Falling Behind the Curve: A Positive Analysis of Stop-Start Monetary Policies and the Great Inflation*

Andrew Levin

Federal Reserve Board

and

John B. Taylor

Stanford University

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Abstract

This paper documents the evolution of long-run inflation expectations and models the stance of monetary policy from 1965 to 1980. Using a host of survey-based measures and financial market data, it demonstrates that long-run inflation expectations rose markedly from 1965 to 1969, leveled off in the mid-1970s, and then rose at an alarming pace from 1977 to 1980. The paper also shows that monetary policy during the period can by modeled by a policy rule with a time varying intercept and constant slope coefficients. This time varying rule implies a series of stop-start episodes in 1968-70, 1974-76, and 1979-80. In each episode, policy fell behind the curve by belatedly tightening, causing a contraction in economic activity and then stopping short before inflation was reduced to its previous level. The paper concludes by showing that this evidence and characterization of policy raises questions about most prominent theories of the Great Inflation and suggests a way to prevent future policy mistakes.

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1. Introduction

U.S. consumer price inflation, which had been stable at around 1 percent in the late 1950s and early 1960s, reached double-digit levels by the late 1970s. This bout of inflation is commonly referred to as the "Great Inflation" and has been widely viewed as one of the most dramatic failures of U.S. monetary policy since the founding of the Federal Reserve. Many analysts and commentators have sought to identify the primary causes of the Great Inflation; indeed, understanding its sources might help minimize the likelihood of a recurrence.

In this paper, we document the evolution of long-run inflation expectations and model the stance of U.S. monetary policy over the period from 1960 to 1980. We use this evidence to distinguish among various explanations of the Great Inflation and draw lessons for the future. Despite the remarkable breadth of the existing literature, relatively scant attention has been paid to the behavior of long-run inflation expectations over this period, and most of the empirical studies have focused on using a linear reaction function with fixed coefficients to represent the conduct of monetary policy over the entire Great Inflation period.

We begin by considering several distinct measures of long-run inflation expectations, which indicate that such expectations rose markedly during the late 1960s, remained elevated at that plateau through the mid-1970s, and then rose at an alarming pace from 1977 until mid-1980. Next, we analyze the behavior of real interest rates and show that the course of monetary policy during the Great Inflation period can be represented as a series of stop-start episodes that occurred in 1968-70, 1974-76, and 1979-80. In each case, belated policy tightening induced a contraction in economic activity, but that stance of policy was not sustained long enough to bring inflation back to previous levels.

The paper is organized as follows. Section 2 documents the evolution of long-run inflation expectations. Section 3 models the stance of monetary policy. Section 4 draws implications and Section 5 concludes.

2. The Evolution of Inflation Expectations

In this section, we characterize three stylized facts regarding the evolution of long-run inflation expectations over the Great Inflation period.

Stylized Fact #1: The Great Inflation started in the mid-1960s well before the 1970s.

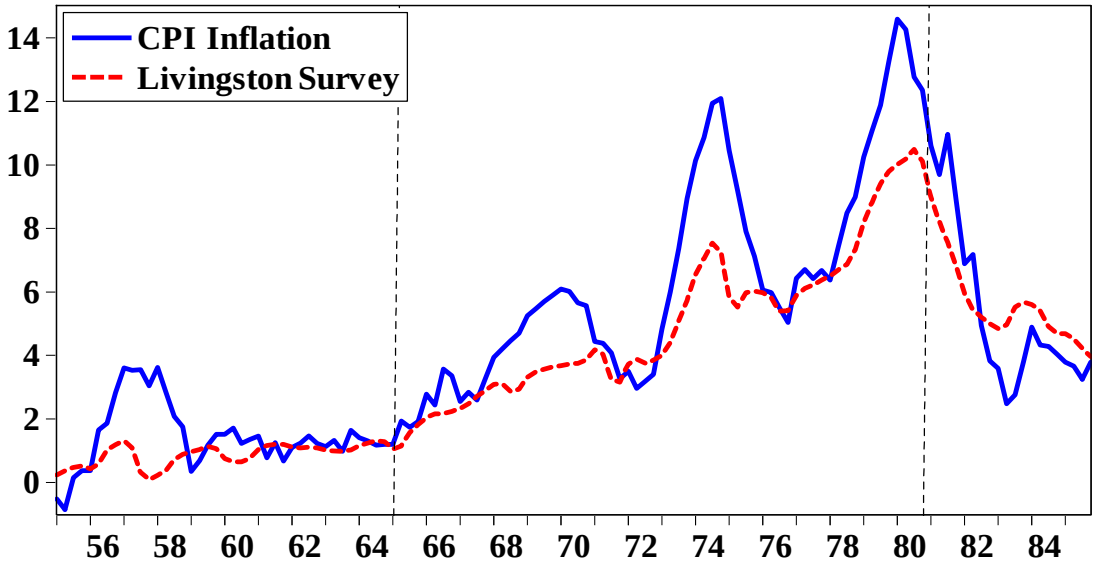
The classic measure of short-run inflation expectations is the Livingston survey of one-year-ahead projections of consumer price inflation. As recounted by Croushore (1997), this survey of business economists was initiated by Joseph Livingston in 1946 and is now conducted by the Federal Reserve Bank of Philadelphia, which began providing support for the survey in the late 1970s and assumed full responsibility in 1989. Since its inception, the survey has been conducted in May and December of each year, shortly after the release of the preceding month's consumer price index (CPI).[1] There have generally been about 50 respondents to each survey, including professional forecasters, chief economists of financial institutions and nonfinancial corporations, and a few academic and government economists.[2] Over the years, the Livingston survey has received widespread attention in the business press and has been analyzed in numerous research papers.[3]

[1] Given this timing of the survey, the horizon of the inflation projections is not exactly one year but alternates between 10 and 14 months—this modest degree of variation in the forecast horizon can be relevant for certain types of statistical tests but is not crucial for any of the analysis presented in this paper.

[2] In the mid-1990s, the sample of respondents included economists from nonfinancial businesses (30 percent), financial institutions (50 percent), academic institutions (13 percent), and other organizations including government agencies, labor unions, and insurance companies (8 percent). For further discussion, see Croushore (1997).

[3] A comprehensive bibliography is available online at http://www.philadelphiafed.org .

Figure 1
Actual Inflation and Short-Run Inflation Expectations, 1955-1985



Note: The solid line depicts the realized four-quarter-average CPI inflation rate, and the dashed line depicts the median response to the Livingston survey regarding expected inflation over the year ahead.

As shown in Figure 1, the Livingston survey indicates that short-run inflation expectations were remarkably stable at about 1 percent from 1956 until 1964, even though actual CPI inflation exhibited substantial variation over this period. An inflation rate of about 1 percent was presumably viewed as consistent with the price stability objective specified in the Federal Reserve's mandate given by the Employment Act of 1946.

In 1956-57, for example, realized CPI inflation reached a peak of nearly 4 percent, but one-year-ahead inflation expectations remained well-anchored, reflecting confidence that tighter monetary policy would be sufficient to bring inflation back to around 1 percent. In effect, business economists and professional forecasters did not expect these inflation fluctuations to be very persistent, but instead anticipated that inflation would subside quite quickly. Indeed, the firm

anchoring of inflation expectations during the late 1950s and early 1960s may well have contributed to the relatively low persistence of actual inflation over this period.[4]

Starting in 1965, however, a sharply different pattern of expectations formation becomes evident in the Livington survey: Short-run inflation expectations begin rising in parallel with actual inflation and reached about 4 percent by 1970, indicating that forecasters anticipated that the upswing in actual inflation would *not* be purely transitory. Moreover, by 1971-72, short-run inflation expectations were virtually identical to actual CPI inflation, consistent with the view that policymakers would allow inflation to stay at around 4 percent rather than taking any decisive action to return to an environment of price stability.

Yields on Treasury securities provide additional confirmation that inflation expectations began to shift markedly around 1965. In particular, Gurkaynak, Sack and Wright (2007) employed the methodology of Nelson and Siegel (1987) and Svensson (1994) to fit daily data on the entire term structure of bond yields since 1961, thereby obtaining a smoothed yield curve that can be used to compute forward interest rates at each date. During the 1960s and early 1970s, the 7-year bond was the longest maturity issue that was auctioned regularly by the U.S. Treasury, and hence for this period Gurkaynak et al. (2007) constructed daily series of one-year forward nominal interest rates for horizons up to six years ahead. Henceforth, we refer to the six- year-ahead forward interest rate as the "far-ahead forward rate;" it should be noted, however, that we have conducted sensitivity analysis which confirms that all of our conclusions are robust to the use of forward rates at even longer horizons (which are available starting in the early 1970s).

To make inferences from far-forward nominal interest rates regarding the evolution of long-run inflation expectations, we assume that the far-forward real interest rate has a constant value of 2 percent and that the term premium has a constant value of 1 percent. The constancy of

[4] For further discussion, see Bordo and Schwartz (1999), Sargent (1999), Levin and Piger (2004), and Benati (2008).

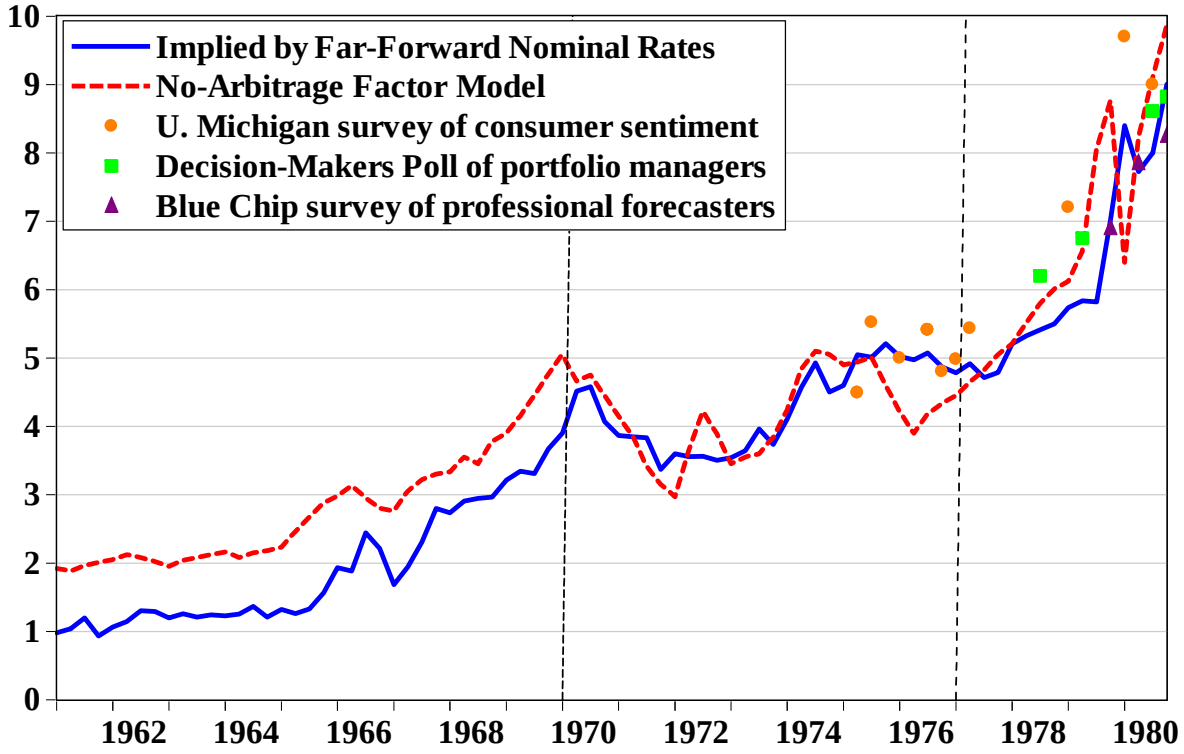
the far-forward real interest rate is consistent with the view that the real economy would be expected to converge to its balanced growth path over a 7-year horizon, and the value of 2 percent for the equilibrium short-term real interest rate is the same as embedded in the Taylor (1993) rule.

Of course, investors might well perceive the equilibrium real interest rate as time-varying, especially in response to a persistent shift in productivity growth like the one that occurred during the 1970s. Indeed, a long literature has documented the extent to which term premiums vary over time, reflecting movements in the perceived distribution of returns as well as in the market price of risk. Nonetheless, as discussed further below, the magnitude of variations in the far-forward real interest rate and the term premium appear to be fairly small compared with the marked shifts in expected inflation that occurred during the Great Inflation, so that this measure of long-run inflation expectations can be very useful, at least as a rough gauge.

As depicted by the solid line in Figure 2, this measure indicates that long-run inflation expectations were quite stable from 1961 until early 1965 at a rate just above 1 percent, consistent with the implications from the Livingston survey. In effect, this evidence confirms that during the early 1960s inflation expectations were firmly anchored at a level broadly consistent with the Federal Reserve's mandate of price stability.

Starting in mid-1965, however, this measure exhibits a fairly dramatic kink: Far-forward inflation expectations began to drift upward steadily, reaching a peak of about 4½ percent in 1970, and then remained in the range of 3½ to 4½ percent over the next several years. Again, this pattern is consistent with the implications of the Livingston survey—not only that inflation expectations drifted upward during 1965-70, but that these expectations remained at an elevated plateau during the early 1970s.

Figure 2
The Evolution of Long-Run Inflation Expectations, 1961-1980



Note: The solid line depicts the forward rate of expected inflation six years ahead, using nominal forward rates computed by Gürkaynak, Sack, and Wright (2006) and subtracting a constant far-forward real rate of 2 percent and a constant term peremium of 1 percent. The dashed line depicts the 5-year expected inflation rate from the no-arbitrage factor model of Ang, Bekaert, and Wei (2008). The three survey measures of long-run inflation expectations are defined in the notes to Table 1.

Importantly, these findings regarding the early stages of the Great Inflation are not sensitive to alternative assumptions about the determination of real interest rates or term premium. For example, a recent study by Ang, Bekaert, and Wei (2008) also provides a measure of long-run expected inflation implied by a no-arbitrage factor model of the term structure. Their analytical framework utilizes latent factors and allows for Markov switching among four different regimes, and was estimated using data over the period 1952:2 to 2004:4 for CPI inflation and zero-coupon Treasury yields at four maturities (1, 4, 12, and 20 quarters).

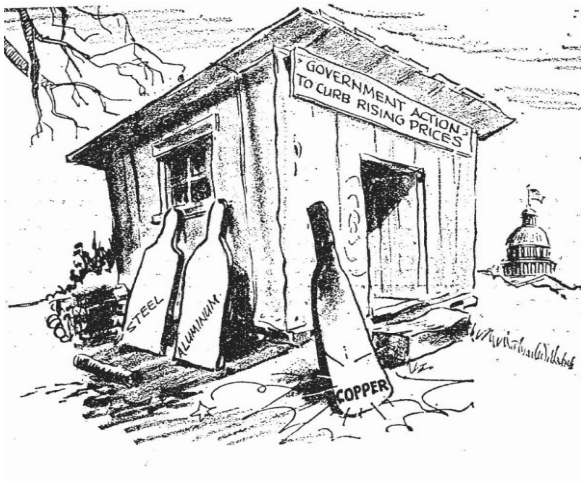
As shown by the dashed line in Figure 2, the five-year average expected inflation rate produced by the no-arbitrage factor model of Ang, Bekaert, and Wei (2008) moves largely in parallel with the measure implied by far-forward nominal interest rates. The level of expected inflation is nearly a percentage point higher during the early 1960s, because the factor model implies that the real interest rate and the inflation risk premium were a bit below their historical averages during this period. (Of course, that implication might change if the Livingston survey were incorporated into the estimation procedure.) More broadly, however, the factor model underscores the extent to which inflation expectations were relatively low and stable during the early 1960s, began rising steadily in 1965, and reached a peak close to 5 percent by 1970.

Moreover, while no direct surveys of long-run inflation expectations were conducted during this period, the view that the Great Inflation started around 1965 is certainly corroborated by the general tenor of media reports, congressional hearings, and academic conferences through the remainder of the decade. Indeed, as shown in Figure 3, editorial cartoons provide contemporary evidence of widespread public concerns about the upward drift in inflation from 1965 to 1969.

In summary, the evidence from the Livingston survey and from bond yield data demonstrates conclusively that the "Great Inflation of the 1970s" actually started earlier, and indeed, that its roots can be traced back to about 1965. This conclusion is consistent with the broad assessment of DeLong (1997), who argued that "America's Peacetime Inflation: The 1970s" actually began well before 1970.

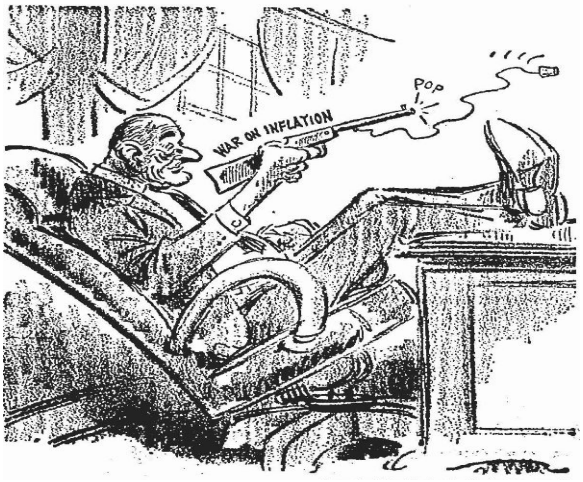
Figure 3
Perspectives on the Early Years of the Great Inflation (1965-69)

November 1965



"Latest paddle at the Washington woodshed"

November 1966



"Could stand some escalation."

February 1969

"He keeps getting bigger and bigger all the time."

December 1969

"Signals—hut... hut?"

Credits: Upper left: Kuekes, *Cleveland Plain Dealer*, reprinted in *New York Times (NYT)* on November 28, 1965, p.E9. Upper-right: Hesse, *St. Louis Globe-Democrat*, reprinted in *NYT* on November 27, 1966, p.E6. Lower-left: Canfield, *Newark Evening News*, reprinted in *NYT* on February 2, 1969, p.E13. Lower-right: Canfield, Newark Evening News, reprinted in *NYT* on December 7, 1969, p.E11.

Stylized Fact #2: Long-run inflation expectations remained at a plateau of about 5 percent during the first half of the 1970s and shifted upwards rapidly over the remainder of the decade.

In the mid-to-late 1970s, several surveys of inflation expectations began to include questions regarding respondents' expectations at longer horizons. In spring 1975, for example, the University of Michigan's survey of consumer sentiment started asking occasionally about the expected average CPI inflation rate over the next 5 to 10 years. In mid-1978, Richard Hoey's "Decision-Makers Poll" of institutional portfolio managers started including an occasional question about the expected average CPI inflation rate over the coming decade.[5] And in fall 1979, Blue Chip Economics Indicators began asking about the longer-run outlook in its survey of professional forecasters, including a question about the expected 10-year average inflation rate for the gross national product (GNP) deflator.[6]

Table 1 reports the median value of the long-run inflation projections from each of these three surveys over the period from 1975 through the end of 1980; these survey results are also plotted in Figure 2. Although the timing of the surveys is quite uneven over this period, the results can be directly compared in 1979 and 1980, and the degree of consistency in long-run inflation expectations across the three groups of respondents—households, institutional portfolio managers, and professional forecasters—seems particularly remarkable in light of the volatility of actual inflation over this period.

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[5] The Decision-Makers Poll was initiated when Richard B. Hoey was employed at Bache, Halsey, Stuart & Shields, and he continued to conduct the survey when he moved to Warburg, Paribus, & Becker, then to Drexel, Burnham, Lambert, and finally to Barclays de Zoete Wedd Research. The number of respondents varied between 175 and 500 and included chief investment officers, corporate financial officers, bond and stock portfolio managers, industry analysts, and economists. Although the survey was originally disseminated via proprietary newsletters, Holland (1984) received permission to publish the median survey responses for long-run inflation expectations; see also *Economic Report of the President* (1985, chapter 1), Havrilesky (1988) and Darin and Hetzel (1995).

[6] Although Blue Chip Economic Indicators is a proprietary survey, the median responses for long-run inflation expectations are publicly available for 1979 to 1991 and can be downloaded from http://www.philadelphiafed.org .

Table 1
Surveys of Long-Run Inflation Expectations, 1975-1980

	Michigan Survey (households)	*Decision-Makers Poll (portfolio managers)*	*Blue Chip Survey (professional forecasters)*
1975Q2	4.5	---	---
Q3	5.5	---	---
1976Q1	5.0	---	---
Q3	5.4	---	---
Q4	4.8	---	---
1977Q1	5.0	---	---
Q2	5.4	---	---
1978Q3	---	6.2	---
1979Q1	7.2	---	---
Q2	---	6.8	---
Q4	---	---	6.9
1980Q1	9.7	---	---
Q2	---	---	7.9
Q3	9.0	8.6	---
Q4	---	8.8	8.3

Note: This table reports the median of respondents' projections for three surveys: The University of Michigan survey of consumer sentiment asked about average CPI inflation over the next 5 to 10 years; the Decision-Makers Poll survey of institutional portfolio managers asked about average CPI inflation over the next 10 years; and the Blue Chip Economic Indicators survey of professional forecasters asked about the average GNP price inflation rate over the next 10 years.

Moreover, as shown in Figure 2 above, these survey-based measures of long-run inflation expectations line up quite closely with the two indicators derived from the term structure of nominal interest rates, further bolstering our confidence that this set of measures provides a useful gauge of the evolution of long-run inflation expectations.

The Michigan survey indicates that household expectations regarding the longer-run inflation outlook stayed in the range of 4½ to 5½ percent from mid-1975 until early 1977, a range that is very similar to that of the two expectations measures derived from bond yield data and to the levels of these two measures at the beginning of the decade. Evidently, long-run inflation expectations had remained around this plateau since about 1970; that is, policymakers were not successful in bringing down long-run inflation expectations but did at least manage to avoid any marked upward shift over the period through early 1977.

Starting in mid-1977, however, long-run inflation expectations began rising at an alarming pace. The Michigan survey indicates that these expectations rose sharply from 5 percent in early 1977 to around 7 percent by early 1979 and to more than 9 percent by early 1980. The results of the Decision-Makers Poll are very similar, with long-run inflation expectations rising from about 6 percent in mid-1978 to about 7 percent in mid-1979 and to nearly 9 percent by 1980. Again, these trajectories are very close to those of the two indicators derived from term structure data, which rose from 5 percent in early 1977 to about 8½ percent by early 1980.

Stylized Fact #3: Long-run inflation expectations did not ebb until late 1980

In October 1979, about two months after Paul Volcker was appointed as chairman, the Federal Reserve switched operating procedures and adopted monetary aggregate targets that led to an unprecedented spike in the federal funds rate. However, this policy tightening turned out to be very short-lived: the stance of policy eased substantially in spring 1980, as the federal funds rate was cut back to its mid-1979 value and remained there until the fourth quarter of 1980.

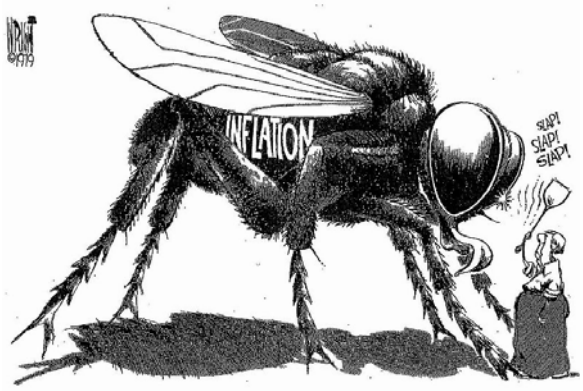
It is clear that long-run inflation expectations did not start shifting downward until after the decisive shift to a disinflationary course of policy in late 1980. This characteristic is apparent from the survey-based measures as well as the two indicators derived from term structure data. Indeed,

even the limited set of results from the Blue Chip Economic Indicators survey indicates that professional forecasters' long-run inflation expectations *increased* by about 1½ percentage points from October 1979 to the same month in 1980—a remarkably large shift within a 12-month period.

Finally, editorial cartoons can provide some additional sense of the public's skepticism about the anti-inflation policies that were implemented during the final phase of the Great Inflation. Indeed, as shown in Figure 4, the broad tenor of editorial cartoons in February-March 1980 was essentially unchanged from a year earlier, exhibiting little confidence that policymakers would take decisive steps to reverse the upward drift in inflation.

Figure 4
Perspectives on the Final Years of the Great Inflation (1979-80)

May 1979



"The fly vs. the flyswatter"

February 1980

"USA! USA! Is it working? USA!"

March 1980

"Stop worrying, y'all—it's guaranteed to open on impact."

March 1980

"New! Long-Range Anti-Inflation Ammo"

***Credits**:* Upper-left: Wright, *NYT*, May 1979. Upper-right: *Washington Post*, February 1980. Lower-left: Oliphant, *Washington Post*, March 1980. Lower-right: *Washington Post*, March 1980.

3. An Empirical Model of Monetary Policy during the Great Inflation

In this section we model empirically the evolution of the stance of monetary policy during the Great Inflation period. A number of previous studies—including Clarida, Gali, Gertler (1998) and Taylor (1999)—have focused on interest rate rules with fixed coefficients and have shown that monetary policy did not satisfy the Taylor principle over this period; that is, the federal funds rate was not raised by more than one-for-one in response to movements in actual inflation. Here we extend that earlier analysis by allowing for discrete shifts in the intercept of the policy rule. This approach is useful in accounting for the possibility of occasional upward shifts in the Federal Reserve's implicit inflation objective—as suggested by the evidence on long-run inflation expectations—and provides a representation for the stop-start pattern of policy tightening and easing that we discussed in the previous section.

To see this, let

$$r_t = \bar{r} + \gamma_\pi (\pi_t - \pi^*) + \gamma_y (y_t - y_t^*) \tag{1}$$

where r_t is the short-term real interest rate, π_t is the actual inflation rate, π^* is the central bank's objective for the inflation rate, and $y_t - y_t^*$ .is the output gap. If the slope coefficients $\gamma_\pi = \gamma_y = 0.5$, then the real interest rate should be raised by 50 basis points in response to a one percentage point increase in the inflation rate relative to target or the output gap. We assume that $\bar{r} = 2$ is the steady-state value of the real interest rate. We now proceed to show that by permitting simple shifts in the implicit inflation objective π^* in equation (1) provides a good fit of the real interest rate during the Great Inflation. We first must describe how we measure the other variables in the equation.

Measuring the Real Interest Rate.

When inflation expectations are fairly stable, the current inflation rate gives a reasonable estimate for the expectation of inflation. In such a situation the real interest rate can be computed by subtracting the current inflation rate from the nominal rate. In that case, equation (1) can be written with the nominal rate on the left hand side and the inflation rate added to the right hand side yielding the Taylor rule. But if inflation expectations are not firmly anchored—as in the Great Inflation period—it is necessary to get a better measure of inflation expectations. For this purpose, we use the Livingston survey of one-year-ahead CPI inflation projections. An advantage of this measure is that it was available nearly two decades prior to the onset of the Great Inflation. Accordingly, our analysis focuses on the real federal funds rate at a quarterly frequency, computed by subtracting the Livingston survey measure from the quarterly average of the nominal federal funds rate.[7]

Measuring the Output Gap.

As emphasized by Orphanides (2002, 2003), the use of real-time estimates of the output gap—as opposed to retrospective estimates constructed at a much later date—can have crucial implications in making assessments of the stance of monetary policy, especially because the difference between real-time vs. retrospective estimates of the output gap may be quite large during periods in which there are substantial shifts in trend productivity growth or the natural unemployment rate.

There are no extant records from the 1960s or 1970s regarding real-time Federal Reserve staff estimates of potential output or the output gap. Thus, following Orphanides (2002, 2003), one approach is to utilize the real-time assessments of potential output and the output gap that were

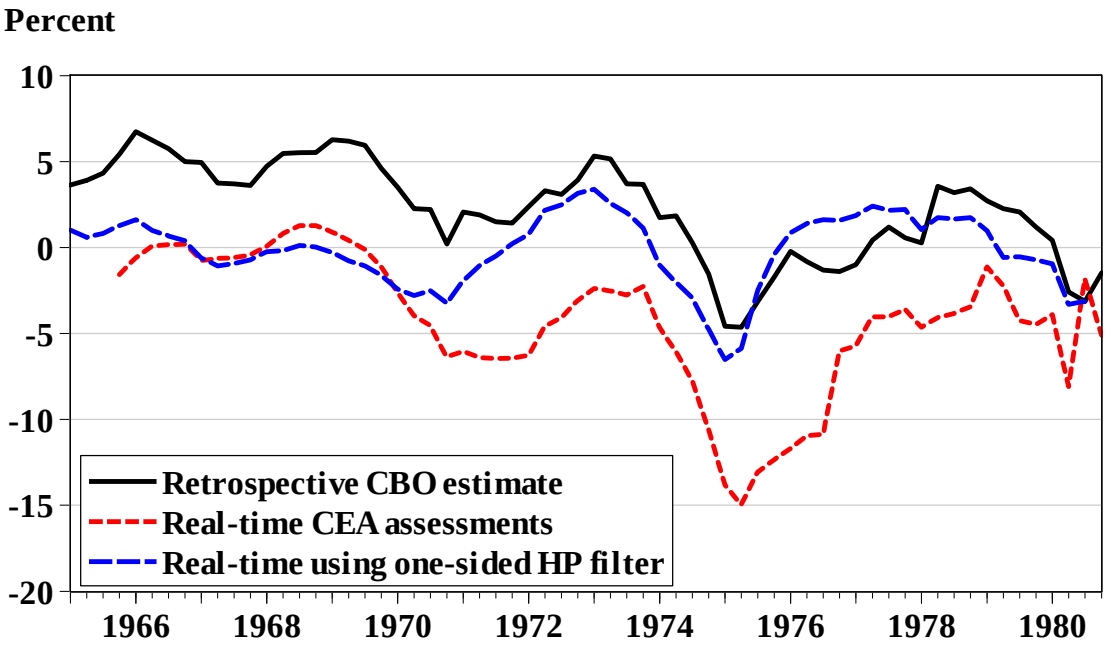
[7] The Livingston survey is conducted semiannually, in May and November; thus, we use linear interpolation to obtain a quarterly time series of one-year-ahead inflation expectations.

constructed by the Council of Economic Advisors and published annually in the *Economic Report of the President (ERP)*. And during the late 1960s, those estimates may well serve as a useful real-time proxy for the assessments that would have been relevant for policymakers at that time. Unfortunately, however, as the CEA estimates became increasingly politicized during the 1970s, neither economic analysts nor policymakers continued paying serious attention to these estimates. Therefore, following the approach of Cecchetti et al. (2007), we construct another proxy for the real-time output gap by applying a one-sided Hodrick-Prescott (HP) to each vintage of real GNP drawn from the Philadelphia Fed's real-time dataset, using a smoothing parameter of 1600.[8] While the Hodrick-Prescott method was not available in the 1970s, it corresponds well with less formal procedures economic analysts use to assess trends.

As shown in Figure 5, the HP filtered series for the real-time output gap is very similar to the CEA series during the late 1960s, but the two measures diverge quite dramatically starting in 1970. In particular, from 1966 to 1969, both series imply that the output gap was fairly close to zero—roughly 5 percentage points below the CBO's most recent retrospective estimate, which we henceforth refer to as the "true" output gap. In contrast, the CEA estimates indicate a dramatic widening of the output gap through the mid-1970s; indeed, the trough of about -15 percent during 1975 suggests that the magnitude of slack in the economy was approaching that of the Great Depression—an implication that underscores the pitfalls of using the CEA series as a real-time measure of the output gap. In contrast, the HP filtered measure remains only a few percentage points below the "true" output gap through the early 1970s, reaching a trough of about -6 percent in early 1975 before recovering sharply and then remaining positive from 1976 through 1979.

[8] We have also confirmed that the results are virtually identical for alternative values of the smoothing parameter.

Figure 5
Real-Time vs. Final Assessments of the Output Gap



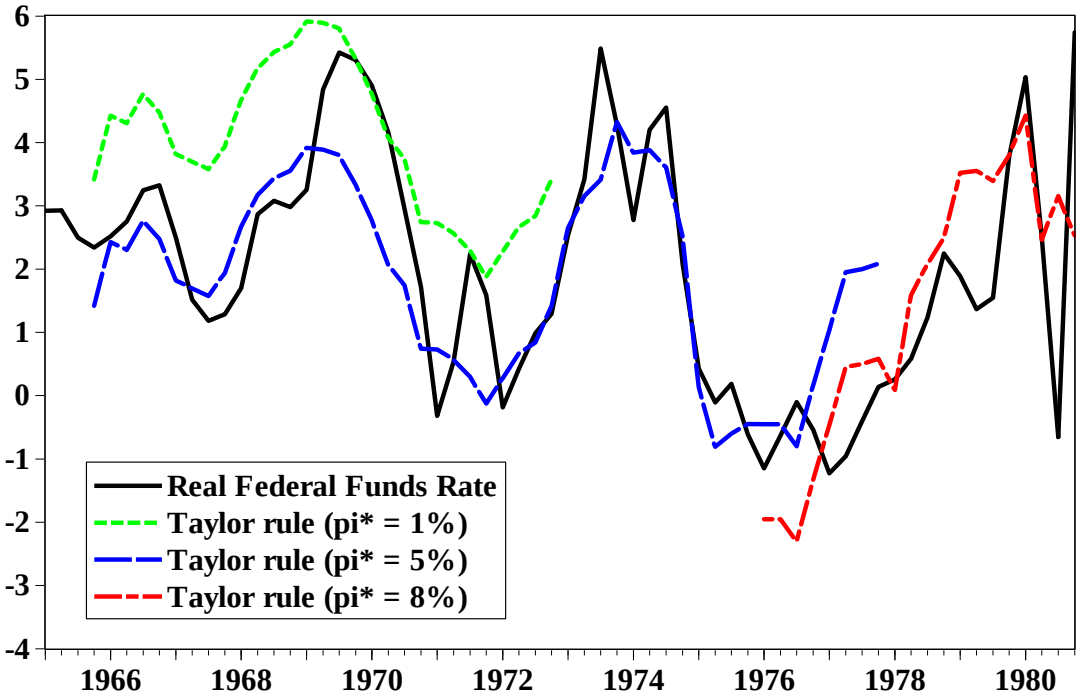
Note: This figure depicts three estimates of the output gap over the period 1965:1 through 1980:4. The solid line depicts the retrospective estimates of the Congressional Budget Office, using all data available through 2007. The short-dashed line depicts the contemporaneous estimates of the Council of Economic Advisors, published annually in the Economic Report of the President. *The long-dashed line depicts the estimate obtained by applying a one-sided Hodrick-Prescott filter to each vintage of real GNP taken from the Federal Reserve Bank of Philadelphia's real-time dataset.*

Discrete Shifts in the Inflation Objective.

Now consider the inflation objective, π^*. We measure actual inflation using the realized four-quarter average CPI inflation rate at each date, that is, the same definition of inflation as in the Livingston survey projections. There is no distinction between real-time vs. revised vintages of data for this inflation measure, because the CPI is not subject to revision. Of course, policymakers did not have an explicit inflation objective during the 1960s and 1970s so even talking about such an objective is an anachronism. However, as an empirical matter it is possible to get an excellent fit for equation (1) by simply assuming that the inflation objective moves up over time in three steps with each step corresponding to one of the three episodes for expected inflation. We show this graphically in Figure 6 for the case where there are three targets for the inflation rate are 1 percent, 5 percent, and 8 percent.

Figure 6 depicts the evolution of the short-term real interest rate and compares it to the prescriptions of the Taylor rule under these three alternative values of the inflation objective. Observe that there is a sequence of three episodes of stop-start monetary policy occurring in 1968-70, 1974-76, and 1979-80. In each case, after a period of ease, policy starts tightening inducing a contraction in economic activity, but the stance of policy was not sustained long enough to bring inflation down. It appears that there are three stages of each of these episodes: (1) policy remains passive while inflation begins to pick up, (2) policy starts to a contractionary effort once the inflation rate exceeds a particular threshold, where the value of the threshold depends on the previous inflation peak, and (3) contracting economic activity causes the policy tightening to stop before inflation has converged back to its initial rate.

Figure 6
Three Episodes of Start-Stop Monetary Policy, 1965-1980



Note: The solid blue line depicts the ex ante *real federal funds rate, using the Livingston survey as the measure of expected inflation. The other lines depict prescriptions of the Taylor (1993) rule for three specifications of the inflation objective: 1 percent (short-dashed), 5 percent (long-dashed), and 8 percent (dash-dotted).*

Regression Analysis.

The graphical implications of Figure 6 are easily confirmed by regression analysis of a Taylor-style rule that incorporates interest rate smoothing and that allows for discrete shifts in the regression intercept, using quarterly data for the period 1965q1 to 1980q3. The regression equation has the following form:

$$(2) \qquad \boldsymbol{FFR}_t = c_o + \rho \boldsymbol{FFR}_{t-1} + (1-\rho)[\alpha(\boldsymbol{PI4CPI}_t - \delta_1 \boldsymbol{DUM70}_t - \delta_2 \boldsymbol{DUM76}_t) + \beta \boldsymbol{YGAP}_t]$$

where ***FFR*** is the federal funds rate, ***PI4CPI*** is the four-quarter-average CPI inflation rate, ***YGAP*** is the one-sided HP-filter estimate of output gap, ***DUM70*** equals 1 for $t \geq$ 1970q2 and 0 otherwise, and ***DUM76*** equals 1 for $t \geq$ 1976q1 and 0 otherwise. It should be noted that the first dummy variable allows for the possibility of a shift in the implicit inflation objective when Arthur Burns became Federal Reserve chairman, and the second dummy variable allows for another shift that occurred at the onset of the election year of 1976.

As shown in the top panel of Table 2, the regression results in the absence of intercept shifts (that is, imposing the restriction $\delta_1 = \delta_2 = 0$) are very similar to those reported in earlier studies. In particular, the estimated policy rule exhibits a very high degree of interest rate smoothing ($\rho = 0.83$) and a fairly aggressive response to the output gap ($\beta = 1.85$). Moreover, the coefficient on inflation is very close to unity, confirming that policy did not satisfy the Taylor principle during this period; that is, the stance of policy was not tightened sufficiently to stabilize inflation around a constant objective.

Now consider allowing for shifts in the regression intercept in 1970q2 and 1976q1. From the middle panel of Table 2, it is evident that these dummy variables are highly significant, with t-statistics exceeding 4, and the estimated coefficients δ_1 and δ_2 indicate that the Fed's implicit inflation objective rose by about 2 percentage points at each of these dates. Indeed, while these

two breakdates have been treated as known *a priori* (based on the key points in Burns' tenure as Federal Reserve chairman), the significance levels are so high that breaks close to these two dates would be confirmed even by procedures that test for the presence of structural breaks at an unknown set of dates and that tend to exhibit substantially lower empirical power.

Moreover, once we account for these two shifts in the implicit inflation objective, the coefficient on inflation in the policy rule is now close to 1.5—roughly consistent with its value in the Taylor rule—and is significantly greater than unity.

Finally, as shown in the bottom panel of the table, the results are essentially the same—though with somewhat higher standard errors—when the equation is estimated using instrumental variables (IV) instead of ordinary least squares (OLS).

Table 2
Regression Evidence on Start-Stop Monetary Policies during the Great Inflation

OLS Estimation Without Shifts in Intercept

Variable	Coefficient	Std. Error	t-Statistic
c_o	0.17	0.38	0.44
ρ	0.83	0.11	7.80
α	1.05	0.33	3.17
β	1.85	1.33	1.39

OLS Estimation Allowing for Intercept Shifts

Variable	Coefficient	Std. Error	t-Statistic
c_o	0.40	0.34	1.17
ρ	0.61	0.10	6.06
α	1.41	0.19	7.27
β	1.25	0.37	3.39
δ_1	1.94	0.46	4.21
δ_2	2.10	0.52	4.03

IV Estimation Allowing for Intercept Shifts

Variable	Coefficient	Std. Error	t-Statistic
c_o	0.25	0.36	0.70
ρ	0.72	0.12	6.03
α	1.52	0.31	4.85
β	1.64	0.71	2.31
δ_1	2.04	0.62	3.28
δ_2	2.27	0.70	3.22

Note: The upper and middle panels report the results of ordinary-least squares (OLS) estimation of equation (2), and the lower panel indicates the results of instrumental variable (IV) estimation, where the instruments include a constant, *DUM70*, *DUM76*, the lagged values of *PI4CPI* and *YGAP*, and two lagged values of *RFFE*.

4. Implications

What are the implications of these stylized facts about inflation expectations and the evolving stance of monetary policy? In our view, these facts raise serious doubts about most of the prominent explanations of the Great Inflation, point to an alternative explanation, and suggest a way to prevent reoccurrences in the future.

Doubts about Some Prominent Explanations of the Great Inflation

First, the strong evidence that the rise in expectations of inflation began in 1965—well before the first oil shock—raises serious doubts that the Great Inflation was caused by aggregate supply shocks as emphasized by Alan Blinder. Adding to this evidence is that the second big rise in long-run inflation expectations occurred in 1975-78, a period when energy and commodity prices were relatively stable.

Second, because the period 1965-80 is not well characterized by a monetary policy regime with a stable inflation goal, it should not be viewed as having been caused mainly by misperceptions of potential growth or the natural unemployment rate as emphasized by Athanasios Orphanidies. Such misperceptions may well have contributed to short-term inflation pressures over this period but cannot explain the rapid upward shifts in long-run inflation expectations during the late 1960s and again during the late 1970s.

Third, the evidence is not consistent with the idea that changes in economic theory lead to the rise and then fall in inflation expectations as has been emphasized by one of us (Taylor (1997). Although the evidence of steady rising inflation expectations starting in the mid 1960 gives support to the idea that economic theory was having an impact on policy (because this was the height of the period when economists thought there was a stable long run Phillips curve), the rise in expectations

of inflation after the mid 1970s (long after the idea that there was no long run Phillips curve tradeoff) raises strong doubts about such an explanation. Even if the accelerationist Phillips curve idea raised concerns about the cost of disinflation, it would not have generated higher inflation.

Fourth, the evidence is not consistent with the view that the magnitude and duration of the Great Inflation can be attributed to the extent that policy makers only learned gradually about the slope of the Phillips curve—an explanation emphasized by Sargent (1999), Primiceri (2003), and others. The continuing rise in inflation long after the data showed the Phillips curve was vertical and that there were therefore no plausible gains in employment and output from doing so is evidence against this hypothesis.

Fifth, the data do not support the view that the Great Inflation resulted primarily from time inconsistency on the part of policymakers.

Political Factors and Lessons for the Future

If all these explanations seem inconsistent with our data, then what was the cause? What lead to the recurring sequence of stop-start policies and the corresponding upward drift of long-run inflation expectations? We think the most likely explanation is a combination of political pressures on the Federal Reserve, as has been emphasized by Meltzer (2005, 2009), combined with a lack of clear guidelines for policy makers to resist these pressures. Although the Employment Act of 1946 established the goal of price stability as part of the Federal Reserve's mandate, this goal was not defined in terms of a specific objective that would have facilitated policy strategy and communication, thereby providing a firm anchor for inflation expectations.

There is considerable anecdotal evidence that the Johnson, Nixon, Ford, and Carter Administrations made persistent attempts to exert pressures on the Fed. During each of these administrations there were failed attempts to control inflation via other tools—including fiscal

policy in the late 1960s, wage and price controls in the early 1970s, the Whsip Inflation Now (WIN) movement in the mid 1970s and credit controls in 1979-80. All of these distracted from the need for monetary policy to take full responsibility for this task. And each time the Fed stopped short in its effort to bring inflation down, political pressures seemed to be a cause. Even the aborted first attempt to break the back of inflation expectations by Paul Volcker ended with the Carter credit controls and a sharp drop in interest rates as we described above.

Other factors amplified these pressures such as financial market regulations—most notably Regulation Q—which constrained the Federal Reserve's ability to tighten policy without undermining the viability of savings & loan institutions. And technical aspects of policy making such as the increased use of forecasts in making adjustments to the stance of monetary policy; it appears in retrospect that excessive weight was placed on economic projections (which often turned out to be overly optimistic) rather than on the current state of the economy. For example, Martin was optimistic that fiscal constraint would slow the economy in 1967, but he subsequently regretted having relied too much on that assessment. Similarly, there was recurring under prediction of inflation outcomes throughout the 1970s.

If these political factors are the explanation then what actions might be taken to reduce the likelihood of a recurrence of the Great Inflation? In our view, the use of simple understandable rules or benchmarks for the conduct of monetary policy can be of great help. For example, a rule such as the Taylor (1993) rule specifies a quantitative inflation objective of 2 percent and clearly prescribes how the stance of policy should be adjusted to achieve this objective over time. Furthermore, this rule is specified in terms of the current inflation rate and output gap, thereby avoiding the pitfalls of relying on any given model for generating macroeconomic forecasts. On occasion, of course, policymakers might find compelling reasons to deviate from the prescriptions of any simple rule, but even in those circumstances, transparency and credibility might well be

enhanced by describing policy strategy in terms of the rationale for the temporary departure from the benchmark rule.

5. Conclusion

In this paper, we have characterized the evolution of long-run inflation expectations and the stance of monetary policy over the period from 1965 to 1980, and we have employed this evidence to distinguish among various competing explanations regarding the causes of the Great Inflation.

Using survey-based measures and financial market data, we have shown that long-run inflation expectations rose markedly from 1965-69, remained elevated but stable through the mid-1970s, and then deteriorated at an alarming pace from 1977 to 1980. We have also shown that the course of monetary policy over this period is well represented by a sequence of stop-start episodes that occurred in 1968-70, 1974-76, and 1979-80. In each case, belated policy tightening induced a contraction in economic activity, but that stance of policy was not sustained long enough to bring inflation back to previous levels.

Finally, we have shown that several well known explanations of the Great Inflation do not stand up to the data we present and that strong political pressures exerted without clear monetary guidelines to resist them are the most likely explanation of the Great Inflation. This suggests that the likelihood of a recurrence of inflation—or other serious policy mistakes can be best minimized by the use of simple rules as benchmarks for the conduct of monetary policy.

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