometric model of the domestic economy allows different assumptions about the expectations formation process, while retaining the feature that there are some adjustment costs associated with wage and price changes. In this forward–looking version of the model, under the assumption that a change in the Fed's inflation objective is viewed as credible by the public, the cost of

reducing inflation is about one–third the cost estimated under the assumption of adaptive expectations. However, the model provides no guidance on how to gain the assumed credibility, and as noted above, sluggish adjustment of inflation expectations seems to characterize postwar behavior fairly well . Indeed, a recent G–10 study (1995) on saving, investment, and real interest rates suggests that inflation expectations, at least in financial markets, may be formed with a very long memory.

D. From a practical perspective, people are likely to learn about monetary policy from observation of and experience with policy actions, rather than having either backward–looking expectations or perfect foresight. Empirical models that allow for "learning" on the part of economic agents are relatively complicated and there is not a larger body of research to draw on for guidance. In part, this reflects the fact that there are few episodes available to judge the speed with which people learn of large changes in policy objectives. Stylized examples of learning have been simulated using the Board staff model; not surprisingly, the results suggest that if the public is assumed to "learn" about changes in the Fed's objectives, the costs of disinflation are less than those estimated under the assumption of adaptive expectations but higher than those under complete credibility.

E. Recent discussions of monetary policy have drawn a distinction between a strategy of deliberate inflation reduction and an opportunistic strategy. A deliberate strategy entails an active effort to reduce inflation whenever it exceeds the long–run target. Such a policy may or may not involve the establishment of a numerical target and a timetable for reaching that target. An opportunistic strategy attempts to hold the line on inflation when it is moderate, by resisting inflationary pressures and waiting for favorable supply shocks and unanticipated demand shortfalls to produce disinflation (Orphanides and Wilcox, 1996).

1. Under the assumption of a simple linear Phillips curve with backward–looking expectations, the costs of achieving any given amount

of disinflation are identical under these two strategies; only the timing of disinflation is affected.

2. If, however, the inflation process can be influenced by the credibility of the monetary authority's commitment to stated policy objectives or by the transparency its objectives, then the costs of disinflation might differ between deliberate and opportunistic policies.

F. The principal advantage of the opportunistic approach is that the Fed does not pursue a policy that deliberately creates real output losses in order to reduce inflation. Moreover, this strategy may produce a smaller variance of real output around its potential than would a deliberate disinflation strategy (Orphanides, Small, Wieland, and Wilcox, 1996). A downside to the opportunistic approach is that it may take a long time to achieve the desired reduction in inflation and, along the way, the public may be uncertain about the Fed's long–run objective and the Fed's commitment to achieving that objective. Thus, it may be more difficult to gain credibility that could, in principle, reduce the costs of disinflation.

G. An argument for a deliberate approach to disinflation is that, to a first approximation, the desired rate of inflation can be reached by a date certain. Moreover, announcement effects or demonstration of a commitment to disinflation by achieving announced transitional targets could result in the accumulation of credibility that would reduce the output losses associated with incremental disinflation.

1. There is little evidence that, to date, the establishment of numerical targets and timetables for disinflation have reduced the output loss associated with disinflation in those countries that have adopted this strategy (Freeman and Willis; 1995).

2. With respect to the establishment of an appropriate timetable for a deliberate reduction in inflation, research provides little clear guidance.

Ball (1995) has found evidence in a cross–country study of disinflation that sacrifice ratios are lower for rapid disinflations than gradual disinflations. But others have argued that, if the monetary authority has credibility, gradual disinflations are likely to be less costly because there will be time for economic agents to adjust contractual commitments to account for the lower announced inflation trajectory (Buiter and Miller, 1985). Indeed, most forward–looking models with sticky wage and price setting have this property, including the Board staff's model. Nevertheless, there simply are not enough data to arrive at any firm conclusions on this issue.

H. The choice of a disinflation strategy ultimately depends on the preferences of policymakers—preferences that both reflect and help shape public opinion. Inflation, real output, and the variances of these variables are likely to be central concerns in developing a policy strategy. Moreover, strategies also may need to be evaluated for their contribution to financial stability and to the containment of systemic risk. Unfortunately, given the current state of our knowledge, the Federal Reserve will continue to face considerable uncertainty in designing strategies for monetary policy that reasonably account for all of these risks.

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