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The quest for prosperity without inflation ☆

Athanasios Orphanides

Division of Monetary Affairs, Board of Governors of the Federal Reserve System, Washington, DC 20551, USA

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Abstract

In recent years, activist monetary policy rules responding to inflation and the level of economic activity have been advanced as a means of achieving effective output stabilization without inflation. Advocates of such policies suggest that their flexibility may yield substantial stabilization benefits while avoiding the excesses of overzealous discretionary fine-tuning such as is thought to characterize the experience of the 1960s and 1970s. In this study I present evidence suggesting that these conclusions are misguided. Using an estimated model, I show that when informational limitations are properly accounted for, activist policies would not have averted the Great Inflation but instead would have resulted in worse macroeconomic performance than the actual historical experience. The problem can be attributed, in large part, to the counterproductive reliance of these policies on the output gap. The analysis suggests that the dismal economic outcomes of the Great Inflation may have resulted from an unfortunate pursuit of activist policies in the face of bad measurement, specifically, overoptimistic assessments of the output gap associated with the productivity slowdown of the late 1960s and early 1970s.
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E-mail address: athanasios.orphanides@frb.gov (A. Orphanides).

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1. Introduction

In his 1957 lectures on *Prosperity Without Inflation*, Arthur Burns eloquently explained that economic policies since the enactment of the Employment Act of 1946 had introduced an inflationary bias in the US economy which had "marred our nation's prosperity in the post-war period" (Burns, 1957, p. v). By promoting "maximum employment", the Act encouraged stimulative policies which, by prolonging expansions and checking contractions, resulted in an upward drift in prices. Burns called for an amendment to the Act, "a declaration by the Congress that it is the continuing policy of the federal government to promote reasonable stability of the consumer price level" (p. 71). Such an amendment, he thought, would lead to a greater policy emphasis "on the outlook for prices and on how reasonable stability of the price level is to be sought" (p. 72). And a reasonable price stability objective "could go a considerable distance in dissipating the widespread belief that we are living in an age of inflation and that our government, despite official assertions and even actions to the contrary, is likely to pursue an inflationary course over the long run" (p. 71). With the appropriate policies, Burns concluded, "[r]easonably full employment and a reasonably stable price level are not incompatible" (p. 88).

Burn's proposed price stability amendment was never enacted. Instead, with the beginning of the 1960s, economic policy was further refined placing even greater emphasis on achieving and maintaining full employment. As Arthur Okun later explained: "The revised strategy emphasized, as the standard for judging economic performance, whether the economy was living up to its potential rather than merely whether it was advancing" (Okun, 1970, p. 40). The resulting activist stabilization policies were not meant to be inflationary. "Ideally," Okun added, "total demand should be in balance with the nation's supply capabilities. When the balance is achieved, there is neither the waste of idle resources nor the strain of inflation pressure" (p. 40).

Despite the best of intentions, the activist management of the economy during the 1960s and 1970s did not deliver the desired macroeconomic outcomes. Following a brief period of success in achieving reasonable price stability with full employment, starting with the end of 1965 and continuing through the 1970s, the small upward drift in prices that so concerned Burns several years earlier gave way to the Great Inflation. Amazingly, during much of this period, from February 1970 to January 1977, Arthur Burns, who so opposed policies fostering inflation, served as Chairman of the Federal Reserve. How then is this macroeconomic policy failure to be explained? And how can such failures be avoided in the future?

Many excellent studies have identified a number of contributing factors to this experience.[1] By several accounts, blame for the failure is to be attributed to the discretionary management of the economy during the period.[2] One potential

[1] Any short listing of studies on this question is bound to be incomplete. The fascinating recent historical accounts provided by De Long (1997), Hetzel (1998), and Mayer (1999) provide extensive bibliographies.

[2] An alternative is to point towards unfavorable supply shocks, especially in energy prices. Barsky and Kilian (2002), present convincing evidence that such shocks cannot account for the inflation experience.

explanation relies on the possibility of a built-in inflationary bias in monetary policy either because of political concerns or a fundamental dynamic inconsistency problem. Another explanation suggests incorrect economic analysis which may have led to a futile attempt to exploit a non-existent long-run inflation-unemployment tradeoff.[3] Both arguments lead to a simple and direct conclusion. Had monetary policy followed a rule focused towards maintaining reasonable price stability, the Great Inflation would have been averted. A concern, however, is that such policies may result in undesirable employment and output volatility.

Along these lines, simple activist monetary policy rules have been advanced as a means of achieving effective output stabilization consistent with near price stability. These rules prescribe that policy respond to inflation and the level of economic activity. Advocates of such policies suggest that these rules provide a flexibility that yields substantial stabilization benefits but simultaneously maintain a discipline which avoids the excesses of overzealous discretionary fine-tuning such as is thought to characterize the U.S. experience of the 1960s and 1970s. (See, e.g. Taylor, 1999a, b). A critical aspect of these activist rules is the emphasis they place on the level of economic activity in relation to a concept of the economy's potential when resources are fully employed. Unfortunately, as a practical matter, the measurement problems associated with the concept of full employment present substantial difficulties. Thus, while the strategy of attempting to stabilize the economy at its full employment potential could be highly successful if the full employment objective were properly measured, in practice, these activist strategies may not yield the desired results.

In this paper, I use the historical experience of the United States economy from 1965 to 1993 to examine the quantitative significance of this concern. Using an estimated model, I contrast the performance of the economy under the assumption that policymakers could have implemented activist stabilization rules with perfect information with the performance under the realistic alternative that policymakers could have relied only on the information available to them in real time. The experiment suggests that the stabilization promise suggested by activist policy rules is indeed illusory. As I demonstrate, the apparent improvement in economic performance that these rules suggest over actual experience can be attributed to unrealistic informational assumptions regarding the knowledge policymakers can reasonably have about the state of the economy at the time when policy decisions are made.

Although these results might appear paradoxical at first, upon reflection they should be rather obvious. The emphasis on the output gap in activist policy rules suggests that the premise underlying these rules does not to differ fundamentally from the rationale underlying the activist discretionary policy of the 1960s and 1970s. Elaborating on the importance of the output gap at that time, Okun observed that "the focus on the gap between potential and actual output provided a new scale for the evaluation of economic performance, replacing the dichotomized business cycle standard which viewed expansion as satisfactory and recession as unsatisfactory. This new scale of evaluation, in turn, led to greater activism in economic policy: As long as the economy was not realizing its potential, improvement was needed and

[3] Sargent (1999) presents a novel interpretation which brings together elements of both explanations.

government had a responsibility to promote it" (1970, p. 41). Despite outward appearances, the activist discretionary policies advocated and practiced during the 1960s and 1970s and the activist policy rules advocated more recently share fundamental similarities.

The problem leading to the Great Inflation, then, was not necessarily that policy relied on discretion rather than a rule but that policy was inappropriately *activist*, much like an inappropriately activist policy rule would have suggested at the time. Examination of the information available to policymakers at the time clarifies the source of the problem. The bulk of the error can be traced to the mismeasurement of potential output. Examination of the evolution of estimates of potential output and resulting assessments of the output gap during the 1960s and 1970s suggests that the problem could be attributed in large part to the productivity slowdown which, though clearly seen in the data with the benefit of hindsight, was virtually impossible to ascertain in real time.

In retrospect, this danger should perhaps have been given greater attention. After all, the information problem was and remains one of the most significant impediments to successful stabilization policy. Further, the information problem has been central in monetarist arguments favoring non-activist policy rules over activist discretionary policies long before the Great Inflation. As early as 1947, Milton Friedman (1947) had sharply criticized reliance on unrealistic informational assumptions for Keynesian prescriptions to maintain "full employment". More recently Allan Meltzer (1987) has again illustrated how lack of information limits short-run stabilization policy. As Karl Brunner summarized: "Discretionary management ultimately fails to deliver, even with the best of intentions, on its promise. The information problem separates the reality and the rationale of discretionary management by an unbridgeable gulf." (Brunner, 1985, p. 12).

The likely policy lapse leading to the Great Inflation, therefore, can be simply identified. It was due to the overconfidence with which policymakers believed they could ascertain in real-time the current state of the economy relative to its potential. The willingness to recognize the limitations of our knowledge and lower our stabilization objectives accordingly would be essential if we are to avert such policy disasters in the future.

2. Policy rules

Over the past several years, a number of authors have examined the stabilization performance of simple rules for monetary policy.[4] A characteristic family of such rules prescribes that the short-term nominal interest rate, R_t, be set so that its deviation from a neutral setting, R_t^*, responds linearly to the deviation of a variable serving the role of an intermediate target, X_t, from a predetermined desired path, X_t^*.

$$R_t - R_t^* = \theta(X_t - X_t^*). \tag{1}$$

[4] McCallum (1999), Taylor (1999a), Clarida et al. (1999) provide surveys of this literature.

Starting with the large-scale model comparison studies reported in Bryant et al. (1993), many authors have investigated rules of this type in depth. A strategy that was found to yield particularly promising outcomes in the Bryant, Hooper and Mann volume was to target the sum of inflation and output deviations from their desired levels. A number of later studies confirmed the advantages of such a strategy and also examined the performance of a more general family of rules which allows for possibly different responses to inflation and output deviations from their desired levels. These rules respond linearly to the output gap, y_t, defined as actual minus potential output expressed as a fraction of potential output, and deviations of the annual rate of inflation, π_t^a, from a desired target, π^*:[5]

$$R_t - R_t^* = \gamma(\pi_t^a - \pi^*) + \delta y_t. \tag{2}$$

As is well known, the family of rules (2) nests an intriguing parameterization due to Taylor (1993) which describes the contours of actual policy in the United States since the late 1980s reasonably well. Taylor's rule uses the sum of the annual inflation rate, π_t^a, and the natural real rate of interest, r^*, as a proxy for the neutral nominal interest rate,

$$R_t^* = r^* + \pi_t^a \tag{3}$$

and substitutes the parameters $r^* = \pi^* = 2$, and $\gamma = \delta = 1/2$.

Taylor rule:

$$R_t = 2 + \pi_t^a + 0.5(\pi_t^a - 2) + 0.5y_t. \tag{4}$$

Subsequent research, importantly many of the studies in Taylor (1999c), has shown that a modified version of this rule with a stronger response to the output gap may have even better stabilization properties. This modification is:

Revised Taylor rule:

$$R_t = 2 + \pi_t^a + 0.5(\pi_t^a - 2) + 1.0y_t. \tag{5}$$

A detailed description of the historical performance of the original and revised parameterizations of the Taylor rule is provided by Taylor (1999b).

The macroeconomic performance of the U.S. economy over the recent period when Taylor's rule successfully describes the contours of interest rate settings has been remarkably good by historical standards. As a result of both this apparent success and the promising findings from the simulation studies, it has been tempting to associate good macroeconomic performance with setting policy based on the Taylor rule and even associate deviations of the federal funds rate from such rules as policy "mistakes". Taylor (1999b) identifies two episodes of such policy "mistakes" since the mid 1960s: the "excessive monetary ease of the late 1960s and 1970s", and the "excessive monetary tightness of the early 1980s" (p. 321).

[5] A number of authors, including Ball (1997), Clarida et al. (1999), Orphanides and Wilcox (1996), Rotemberg and Woodford (1999), Svensson (1997) and Woodford (1999), have shown how reaction functions related to (2) can be reconciled with optimizing central bank behavior in the absence of informational problems.

A potential difficulty in assessing the validity of such conclusions is that the retrospective policy evaluations upon which they are based rely on unrealistic informational assumptions. One problem, in particular, is that, as specified, these rules incorrectly assume that the policymaker has accurate information regarding the current values of inflation and the output gap when setting the interest rate. In fact, however, both inflation and the output gap are measured with considerable noise that should be taken into account in constructing an accurate depiction of realistic policy alternatives. Most importantly, the measurement of the economy's productive capacity—a necessary element for computing the output gap—presents notoriously complex problems whose understanding is absolutely critical for evaluating activist stabilization strategies.[6] To address this issue, let $\tilde{\pi}_t^a$ and $\tilde{y}_t$ denote the policymaker's observations regarding the annual inflation rate and the quarterly output gap, respectively, when decisions are made. In practice, policymakers recognize that the information they possess in real-time is imperfect and subject to revision. Following Orphanides (2003a), let x_t denote the noise in the observation of the true rate of inflation, π_t^a, and z_t the noise in the observation of the true output gap, y_t:

$$\pi_t^a = \tilde{\pi}_t^a + x_t,$$

$$y_t = \tilde{y}_t + z_t.$$

Rewriting (2) to conform to what is actually known at the time the policy decision is made about inflation and output gives:

$$R_t - \tilde{R}_t^* = \gamma(\tilde{\pi}_t^a - \pi^*) + \delta\tilde{y}_t, \tag{6}$$

where $\tilde{R}_t^* \equiv r^* + \tilde{\pi}^a$. Written in terms of the true measures of inflation and the gap, the interest rate policy corresponding to rule (6) is:

$$R_t - R_t^* = \gamma(\pi_t^a - \pi^*) + \delta y_t - \underbrace{((1+\gamma)x_t + \delta z_t)}_{\text{noise}}. \tag{7}$$

This equation reveals the nature of the information problem. Setting the federal funds rate in reaction to the output gap and inflation, as the rules in (2) suggest, introduces inadvertent deviations into policy choices from what the policymaker would have liked to do had the policymaker known the true underlying measures

[6] Several authors, including Estrella and Mishkin (1999), Orphanides (2001), McCallum (1999) and McCallum and Nelson (1999) have recently discussed this problem at length. Orphanides (2003a) and Smets (2002) have shown explicitly how the efficient choice of the response coefficients γ and δ in a policy rule such as (2) is distorted once the uncertainty regarding the measurement of the output gap is incorporated in stochastic simulation comparisons. Orphanides and van Norden (2002) detail the pervasiveness of the output gap measurement problem across alternative estimation methods. A number of other issues, including model mispecification and parameter uncertainty may pose additional related difficulties that could also complicate retrospective evaluations. Several recent papers including, Levin et al. (1999), Sack (1998), Onatski and Stock (1999) and Williams (1999), have illustrated aspects of these problems.

of inflation and the output gap. The resulting undesirable movements in the interest rate that feed back to the economy through the noise terms could adversely influence macroeconomic performance. For instance, a policymaker attempting to follow the Taylor rule may at times inappropriately ease policy in response to a perceived opening of the output gap only to discover, perhaps many years later and after inadvertently fueling inflationary pressures in the economy, that the perception upon which the original policy easing was based was false.

Consequently, a proper examination of the historical performance of the economy that evaluates outcomes had the Federal Reserve counterfactually followed the activist stabilization policies prescribed by rules (2), needs to take into account the noise in the underlying data. Only after accounting for the presence of such informational limitations and only if the properties of activist policies such as the Taylor rule continue to obtain once these practical limitations are accounted for can the conclusions regarding the desirability of such policies be confidently entertained.

3. An estimated model of the U.S. economy

In order to perform the counterfactual simulations necessary to compare policy outcomes under alternative informational assumptions we need a structural model of the economy. To some extent, the comparisons are conditional on the specification of the model as well as the underlying assumptions regarding its structure. And for the results to be informative, the model should fit the historical data reasonably well. With these considerations in mind, I rely on a three equation system of the economy which can be interpreted as a mildly restricted structural vector autoregression (VAR) estimated with four lags using quarterly data. The two key variables describing the state of the economy are the quarterly rate of inflation, π_t, and the output gap, y_t. The third variable is the policy instrument, the federal funds rate, f_t, but since in my simulations this is determined by an imposed policy rule, only the equations for inflation and output require estimation. I estimate the following process for the output gap:

$$y_t = b_0 + \sum_{i=1}^{4} b_i^{\pi} \pi_{t-i} + \sum_{i=1}^{4} b_i^{y} y_{t-i} + \sum_{i=1}^{4} b_i^{f} f_{t-i} + u_t \tag{8}$$

and the following process or inflation:

$$\pi_t = \sum_{i=1}^{4} a_i^{\pi} \pi_{t-i} + \sum_{i=0}^{4} a_i^{y} y_{t-i} + e_t. \tag{9}$$

In estimating these equations, I impose two additional restrictions in order to enforce the classical dichotomy. First, to ensure that only sustained changes in real interest rates (and not nominal rates) can have a sustained influence on output, I

impose the restriction $\sum_{i=1}^{4} b_i^{\pi} + \sum_{i=1}^{4} b_i^{f} = 0$. Second, I impose the accelerationist restriction $\sum_{i=1}^{4} a_i^{\pi} = 1$.[7]

Finally, as with any empirical model of this nature, the Lucas critique of econometric policy evaluation is a source for concern. This would hinder comparisons of alternative policies that are drastically different from the actual historical policy. Fortunately, as will become evident, the alternative policies we need to consider are such that it would not be implausible for the public to consider them as stochastic realizations from a fixed distribution of policies. Therefore, as Sims (1998) explains, counterfactual simulations of a model of this nature remain useful for policy evaluation.

I estimate the model with quarterly data from 1960:1 to 1993:4 using data available as of 1994:4. Inflation reflects the quarterly change of the GDP deflator, in percent. The output gap is the difference between actual real output and potential output measured as a fraction of potential output, also in percent. Although more recent data on output and the output deflator are available from the Commerce Department, 1994:4 marked the latest series for historical potential output data that was publicly available from the Federal Reserve when this study was completed. As one of my central objectives is to rely exclusively on information available to the Federal Reserve for comparisons, I restrict attention to this data.[8]

The estimated model is similar to the semiannual model in Orphanides (2003a) and the quarterly model in Rudebusch and Svensson (RS) (1999). Two important properties of the model for monetary policy are the cost of disinflation and the sensitivity of output and inflation to changes in the federal funds rate. The implicit sacrifice ratio is about three and a half, which is similar to the ratio in the RS model and also to that reported by Mauskopf (1995) for the Federal Reserve's MPS model.[9] To examine the interest sensitivity of output and inflation, I computed the dynamic responses of these variables to a two-year tightening of the federal funds rates by 100 basis points. By the end of the second year, output is about a percentage point below a baseline that does not reflect the tightening, and inflation about half a percentage point lower. Finally, implicit in the output equation specification is an estimate of the equilibrium real interest rate, $r^* = -b_0/(\sum_{i=1}^{4} b_i^{f})$. The point estimate of 2.1 percent is close to the average ex post interest rate for the estimation sample,

[7] Imposing these two additional restrictions serves two useful purposes: It greatly simplifies the evaluation of alternative policies by separating the choice of a long-run inflation target, π^*, from the evaluation of alternative policy rules which influence the stochastic performance of the economy. And, perhaps more importantly, it conforms with views central bankers express in discussing the formulation of monetary policy. See e.g. Blinder (1996), Yellen (1996) and Meyer (1998). There are, however, longstanding theoretical and empirical issues regarding the classical dichotomy that have not yet been resolved. Orphanides and Solow (1990), and King and Watson (1994), respectively, present some of these theoretical and empirical issues.

[8] In a sense, I treat the data available at the end of 1994 as reflecting the "truth" regarding historical inflation and the output gap. Of course, I recognize that this is only approximately correct.

[9] Direct comparisons with the new Federal Reserve model (FRB/US) are not immediate. The FRB/US model allows a wide range of implicit sacrifice ratios which span the point estimates in the MPS, RS and the model I employ here. Reifschneider et al. (1999) present some illustrative simulation results based on the FRB/US model.

2.2, and conveniently close to the two percent equilibrium real interest rate assumption reflected in the Taylor rule.

4. The promise of activist stabilization policy

To demonstrate the stabilization promise of following activist policies under the heroic assumption of perfect information regarding the state of the economy, I perform dynamic counterfactual simulations of the model starting with 1965:4 and ending in 1993:4. To perform a simulation with the Taylor rule, I recursively use the rule (4) and the estimated Eqs. (8) and (9), with the historical values of all variables up to 1965:4 serving as initial conditions. That is, for each quarter t, I use the lagged simulated values of f, π and y together with the estimated residuals for the quarter, u_t and e_t, to obtain simulated values for f_t, π_t and y_t. Similarly, to perform the simulation with the Revised Taylor rule, I repeat this process using rule (5) instead of rule (4).

The results are shown in Fig. 1. The top and middle panels show the results for inflation over four quarters, and for the output gap, respectively. The bottom panel plots the federal funds rate minus the annual rate of inflation shown in the top panel. This proxy for the real federal funds rate conveniently summarizes the stance of monetary policy. In each panel, the solid line denotes the actual historical evolution of the variable shown from 1966 to 1993. The dashed line indicates the counterfactual alternative if policy were to follow the Taylor rule with perfect information and the dotted line the counterfactual alternative corresponding to the Revised Taylor rule.

The figure unambiguously confirms the promise of following these activist rules. From the top panel, had either of these rules been followed (assuming always that this *could* be done), the problem visible in the actual path of inflation would have been avoided. To be sure, the commodity price shocks and oil shocks of 1973 and 1979 are still visible in the simulated counterfactual paths of inflation. But inflation is successfully stabilized around the two percent target and only exceeds five percent briefly at the end of 1974, compared with the eleven percent rate in the actual data. Comparing the two activist rules, the revised version performs marginally better but the difference is small relative to the improvement in performance that either of the two activist rules indicates relative to the actual history of inflation. As well, the simulations confirm that actual inflation since the late 1980s has been nearly identical to what the simulations based on the Taylor rule would imply.

Equally impressively, the middle panel confirms the promise of these activist rules with regard to stabilizing output. The two simulated paths are clearly less volatile than the actual output gap. Only in 1975 and 1976 would the counterfactual policies have induced more severe contractions than actual history, and this would have been an entirely appropriate response to the inflation situation resulting from the unfavorable shocks in 1973 and 1974. As well, had either variant of Taylor's rule been followed, the recession of 1982 would have resulted in an output gap smaller than three percent (in absolute value) whereas in reality the output gap was more

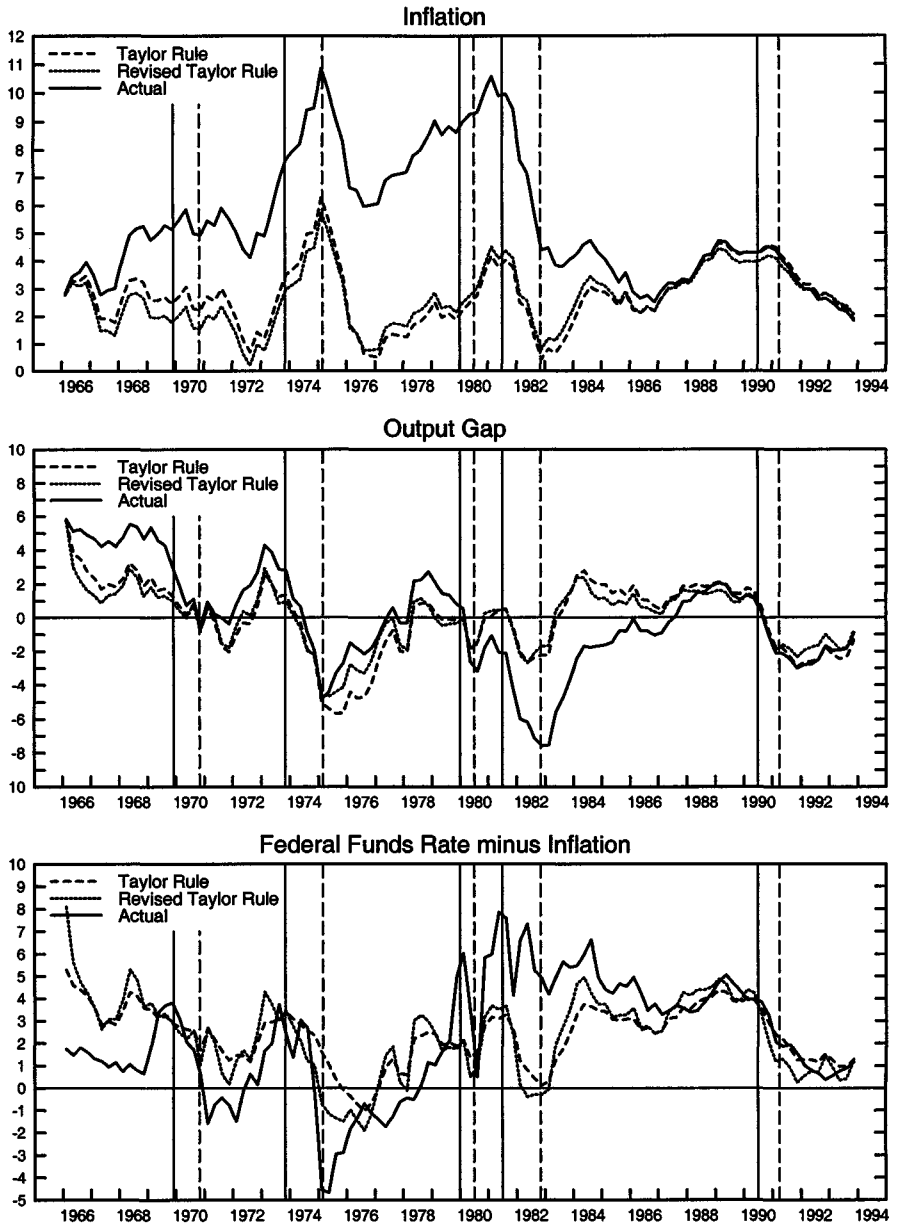

Fig. 1. Promise of activist stabilization rules. Dynamic simulations assuming no misperceptions in the measurement of inflation and the output gap. All data in percent. Actual reflects information at the end of 1994. The output gap is the difference between real output and potential output, measured as a fraction of potential output. Inflation is the rate of change in the implicit output deflator over four quarters. The solid and dashed vertical lines denote NBER business cycle peaks and troughs, respectively.

than twice as large. And the bottom panel confirms the two policy "mistakes" during this period: Actual policy was systematically easier during the 1960s and 1970s and tighter during the early 1980s than either of the two rules would have suggested in the simulation.

Indeed, based on such promising results, it *is* rather tempting to conclude that activist stabilization policies following a rule such as Taylor's perform remarkably well. But are these apparent remarkable outcomes real?

5. The reality of activist stabilization policy

5.1. Information in real-time

The greatest difficulty associated with attempting to reconstruct counterfactual simulations based on realistic information is the need to recover the information upon which policymakers could actually base their decisions in real-time. Using this information, the counterfactual simulations can then be designed to provide the parallel simulated paths of both the actual and perceived inflation and output had policy actions followed a different path from historical decisions.

From 1965 to 1993, the period of interest, the FOMC held regular scheduled meetings either two or three times in every quarter and occasionally had additional unscheduled conference calls to discuss possible policy actions. To simplify the task at hand, and since the frequency of my data is quarterly, I concentrate on just one FOMC meeting per quarter, the one corresponding as closely as possible with the middle month of the quarter. For each of these meetings, I rely on information that was available from the production of the Board of Governors staff analysis of the economic situation just prior to the meeting. The Greenbook, which is distributed to FOMC members by the staff a few days before each meeting, provides a valuable source for this information. As explained in Orphanides (2003a,b), all the necessary information to reconstruct inflation and the output gap in real-time for the 1980s and 1990s is available from Federal Reserve documents. For the earlier period, however, reconstructing the data is somewhat more involved. While the Greenbook provides real-time information on nominal and real output from which I can complete a time-series of real-time inflation measures, I have not been able to recover a complete time-series for potential output estimates from Federal Reserve sources. This limitation is not a reflection on the availability of the series at the Federal Reserve, however. Indeed, in discussing the process employed in the analysis of the economic outlook while he was Governor at the Federal Reserve during the late 1960s and early 1970s, Maisel (1973) lists the potential output series as one of the key macroeconomic variables associated with the development of the staff forecasts.[10] Further, discussion of output gap measures appears in the FOMC Memorandum of Discussion throughout this period.

[10] Governor Maisel's account is particularly valuable in this regard as he joined the Board in June 1965 and was instrumental in the introduction of formal forecasts at the Federal Reserve later that year.

From those occasions when quantitative measures of the output gap appear in the Memorandum of Discussion or the Greenbook, I was able to confirm that throughout the 1960s and 1970s these measures were based on the Council of Economic Advisers estimates of potential output. Indeed, from 1961 until 1981 the Council regularly produced and updated estimates of potential output and for a number of years these estimates were considered (in fact referred to) as the "official" estimates. The starting date for the availability of these data was not accidental. Data on the gap between actual and potential output were first presented by the Council of Economic Advisers during the first appearance of president Kennedy's Council before the Joint Economic Committee on March 6, 1961.[11] (Heller et al., 1961). By June 1961, the Council's measures of the output gap had already been employed in staff presentations regarding economic developments at the Federal Reserve and appeared in FOMC discussions.[12] Indeed, from 1968 to 1976 the Council estimates were "officially" treated as data, updated and published every month by the U.S. Department of Commerce together with actual output data. Further, for 1980 and 1981 when I can compare records of the real-time output gap from the Federal Reserve to the "official" measures published by the Council, the two series match, as expected. Based on this information, I rely on the real-time Council potential output estimates to complete my time-series of the real-time output gap available to policymakers.

The top and middle panels of Fig. 2 show the real-time and final data for inflation and the output gap. These data provide time series of estimates for x_t and z_t, the noise in inflation and the output gap measures faced by policymakers in every-quarter from 1965:4 to 1993:4 and form the basis for the realistic policy rule simulations that follow.

As is evident from the figure, the mismeasurement in these series is not trivial. For inflation, deviations between the real-time and final data often exceed one percentage point, especially in the first half of this sample. As well, the real-time data appear to understate the final inflation estimates somewhat during the 1970s. But the mismeasurement of inflation appears to be a relatively minor issue when compared to the mismeasurement of the output gap. Comparing the real-time and final series on the output gap reveals systematic one-sided measurement errors. Output gap mismeasurement, of course, reflects two types of errors. The first source is errors in the measurement of actual output. Although such errors are at times substantial, they are comparable in magnitude to errors in the measurement of inflation and cannot account for the magnitude of the mismeasurement shown in the figure. Rather, the bulk of the problem is due to errors in the measurement of potential output. As is now evident, real-time estimates of potential output severely overstated

[11] The 1962 *Economic Report of the President* provided a comprehensive discussion of the data. Okun (1962), detailed the underlying methodology.

[12] Okun's (1962) methodology for estimating potential output and the resulting Council estimates were adopted rather quickly by many, including Federal Reserve economists. Characteristic of this is the fact that the only other paper in the session of the 1962 American Statistical Association Meeting where Arthur Okun presented his analysis was an investigation of the full employment budget surplus using the Council concepts by Robert Solomon of the Board of Governors (Solomon, 1962).

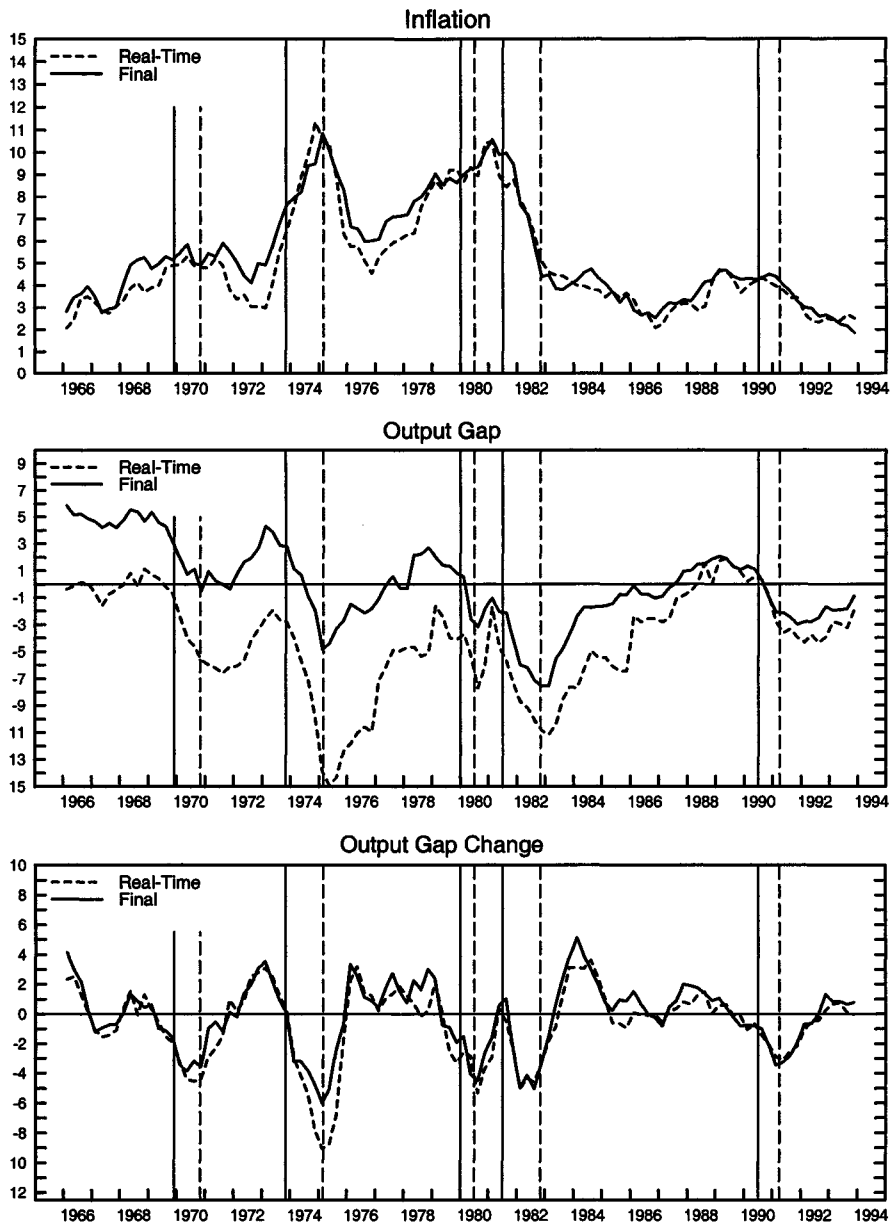

Fig. 2. Real-time misperceptions. Real-time data reflect information as of the middle of the quarter shown. Final data reflect historical information with data available at the end of 1994. See also notes to Fig. 1.

the economy's capacity relative to the recent estimates, in this sample. The resulting error in the measurement of the output gap, although already substantial at the beginning of the sample in 1965, worsened significantly during the early and mid 1970s before gradually improving later on. (In Section 7, I provide a detailed accounting of the forces that contributed to this massive error.)

An important element in the mismeasurement of the output gap is that it is highly serially correlated. As a result, errors in estimates of the *level* of the output gap are more pronounced than corresponding errors in the *difference* of the output gap. To illustrate this, the bottom panel of the figure plots the annual difference of the output gap ($\Delta^a y_t = y_t - y_{t-4}$) using real-time and final data. The figure confirms that the mismeasurement of this difference is considerably smaller than the mismeasurement of the level of the gap. At the same time, the change is also correlated with the business cycle suggesting that it may also serve as a simple real-time filter of the state of the economy.

5.2. *Simulations with noisy data*

Next I reexamine the simulated performance of activist policy rules taking into account the mismeasurement reflected in the actual data in Fig. 2. In parallel with the earlier simulations, the counterfactual simulations based on the real-time data employ the historical values of all variables up to 1965:4 as initial conditions and the estimated residuals from Eqs. (8) and (9) from 1966:1 to 1993:4. But here, the simulations keep track of two parallel concepts for inflation and the output gap: The *true* simulated paths, obtained as in the simulations without noise from Eqs. (8) and (9), and the *perceived* simulated paths which are obtained from the true simulated values by substracting the historical mismeasurement, x_t, and z_t, shown in Fig. 2 as the difference between the final and real-time series of inflation and the output gap. Keeping track of the *perceived* simulated paths of inflation and the output gap is needed because, by assumption, in these simulations the policymaker sets the interest rate responding to the mismeasured *perceived* simulated paths of inflation and the output gap, and not the *true* paths which would not be available in real-time.

Implicit in the simulations is the assumption that for the range of alternative policies examined, the specific choice of policy would not significantly influence the mismeasurement pattern in the data. This assumption exactly parallels that regarding the usual invariance of the structural shocks of the model to the choice of policy.

The realistic simulation results for the two activist rules are shown in Fig. 3. Once the real-time data imperfections facing policymakers are incorporated into the analysis, the promising results regarding stabilization policy based on the Taylor rule vanish. In particular, inflation in the 1970s is as high with the Taylor rule as actually occurred. With the revised Taylor rule, inflation becomes significantly worse than actual experience. But while the Volcker disinflation at least brought inflation under control in the early 1980s, if policy had followed the Taylor rule, inflation would have remained high for considerably longer and, with the revised Taylor rule, would have remained in double digits into the 1990s. Not only would these activist policies

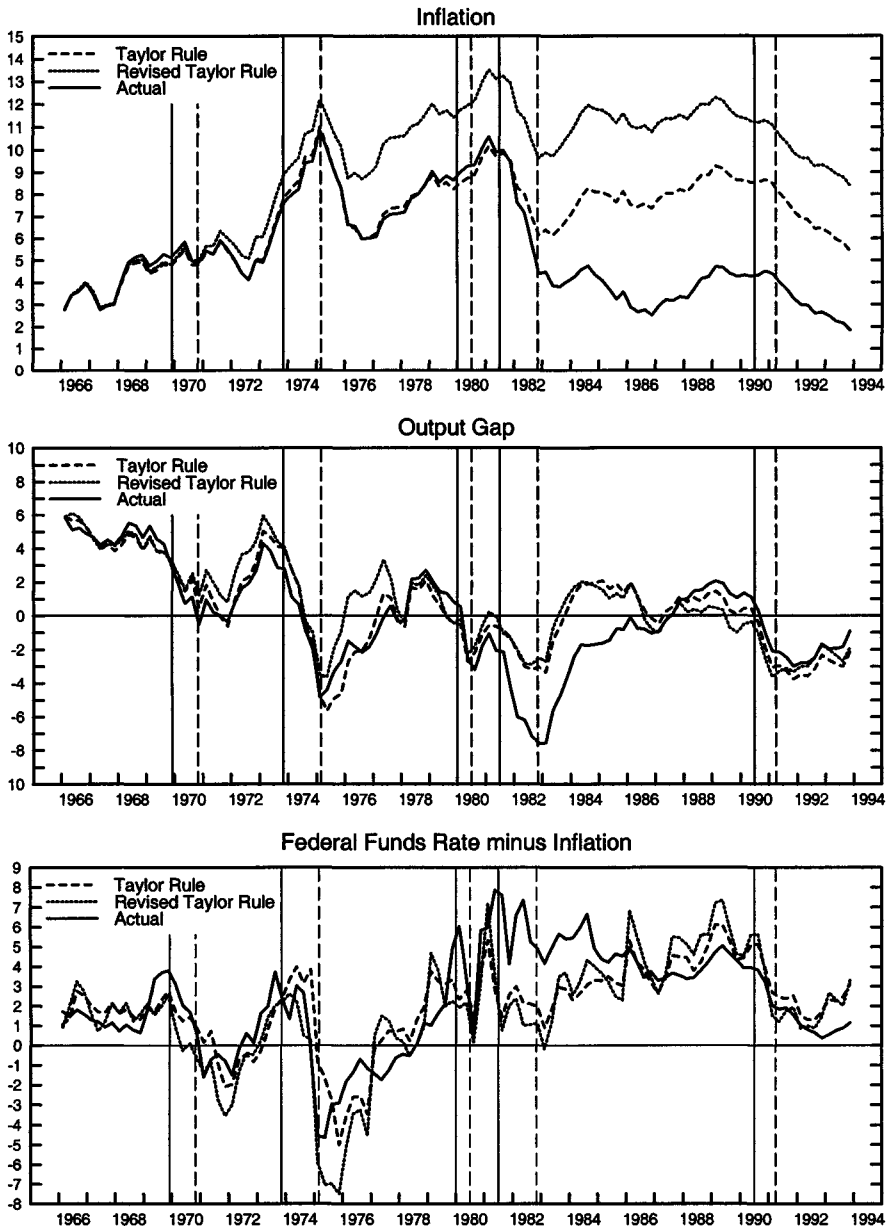

Fig. 3. Reality of activist stabilization rules. Dynamic simulations incorporating real-time misperceptions in the measurement of inflation and the output gap. See also notes to Fig. 1.

in a sense have produced the inflation of the 1970s, they would have greatly inhibited the disinflation of the 1980s as well.

6. The great inflation

6.1. Two suggested interpretations

The counterfactual simulations based on the Taylor rule appear surprisingly useful for understanding the path of inflation in the United States since 1965. Fig. 4 compares the path of actual inflation to the two counterfactual simulations based on the original specification of the Taylor rule. Each of the two counterfactual simulations offers a distinct interpretation of monetary policy since the mid 1960s.

The first interpretation, based on the simulation without noise, suggests that inflation accelerated in the late 1960s and 1970s because policy must have *deviated* from the sensible prescriptions suggested by the Taylor rule and was instead systematically too easy. Following an abrupt reversal, policy became exceedingly tight and engineered a harsh disinflation in the first half of the 1980s. Since then, it appears that the economy has been more or less successfully stabilized much as it would have been under the Taylor rule.

The second interpretation, based on the simulation with noise, suggests instead that inflation accelerated in the late 1960s and 1970s because policy must have *actually followed* a strategy indistinguishable from the Taylor rule! Belatedly recognizing the inflationary consequences of this strategy, policymakers adopted a policy that was appropriately tighter than the prescriptions suggested by the Taylor rule in the first half of the 1980s.

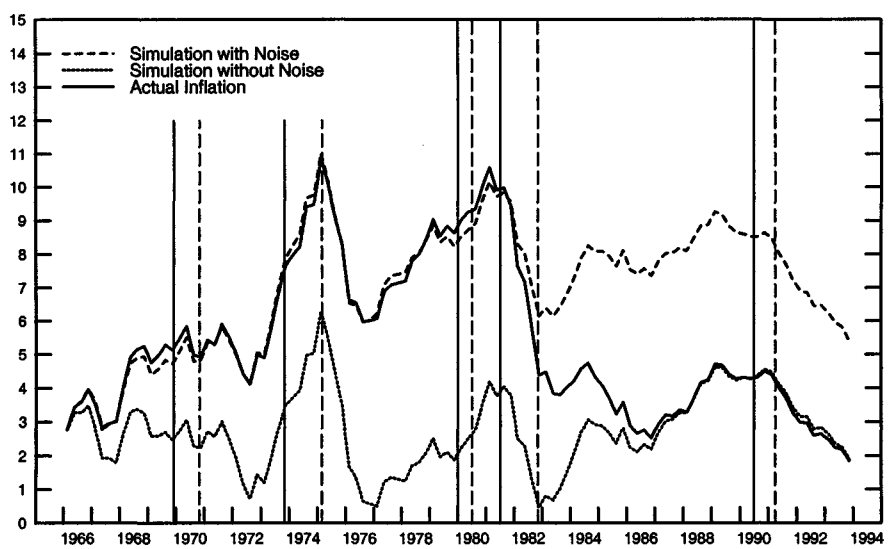

Fig. 4. Inflation with the Taylor rule.

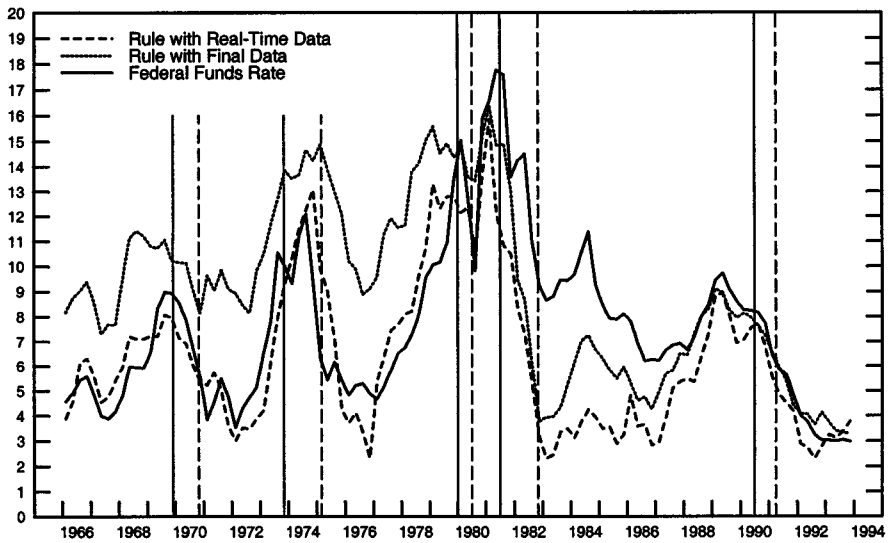

Fig. 5. Then and now: Taylor rule with final and real-time data.

The two alternative readings of the history of policy decisions can be reconstructed by comparing the actual path for the federal funds rate to the Taylor rule prescriptions based on the real-time and final data for inflation and the output gap. The results are shown in Fig. 5. Here, for each quarter, the dotted and dashed lines show what the Taylor rule would have prescribed for the federal funds rate for that quarter based on the actual historical inflation and output information for that quarter. The dashed line reflects information available during the quarter the federal funds rate was set ("then"), the dotted line reflects the final data ("now"). The solid line shows the actual history of the federal funds rate. Surely, if policy is to be evaluated based on information that is now available, the Taylor rule appears to represent reasonable policy and indeed, two "mistakes" are evident by comparing the dotted and solid lines in the figure. Policy was easier than the rule during the late 1960s and 1970s and tighter than the rule in the first half of the 1980s. But if policy is to be evaluated based on information that was actually available when policy decisions were made, a different conclusion emerges. This is evident by comparing the dashed and solid lines in the figure. If anything, the policy "mistake" of the late 1960s and 1970s is that actual monetary policy "followed" the Taylor rule, too closely! Rather than "follow" the Taylor rule, policy should have been considerably tighter. Given the "mistake" of "following" the Taylor rule in the 1970s, the deviation from the Taylor rule in the early 1980s and the policy tightening associated with the Volcker disinflation was an appropriate response to the inflation problem created by "following" the rule.[13]

[13] See Orphanides (2003b) for a comparison of policy before and after Volcker's appointment as chairman in 1979 drawing on real-time information and the policy record of the FOMC.

6.2. A decomposition

The two alternative interpretations suggest that a useful accounting of the sources of the Great Inflation may be obtained by comparing the actual path of inflation to the path of inflation from counterfactual simulations based on the Taylor rule using alternative information assumptions. Fig. 6 provides such an accounting.

Each line in the figure shows the difference in inflation between a baseline simulation and an alternative path. The baseline is always the counterfactual simulation based on the assumption that policy could follow the Taylor rule with no informational limitations. The solid line, reflects the difference between actual inflation and the baseline. As can be seen, this difference increases almost continuously from 1966 to 1979. At the peak of the discrepancy, in 1979 and 1980, actual inflation was about 7 percentage points higher than what a policy based on the Taylor rule with perfect information could have delivered. The dashed line reflects the difference between the baseline and a simulation that assumes that the policymaker faced noise only with respect to the measurement of inflation. Based on this difference, about one and a half percentage point of the discrepancy between the actual inflation and the baseline Taylor rule simulations during the 1970s can be attributed to inflation noise. The dash-dot line reflects the difference between the baseline and a simulation that assumes that the policymaker faced noise only with respect to measurement of the output gap. At its worst, in the late 1970s, the mismeasurement of the output gap squarely contributed about 5 percentage points to the inflation discrepancy.

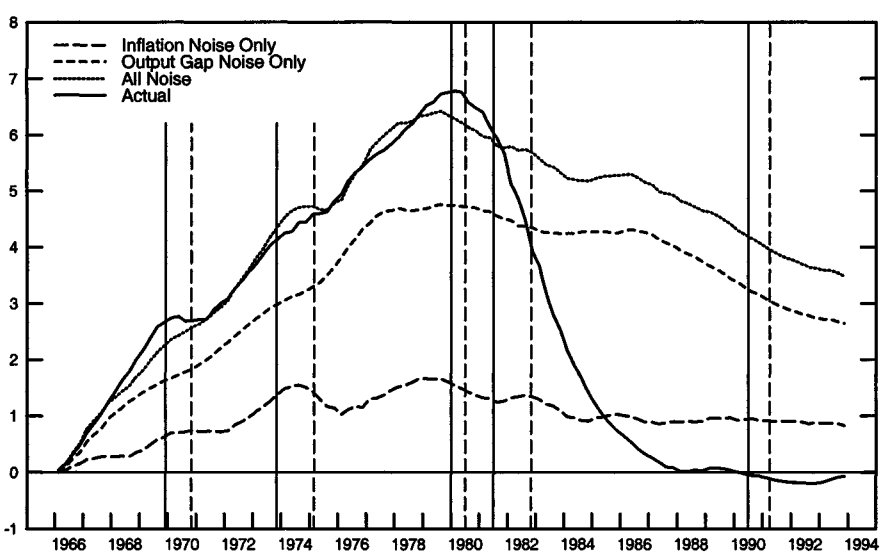

Fig. 6. Decomposition of simulated inflation differences. The solid line indicates the difference between actual inflation and the simulation without noise. Each of the remaining lines shows the difference between the path of inflation from the simulation without noise and a simulation with the noise indicated.

Finally, the dotted line reflects the difference of the simulation based on the real-time data, including both inflation and output gap noise from the baseline. That is, it reflects the discrepancy between the Taylor rule as it could have been actually implemented and the infeasible implementation that assumes away the noise in the data. Comparing the solid and dotted lines reveals that only about one-half percentage point of the inflation discrepancy at its peak in 1979–1980 can be attributed to policy deviations from the Taylor rule, as could have been implemented in practice. The rest simply reflects the unintended consequences of policy responding to noise.

Following the decomposition further into the 1980s is also illuminating. By 1987, a discrepancy of five percentage points relative to the baseline would have remained, had policy followed the Taylor rule with the imperfect data. In contrast, by adopting the strategy associated with the Volcker disinflation actual policy resulted in a path of inflation that eliminated the discrepancy with the baseline simulation and restored stability in the economy.

6.3. *Avoiding the output gap*

As the decompositions above illustrate, the key source of the policy failure during the 1970s, and flaw in the pursuit of activist policies is that they prescribe that the FOMC react to the level of underutilization or overutilization of the economy's potential. But alternative policies can be designed that avoid reacting to the *level* of the output gap altogether. To examine whether such alternatives could have improved upon the instability that the activist policies examined earlier would have induced over this period, I provide a brief comparison with two alternatives that are based on the specification of the original Taylor rule (4):

Inflation targeting rule:

$$R_t = 2 + \pi_t^a + 0.5(\pi_t^a - 2) \tag{10}$$

Natural growth targeting rule:

$$R_t = 2 + \pi_t^a + 0.5(\pi_t^a - 2 + \Delta^a y_t). \tag{11}$$

The first of these simply drops the output gap from the rule, whereas the second replaces the gap with its change over four quarters.[14] To be sure, given the already established promise of activist stabilization policies, one would expect that these rules would not have performed as well over history, had information been

[14] I call this a natural growth targeting rule because, as a simple regrouping of the variables indicates, $\pi^a - \pi^* + \Delta^a y = n^a - n^*$ where $n^a = \pi^a + \Delta^a q$ is the growth of nominal income over four quarters and $n^* = \pi^* + \Delta^a q^*$ the natural growth rate of nominal income over the same period. This rule can be viewed as an operational version of nominal income targeting. See the working paper version of this study for a more detailed discussion. Orphanides (2003b), and Orphanides et al. (2000) present policy rule evaluations that allow comparisons of versions of the Taylor and natural growth targeting rules under alternative informational assumptions.

perfect. Nonetheless, they might have performed satisfactorily in the presence of concerns regarding informational problems, avoiding potentially large errors. Rules with these characteristics might be termed *prudent*. In the case of the natural growth targeting rule, in particular, since the change in the gap, $\Delta^a y_t$, may serve as a simple filter of real activity that is less sensitive to measurement problems than the level of the gap itself (as seen in Fig. 2), this rule may retain some of the stabilization benefits suggested by the Taylor rule in the absence of information problems.

To compare the performance of these two alternative rules, I performed simulations parallel to the ones described in Sections 4 and 5 for the Taylor and revised Taylor rules. As anticipated, the inflation and natural growth targeting rules do not share the high degree of stabilization performance of the two activist rules under perfect information. On the other hand, they also avoid the Great Inflation experience associated with those rules when measurement errors are taken into account. Fig. 7 provides a summary. (The working paper version of this study (Orphanides, 2000) presents detailed results.) To compare performances,

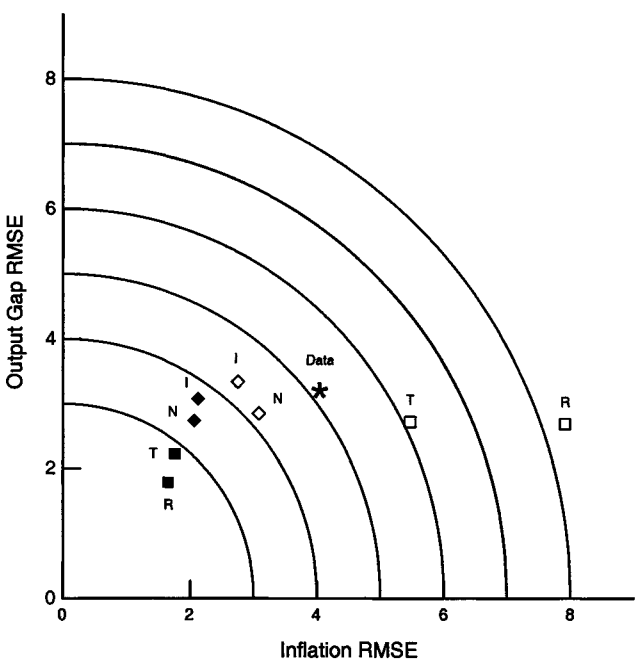

Fig. 7. The performance of alternative policies: 1966:1 to 1993:4. T and R denote the original and revised Taylor rules, respectively. I denotes inflation targeting and N natural growth targeting. The solid squares and diamonds indicate infeasible outcomes from simulations assuming perfect information. The blank squares and diamonds indicate the realistic outcomes from simulations reflecting the actual information that would be available when policy decisions were made. The star indicates the actual performance of the economy over the simulation period.

for each simulation I compute the root mean square errors of the simulated final output gap and of the simulated final inflation deviations from the assumed two percent target from 1966:1 to 1993:4. To facilitate comparison of the performance of the alternative rules, the concentric circles could be read as iso-loss surfaces for a policymaker who places equal weight of output and inflation stabilization.

Comparing the rules without noise (solid squares and diamonds) confirms that the two activist rules perform better than the two prudent rules. In simulation, both the Taylor and the revised Taylor rule yield both better inflation and better output stability than either the natural growth rule or the inflation targeting rule. With perfect hindsight, the revised Taylor rule dominates by producing best results for both inflation and output stability. However, once we account for the noise in the data, these outcomes are reversed. As shown by the blank squares and diamonds, the revised Taylor rule actually yields the worst performance in this case and both the Taylor rule and revised Taylor rule in fact do far worse than the actual performance of the economy, shown by the star.

7. The mismeasurement of the output gap

Since the real-time mismeasurement of the output gap appears to be a key factor of the policy failure associated with the Great Inflation, a more detailed examination of its sources is warranted.

One possibility is that potential output and the resulting output gap were constructed in a way that would render them inconsistent with price stability. If that were the case, then surely policymakers should have never incorporated this data into any analysis without making an appropriate adjustment. But this was not necessarily the case. As Okun (1962) emphasized in implementing the methodology he proposed for measuring the output gap, "[t]he full employment goal must be understood as striving for maximum production *without inflationary pressure*" (emphasis added).

As is evident in retrospect, however, the underlying assumptions built into the estimates of potential output during the late 1960s and 1970s were seriously misguided. Two key assumptions, in particular, proved overly optimistic. The first is the level of unemployment compatible with full employment, what later became known as the "natural rate" of unemployment or the "non-accelerating-inflation rate" of unemployment (NAIRU). When the Council first produced their estimates of potential output in 1961, it was assumed that four percent was a reasonable estimate. Given the experience of the past thirty years, this now surely appears to have been unreasonably low. Unemployment averaged 6.3 percent from 1966 to 1993. But four percent was an entirely reasonable assumption to make in 1961. Indeed, four percent was considered a rather pessimistic assessment of the American economy's full employment potential at the time. Unemployment had averaged just 4.5 percent from 1947 to 1960—not a period of remarkable economic stability—and

was under 4 percent in several of these years, without much discernible inflation from the current perspective.[15]

The second crucial assumption necessary for assessing the economy's full employment potential concerns the rate of labor productivity improvement and its translation to the natural growth rate of output. Okun's calculations in 1961 suggested that the experience of the U.S. economy in the post-war period was consistent with potential output growing at a rate of $3\frac{1}{2}$ percent per year. But the absence of any inflation during the first half of the 1960s and an apparent increase in the rate of growth of the labor force led to upward revisions of the estimates of potential output growth. By the time Arthur Okun became chairman of the Council in the final year of the Kennedy–Johnson administrations potential output was assumed to grow at four percent. But again, these estimates were, if anything, believed to be conservative.[16]

As overly optimistic as the assessment of the economy's potential proved to have been, the mismeasurement of potential output during the 1960s was almost trivial relative to the subsequent errors. Emboldened by the growth performance of the economy during the 1960s, Nixon's Council adopted a 4.3 percent potential output growth estimate from 1970 to 1973, exactly at the time when, as was recognized later on, productivity was slowing down. But in a way, 1970 marked a change in the tide. Over the next several years, the issue became one of questioning the optimism reflected in the assessment of the economy's potential and a gradual downgrading of expectations. In a series of steps, estimates of both the natural rate of unemployment and the natural growth of output became gradually more pessimistic and the Council's estimates of potential output were brought down. Fig. 8 shows the effects of these changes on historical estimates of the output gap based on the data published in the Economic Report of the President in 1973, 1976, 1977 and 1979, compared to the current data. (For each year, the estimates shown were published in January or February of that year, so the data upon which the analysis underlying the potential output estimates would have been as of the end of the previous year.) The most striking element in these revisions is that despite moving in the right direction throughout the decade, the mismeasurement of the output gap worsened during the first half of the decade. This, of course, is the expected pattern of errors in the face of

[15] The fact that the full employment level of unemployment was presumed to be half a percentage point below the average unemployment over the several years prior to 1961 with fairly stable prices might suggest at least some unwarranted optimism. But this would be the case only from a modern perspective based on a linear accelerationist Phillips curve. However, at the time, it was believed that the Phillips curve in the U.S. economy was non-linear with the implication that greater macroeconomic stability alone would reduce the average rate of unemployment—other things being equal. And, of course, increased stability at full employment was the ultimate objective. Baily (1978) and more recently Laxton et al. (1999) have reexamined the implications of this argument with a non-linear accelerationist Phillips curve.

[16] Contemporaneous academic studies based on alternative methodologies, suggested an even brighter outlook for the economy. Thurow and Taylor (1966) estimated a 4.7 percent potential output growth for the second half of the 1960s, and although more conservative, Black and Russell (1969) still concluded that there was "a clear acceleration in the rate of growth of potential GNP in the late 1960s to a rate slightly above 4 percent." (p. 75). As Clark (1979) observed about alternative estimates of potential output: "All the results were similar to the CEA estimates or even somewhat higher" (p. 141).

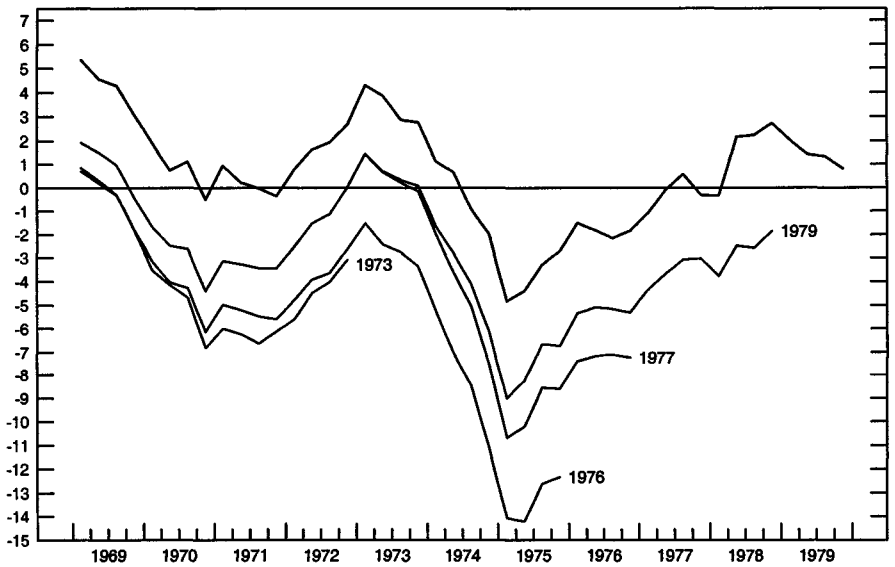

Fig. 8. The evolution of history during the 1970s: Output gap measurement. The dark solid line indicates the historical series for the output gap with data available at the end of 1994. Each of the thin solid lines shows the historical series for the output gap based on data available in the first quarter of the year shown.

an unexpected slowdown in potential output growth that is only gradually recognized over time.[17] By 1976, the Council recognized that a major revamping of its estimates was required. The resulting revision was presented in the 1977 Economic Report of the President. The new estimates provided a drastic correction to the mismeasurement problem. The size of the revision was substantial. It implied that output for the previous year (1976) was four percentage points closer to potential than the earlier estimates had suggested.[18]

[17] As early as 1972 the Council recognized that the confidence with which they could provide estimates of the economy's potential had deteriorated but this did not result in any significant progress. The energy crisis in 1973 and 1974 compounded the problem and raised the degree of uncertainty regarding the measurement of potential output. Not only additional complexities regarding the treatment of energy became apparent, the underlying national income accounts data became less reliable as well. The problems with the underlying GNP data led the Office of Management and Budget to establish The Advisory Committee on GNP Data Improvement which provided a comprehensive evaluation of the underlying data and led to a subsequent effort to improve their measurement (United States Department of Commerce, 1977). Of course the Council was intimately aware of these difficulties, especially after a member of the Advisory Committee, Alan Greenspan, became Chairman of Ford's Council.

[18] Clark (1977), presented details of the underlying methodology for the Council's new estimates following a request made at the Congressional Hearings. As could be anticipated following such a major downward revision in the estimates of the nation's productive capacity, Council Chairman Greenspan faced an unusually intense questioning by the members of the Joint Economic Committee. As large as it was, this revision only corrected about half of the problem, as it appears from today's perspective. But again, this could not have been known in 1977. Although at the time it was widely recognized that the 1976

The most fascinating element of the Council's 1977 analysis, however, was the identification of the sources of the mismeasurement of the output gap since the late 1960s. One source was not difficult to identify. The rate of unemployment consistent with full employment had drifted upwards during the decade. Another important source of mismeasurement, however, was a dramatic drop in labor productivity growth. As noted in the 1977 Report, while productivity growth in the private sector had averaged 3.3 percent per year from 1948 to 1966, between 1966 and 1973 the productivity growth rate had fallen to only 2.1 percent and if anything, appeared to have fallen even further after 1973. Since it was not yet possible to accurately separate the cyclical influence of the 1974 recession from the additional suspected long-run trend change in productivity after 1974, most of the Council's analysis concentrated on the pre-1974 slowdown.

In retrospect, much of the systematic mismeasurement of the output gap estimates could be squarely attributed to a delay in recognizing that the underlying trend of labor productivity had shifted unfavorably in the late 1960s. And that was in 1977. By 1979, the additional data validated the suspicion of a further slowdown after 1973, leading to the last revision in the estimates shown in Fig. 8. Estimates of productivity growth subsequently fell even further, so much in fact that most current discussions concentrate on the slowdown after 1973 without mention of the deterioration of the late 1960s and early 1970s.[19] Unsurprisingly, this disappointing performance led to the further revisions in potential output that now suggest that, despite their best efforts, the Council's revisions even during the late 1970s were far too optimistic after all.

In summary, the systematic mismeasurement of the economy's productive capacity during the late 1960s and 1970s is hardly surprising. After all, accurate measurement would have required information about what is appropriately known as Solow's *residual*, following R. Solow's (1957) seminal growth accounting decomposition. The accuracy of our measurement, then, should reflect the accuracy of what M. Abramovitz (1956) aptly characterized as a "measure of our ignorance".

8. The view from Constitution Avenue

Given the obvious difficulties associated with striving to achieve an ill defined full employment objective and given the Federal Reserve's undisputed responsibility for

(footnote continued)
estimates of potential output overstated the economy's capacity, the extent of the overstatement was a matter of controversy and the Council's new estimates were well within the range of reasonable alternatives. Thus, while Rasche and Tatom (1977) provided somewhat lower estimates of potential output than the Council's, Perry (1977) suggested somewhat more optimistic estimates. Unsurprisingly, none of these estimates was anywhere as pessimistic as the present perspective would suggest would have been appropriate.

[19] Compare, for instance, Chart 3 in the 1977 Report which suggests a single break in productivity after 1967 with Chart 2–5 in the 1996 Report which suggests instead a single break after 1973.

maintaining price stability, a natural question is whether FOMC actions during the late 1960s and 1970s could have been guided by an activist stabilization objective.

A superficial answer would be in the affirmative. As Fig. 5 suggests, Federal Reserve policy could indeed be characterized as consistent with an activist strategy indistinguishable from following a rule such as Taylor's, based on the aggregate activity and inflation measures available to the FOMC in real-time. On the other hand, a closer look at the record also suggests that the FOMC recognized the difficulties associated with the measurement problem and did not necessarily intend to be excessively activist. Apparently, the dangers associated with the pursuit of activist policies were simply not sufficiently appreciated. Of particular interest in this regard are the views of Arthur Burns who became Chairman of the Federal Reserve Board in February 1970. A respected academic who had served as Chairman in Eisenhower's Council, and arguably the nation's leading expert on business cycles at the time, Burns joined the Board with impeccable credentials and considerable knowledge of at least some of these problems as he had frequently come across them earlier during his career. In a largely forgotten study he published in 1936, Burns (1936) had in fact already discussed the theoretical impossibility of accurately measuring potential output. And in 1966, he explained in detail the difficulties inherent in interpreting the Council's estimates of the output gap, anticipating correctly much of the confusion associated with the supply issues that only became widely understood after the 1973 oil crisis.

> However, the Council's calculations of the gap between actual and potential output, quite apart from being fragile, cannot be treated as measures of demand shortages. If aggregate output falls short of its potential, the gap may have nothing to do with any weakness of demand. It may instead reflect obstacles on the side of supply or a failure of the constituent parts of demand and supply to adjust sufficiently to one another. Since the structure of our economy keeps changing, these changes as well as difficulties on the demand side must be reckoned with in a scientific diagnosis. (Burns, 1966, p. 28)

Despite his awareness of these difficulties, however, Burns believed that he had a solid grasp of business cycle and inflation dynamics.

In retrospect, the policy mistakes of the 1970s arguably started with Burns' very first FOMC meeting, on February 10, 1970. The consensus at the Federal Reserve during the previous year and leading to Chairman Martin's last meeting was that the main problem facing the economy was inflation and, consequently, the Committee had tightened policy significantly during 1969. Coming from the National Bureau of Economic Research, Burns was tuned into the cyclical indicators of the performance of the economy and arrived at the Board with a great concern. A recession loomed large on the horizon. And Burns strongly believed that if a recession had already started, that would be sufficient to reverse the inflationary tendencies of the economy, based on the experience of earlier recessions. As a result, he suggested that the FOMC ease policy. The FOMC was split but eventually agreed to start easing policy at that meeting and, in a number of steps, eased policy further later that year.

The NBER later confirmed that a recession had indeed started in December of 1969. A peculiar feature of the 1970 recession, however, quickly became increasingly difficult to interpret. Contrary to expectations, inflation kept creeping up. This despite worsening unemployment, falling capacity utilization measures and an opening of the output gap. Indeed, the gap, which had already turned negative in the third quarter of 1969, remained negative through 1970 and into 1971. Something, had gone terribly wrong.

In retrospect, of course, all is perfectly clear. The utilization measures were exceedingly misleading. Despite the connotations associated with the NBER calling this episode a recession, the behavior of the economy in 1970 looked more like a somewhat bumpy landing from a state of unsustainably high economic activity to a more or less normal state of affairs. In no quarter did the unemployment rate exceed six percent. Surely, this was a disturbing figure for those associating full employment with a four percent rate, but it is unremarkable from today's perspective. And contrary to the prevailing view at the time, output hardly fell below potential based on what we now know. Of course, all these measures appeared very different then. 1970 must have been an extremely disturbing year for the new Chairman.

Unfortunately, by easing policy in 1970, the Federal Reserve missed the opportunity to reap the benefits of the 1969 tightening to eradicate the increasingly more virulent inflation. Even worse, Chairman Burns misinterpreted the causes of the 1970 economic outcomes. In retrospect, the faulty assessment of the economy's productive capacity seriously misled him. He explained his predicament during a Congressional testimony in July of 1971:

> A year or two ago it was generally expected that extensive slack in resource use, such as we have been experiencing, would lead to significant moderation in the inflationary spiral. This has not happened, either here or abroad. The rules of economics are not working in quite the way they used to. Despite extensive unemployment in our country, wage rate increases have not moderated. Despite much idle industrial capacity, commodity prices continue to rise rapidly. (Burns, 1971, p. 656)

A natural response to a situation interpreted as a change in the rules of economics is to seek new remedies. In August 1971, with Burns' encouragement, President Nixon imposed price controls on the economy. Aside from proving to be bad policy that did not resolve the inflationary situation, the price controls proved rather unfortunate in that they distorted the very information that could be used to reassess what was wrong with the underlying economic assumptions. An unintended side-effect of the controls was to impede efforts that could have led the Council to improve their "official" estimates of the economy's potential. Consequently, to the extent policy continued to be influenced in any way by the faulty measurement of potential output and the uncertainty about the natural rate of unemployment, the error was becoming worse. In a sense, bad policy and bad measurement were reenforcing each other.

Going into 1973, policy was decidedly too expansionary and remained so for too long. Despite an attempt to reverse course with tighter policy, inflation was headed

to frustrating higher levels—even without an influence from the oil embargo which came later, in November. In 1974, the Council succinctly summarized the success of the various programs targeted at containing inflation and the outlook for the future as follows: "Inflation seemed a Hydra-headed monster, growing two new heads each time one was cut off." (p. 21). But by then, the major policy errors had already been committed.

Shortly after he left the Federal Reserve, Burns explained the role of mismeasurement in precipitating the policy errors of the early 1970s. The first element appeared in a rather circumspect paragraph in his aptly titled lecture "The Anguish of Central Banking."

> In a rapidly changing world the opportunities for making mistakes are legion. Even facts about current conditions are often subject to misinterpretation. ... [After World War II], a broad consensus developed that an unemployment rate of about 4 percent corresponded to a practical condition of full employment, and that figure became enshrined in economic writing and policymaking. Conditions in labor markets, however, did not stand still. ... The unemployment rate corresponding to full employment is now widely believed to be about 5 1/2 or 6 per cent, and this year's report of the Council of Economic Advisers appears to concur in that judgment. But governmental policymakers, while generally aware of what was happening in the labor markets, were slow to recognize the changing meaning of unemployment statistics, whether viewed as a measure of economic performance or as a measure of hardship. The Federal Reserve did not escape this lag of recognition and, once again, I believe that other central banks at times have made similar mistakes. (Burns, 1979, p. 17)

Plainly and justifiably, Burns was suggesting that the FOMC was in good company when it incorrectly based policy on an incorrect natural rate assumption. In a later speech, after first repeating the role of faulty measures of the natural rate, he provided the final piece solving the puzzle:

> A second major reason for the grave inflation that got under way in the late 1960's is the flattening out of the historical upward trend in output per man-hour of our nation's workshops. (Burns, 1981, p. 9)

9. Concluding remarks

Two lessons can be drawn from this historical journey. First, the dismal economic outcomes of the Great Inflation could be attributed, at least in part, to an unfortunate pursuit of activist policies in the face of bad measurement, specifically, overoptimistic assessments of the output gap associated with the productivity slowdown of the late 1960s and early 1970s. Second, and perhaps more important, that in the face of informational problems, activist stabilization policies such as the Taylor rule, may not accomplish the stabilization of inflation and output which are often associated with them. Potentially, alternative strategies that do not rely on the

level of the output gap may provide more robust benchmarks for policy analysis. To be sure, the analysis here only offers an example of the difficulties in identifying robust policy strategies. However, the results are also consistent with the lessons from more detailed policy evaluation comparisons dealing with informational problems, such as presented in Orphanides (2003a) and Orphanides et al. (2000). In particular, these studies suggest that the appropriate degree of policy activism, as measured by the efficient policy response to the real-time assessments of the output gap, depends sensitively on its reliability, and also that avoiding the level of the output gap appears to be a robust approach for guarding against serious mismeasurement problems.

Although economics is often called the dismal science, many macroeconomists appear to be, if anything, overly optimistic and cheerful about the prospects for improving macroeconomic performance. Armed with models we know are imperfect, having to design policies based on data that we know are at best incomplete and at times exceedingly misleading, and lacking the means for controlled experiments, many continue to search for the promise of improved macroeconomic stability. Such efforts are always welcome. Expectations regarding the likely improvement in policy design that might fruitfully result from such efforts, however, must be scaled down. It is all too easy to be drawn back to the promise of excessively activist monetary policy by the siren song of sustained prosperity without inflation. It is all too tempting to dismiss the failed policies of the past as due to faulty analysis and incompetence that we now know how to avoid. But upon closer examination, strategies identified as new and improved guides for activist monetary policy in recent years bear more similarities to the discredited policies of the past than commonly recognized, and too close a resemblance to those policies for comfort.

This is not to deny that activist policies may at times be entirely appropriate and successful. That may be the case if and when a high degree of confidence regarding our understanding of the workings of the economy is warranted. But such times cannot be easily identified ex ante. A willingness to recognize our ignorance and lower our stabilization objectives accordingly may then be the safest defense against destabilizing fine-tuning.

At the deepest level, the failure of the macroeconomic policies of the 1970s and the need for the dislocation of the early 1980s to restore monetary order were due to the hybris that enough was known to perfect the economy's performance. Arthur Burns had already taught us this lesson in 1967 when he perceptively identified the true origins of the Great Inflation:

> And so we finally come to the agonizing question: why did the nation's policy-makers, who for years had succeeded so well in monitoring a business expansion under difficult conditions, finally unleash the forces of inflation? Why did men who showed the ability to profit from experience succumb to one of the oldest weaknesses of government practice? One reason, I think, is that they were misled by the very success that for a time attended their efforts. (Burns, 1967, p. 30)

The continuing fallacy is to downplay the degree of our ignorance and at times perhaps mistake the good fortune of the recent past for wisdom. Must we repeat such errors before we learn to respect the limits of stabilization?

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