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USING MONETARY CONTROL TO DAMPEN THE BUSINESS CYCLE: A NEW SET OF FIRST PRINCIPLES

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ABSTRACT

This paper reviews the main characteristics of cyclical behavior in the postwar U. S. economy and reviews the arguments for and against an activist stabilization policy to dampen business cycles. Four major behavioral characteristics are identified from summary data on U. S. postwar business cycles. These involve (1) the volatility of velocity growth in comparison with that of money growth, (2) the inertia of inflation, (3) the natural rate of unemployment as a dividing line between conditions of accelerating and decelerating inflation, and (4) the role of supply shocks.

The volatility of nominal GNP growth suggests that a target for nominal GNP growth might be considered as a possible alternative to control of monetary aggregates. Major qualifications to the case for this approach include lags and forecasting errors, uncertainty about policy multipliers, uncertainty about the natural rate of unemployment, and recent critiques based on the rational expectations view of macroeconomic behavior.

The paper treats supply shocks and institutional rigidities as constraints faced by policymakers. These influence the optimal degree of monetary accommodation of supply shocks and the choice among alternative paths for economic recovery. The analysis of constraints faced by the central bank contrasts with the usual analysis of a central bank operating in isolation.

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I. INTRODUCTION

In late 1982 the U. S. economy experienced the most serious business slump since the Great Depression of the 1930s. This verdict, supported by a wide variety of economic indicators, lends urgency to the search for a new approach to achieve a dampening of business cycles. Our concern with business cycles stands in marked contrast to the heady optimism of the late 1960s, when courses labelled "Business Cycles" were being expunged from the economics curriculum and when conferences were being organized to debate the topic "Is the Business Cycle Obsolete?"

Effect of the Business Cycle on Economic Ideas

In retrospect the nine-year business expansion between early 1961 and late 1969 appears to have been the exception, and in other decades of this century recurrent expansions and contractions have been the rule. Between late 1949 and early 1961 there were three complete business cycles, with an average duration of 3.7 years. Between late 1970 and late 1982 again there were three complete business cycles, with an average duration of 4.0 years. Worse yet, by almost any measure, economic performance during the 1970-82 period was inferior to that between 1949 and 1961. Economists have a serious professional obligation to explain why macroeconomic performance should have deteriorated while the tools of their trade have advanced in sophistication.

The adverse turn of events in the 1970s had not been predicted by the reigning orthodox wisdom of the 1960s, which combined a textbook Keynesian approach to aggregate demand behavior with a Phillips-curve approach to aggregate supply behavior. Not surprisingly, this consistent set of surprises and forecast errors unleashed an intellectual

counterrevolution. Milton Friedman and Robert Lucas have often been viewed as the Copernicus and Galileo of a new business cycle theory, overthrowing the previous Aristotelian orthodoxy of postwar Keynesianism. In fact Lucas and his colleague Thomas Sargent consciously adopted a revolutionary rhetoric, and in a famous polemic described themselves as "sorting through the wreckage" of the Keynesian Revolution.[1]

Despite differences in the details of their economic models, particularly the length of the horizon being addressed, Friedman and Lucas and their followers were united in their opposition to the "fine tuning" or "activist" monetary and fiscal intervention favored by mainstream Keynesians. The deteriorating performance of the economy in the 1970s brought many new adherents to their "monetarist counterrevolution" and its primary policy recommendation--that the Federal Reserve carry out a simple constant-growth monetary rule (CGMR).

The debate between Keynesians and monetarists over the control of the business cycle still rages. Many commentators have interpreted the shift by the Federal Reserve in October, 1979, toward greater emphasis on targets for monetary growth as representing the official adoption of monetarism. Yet neither school of thought is pleased with the performance of policy since 1979. Monetarists disavow the Fed's policy because of the high short-run volatility in monetary growth that occurred over short periods. Keynesians charge that the Fed's policies, whatever they are called, allowed the economy to collapse and unemployment to rise to a postwar record in 1982.

This paper sets out a few simple but central ideas about stabilization policy, in an attempt to clarify the current debate about the

conduct of policymakers. It begins by identifying four main characteristics of the economy's behavior and discusses manifestations of that behavior over postwar business cycles. It then reviews some of the main arguments for and against activist policy intervention. The unifying theme is the search for policies to dampen the business cycle and reduce the human and economic waste that has been experienced in the early 1980s.

Four Central Characteristics of Macroeconomic Behavior

We distinguish four central characteristics of the economy's response to policy actions. These help us to understand just where the mainstream Keynesian approach went wrong. But the four characteristics also help us to understand why the monetarist CGMR panacea fails to provide a solution to the flaws in the 1960s Keynesian remedy. And they point the way to a reconstructed policy approach which combines rules with activism, avoiding the weaknesses of both doctrinaire activism and ritual monetarism.

The first characteristic concerns the nature of the economy's fluctuations in nominal aggregate demand, and the other three relate to the response of real output, i.e., aggregate supply:

(1) Over postwar business cycles the growth rate of nominal GNP has been highly variable, averaging almost 8 percentage points faster at an annual rate over expansion phases of the business cycle than over recession phases. Procyclical fluctuations in the growth rate of the money supply, however, account for only a trivial fraction of fluctuations in nominal GNP growth, 14 percent on average over seven

postwar business cycles. The remaining 86 percent is accounted for by changes in the growth rate of the "velocity" of money, i.e., how much nominal GNP is purchased with a given amount of money. The timing of these velocity movements is largely independent of monetary growth fluctuations and suggests that there would still be substantial fluctuations in nominal GNP growth even if the Federal Reserve were to carry out successfully the monetarists' long-sought CGMR policy.

(2) Changes in real GNP occur by definition when changes in nominal GNP differ from the rate of inflation. Real GNP could remain stable in the face of wide swings in nominal GNP growth only if the inflation rate duplicated those wide swings with little or no lag. But a fundamental characteristic of the U. S. inflation process is the sluggish adjustment or "inertia" of inflation in response to fluctuations in the growth rate of nominal GNP. Thus the dampening of business cycles requires that nominal GNP fluctuations be moderated, unless a way can be found to increase substantially the speed of inflation's response to those fluctuations.

(3) The evidence now seems compelling in support of Friedman's proposition that the economy has a natural rate of unemployment. Any attempt to maintain unemployment for a long period below the natural rate generates a continuously accelerating inflation rate, as we learned in the late 1960s. An unemployment rate substantially above the natural rate generates downward pressure on the inflation rate, as we have seen in 1981-83.

(4) A counterpart of inflation inertia is that "supply shocks," sudden changes in the prices of important raw materials like oil, have consequences for the aggregate inflation rate, simply because

prices in the rest of the economy (i.e., non-oil prices) are not capable of dropping quickly enough when oil prices rise, nor of rising quickly enough when oil prices fall. Adverse supply shocks pose a fundamental dilemma for policymakers, since the previous rate of inflation cannot be maintained without a significant loss of non-oil output, whereas maintenance of the previous level of output will cause a marked and perhaps permanent acceleration in the rate of inflation.

These four characteristics form the basis of our interpretation of both the 1960s version of activism, and the monetarist CGMR prescription. The paper suggests that a new approach is needed, based explicitly on these four characteristics of economic behavior. Our suggestion involves a long-run objective of maintaining the actual unemployment rate equal to the natural unemployment rate, while operating monetary policy by establishing a target path for nominal GNP growth in the short run. Because the proposed policy approach is closer in spirit to activism than a monetarist CGMR, much of the paper is concerned with both old and new objections to activist policy intervention.

II. LESSONS FROM POSTWAR BUSINESS CYCLES

An Analytic Arrangement of the Data

Keynesians and monetarists agree that the central actors in macroeconomic drama are output, unemployment, inflation, and money. While there are numerous theories about the connections among these variables, one undeniable fact is the definition that links output, inflation, and money. This is the growth rate version of the famous "quantity equation," and states that:

monetary growth + velocity growth $\equiv$ inflation + real growth

We can give a separate lower-case symbol to each growth rate, and rewrite the quantity equation as:

$$m + v \equiv y \equiv p + q \qquad (1)$$

The "y" inserted in the middle of the quantity equation stands for the growth rate of nominal GNP and reminds us that the left side (m + v) and right sides (p + q) are simply alternative ways of decomposing nominal GNP growth.

Data for seven postwar business cycles are exhibited in Table 1 in the same arrangement as equation (1). The timing of each cycle is dictated by the choices of the National Bureau of Economic Research (NBER), which has established a chronology of U. S. business cycles extending back to 1837. The table shows each business cycle in a grouping of three lines, labelled "expansion," "plateau," and "recession." The "expansion" begins in the calendar quarter designated by the NBER as the official cycle "trough." The "recession" begins in the quarter designated as the official NBER "peak." An intermediate stage is defined here that separates the period between trough and peak into two intervals, divided at the quarter when real GNP reaches its highest level relative to its secular trend. During the plateau phase, the economy exhibits continued real GNP growth at a rate slower than the secular trend.

Evidence on the Four Central Characteristics

The data displayed in Table 1 provide evidence to support our interpretation of the four central macroeconomic characteristics of the

Table 1

Basic Characteristics of U. S. Business Cycles
1949-1982

Phase	Date Phase Begins	Length of Phase in Years	Four-quarter growth rates: Money + Velocity = Nominal GNP			GNP Deflator	Real GNP
			Supply(m)	of M1(v)	GNP(y)	(p)	(q)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Expansion	1949:Q4	3.50	4.3	6.5	10.8	3.3	7.5
Plateau	---	---	---	---	---	---	---
Recession	1953:Q2	1.00	0.8	-2.7	-1.9	1.4	-3.3
Expansion	1954:Q2	1.50	2.9	5.6	8.5	2.0	6.5
Plateau	1955:Q4	1.75	0.8	6.1	6.9	3.6	3.3
Recession	1957:Q4	0.75	0.6	-3.2	-2.6	1.0	-3.6
Expansion	1958:Q2	1.00	4.5	6.3	10.8	2.7	8.1
Plateau	1959:Q2	1.00	-0.6	3.8	3.2	1.5	1.7
Recession	1960:Q2	0.75	1.9	-1.4	0.5	0.6	-0.1
Expansion	1961:Q1	5.00	3.8	3.9	7.7	1.9	5.8
Plateau	1966:Q1	3.75	5.0	2.3	7.3	4.3	3.0
Recession	1969:Q4	1.00	5.0	-0.1	4.9	5.0	-0.1
Expansion	1970:Q4	2.25	7.7	3.5	11.2	4.6	6.6
Plateau	1973:Q1	0.75	4.8	4.7	9.5	7.3	2.2
Recession	1973:Q4	1.25	4.4	1.4	5.8	10.1	-4.3
Expansion	1975:Q1	3.75	7.1	4.7	11.8	6.5	5.3
Plateau	1978:Q4	1.25	7.4	2.7	10.1	8.5	1.6
Recession	1980:Q1	0.50	10.8	-5.5	5.3	9.5	-4.2
Expansion	1980:Q3	0.50	7.9	8.5	16.4	10.2	6.2
Plateau	1981:Q1	0.50	4.5	3.6	8.1	7.7	0.4
Recession	1981:Q3	1.50	6.1	-1.6	4.5	5.9	-1.4
Average All Cycles (Weighted by length)							
Expansion		2.53	5.1	5.1	10.2	3.8	6.4
Plateau		1.28	3.9	3.5	7.4	4.9	2.5
Recession		0.98	4.0	-1.4	2.6	5.2	-2.6

postwar economy. Common features of the seven cycles are summarized in the bottom section of the table, which provides averages of the variables for each phase over all seven cycles, with each phase weighted by its length. Columns (3) through (5) show that nominal GNP growth was highly volatile, with a 10.2 percent average growth rate during expansion phases and 2.6 percent rate during recession phases, for a difference of 7.6 percent. In contrast, M1 growth was much less volatile, with growth in expansion phases only 1.1 percent faster on average than in recession phases. As a result, fluctuations in monetary growth accounted on average for only 14 percent (1.1/7.6) of fluctuations in nominal GNP growth. The remaining 86 percent is accounted for by fluctuations in the growth rate of velocity.

This fact implies that a hypothetical policy which maintained rigid growth of the money supply over business cycle phases would not stabilize nominal GNP growth. Nevertheless, monetary mischief was partially responsible for the poor macroeconomic outcome of the past 15 years. First, we notice a consistent tendency for monetary growth to be lower in recessions during the three business cycles between 1949 and 1961. This destabilizing behavior may be viewed, along with the procyclical movements of money during the Great Depression, as the catalyst for Friedman's CGMR proposal. The proposal might not achieve complete stabilization of the growth of nominal GNP, Friedman reasoned in 1960, but it was likely to result in more stability than had been achieved by the actual monetary policies observed up to that time.[2]

Another prominent feature in Table 1 is the steady acceleration of monetary growth in successive business cycles beginning in 1961. The weighted average growth rates of money, velocity, and nominal GNP in

successive cycles were (in percent):

	Money	Velocity	Nominal GNP
1958-61	1.9	3.3	5.2
1961-70	4.4	2.7	7.1
1970-75	6.2	3.1	9.3
1975-80	7.5	3.3	10.8
1980-82	6.1	1.5	7.6

Since velocity growth exhibited no significant change over these cycles, except for 1980-82, the behavior of money can be blamed for the long-term increase in nominal GNP growth and in the rate of inflation in the 1970s as compared to the 1950s and early 1960s. Thus a careful distinction must be made between the small role of money growth in contributing to the short-run timing of individual cycles, and its large role in contributing to the acceleration of nominal GNP growth and inflation that occurred in the 1960s and 1970s.

The behavior of the inflation rate in column (6) averaged over all cycles shows a striking pattern, with an average growth rate of 3.8 percent in expansions and 5.2 percent in recessions. This appears to conflict with the usual view that recessions are a necessary evil to bring down the inflation rate. An examination of the individual cycles, however, suggests that the seven-cycle average mixes up three quite different types of experience. The recessions between 1949 and 1961, as well as the most recent 1980-82 episode, display the expected procyclical movement. The middle three cycles between 1961 and 1980, however, exhibit a strong countercyclical pattern that helps to demonstrate the effect of two of our central characteristics.

Characteristic (3) refers to the continuous upward adjustment of the inflation rate that occurs when unemployment remains below its natural rate. This gradual adjustment of inflation was most obvious in the long 1961-70 cycle. Because inflation adapted with substantial inertia to rapid nominal GNP growth (characteristic 2), the economy experienced a period between 1964 and 1969 when the actual unemployment rate fell substantially below the natural rate of unemployment. The gradual upward adjustment of inflation continued into the 1969-70 recession, which witnessed faster inflation than previous phases despite slower nominal GNP growth. A complementary explanation is that the slowdown in nominal GNP growth in 1969-70 was the mildest of any of the postwar cycles, further inhibiting any deceleration of inflation.

Characteristic (4) refers to the impact of supply shocks (sharp swings in the relative prices of important materials) on the aggregate inflation rate. If the growth rate of nominal GNP were to remain constant, then a spontaneous upsurge of the inflation rate following a supply shock would cause a reduction in real GNP growth, and, in severe cases, a recession. The 1970-75 and 1979-80 business cycles both ended with recessions that were triggered by supply shocks and amplified by a slowdown in nominal GNP growth. Between late 1972 and 1975 the relative price of oil increased by 25 percent, and again by more than 40 percent between late 1978 and late 1981. The relative price of food increased by about 10 percent between 1972 and 1974. Finally, the recession of 1973-75 was aggravated by the extra inflation that occurred after the termination in May 1974 of the Nixon-era price control program.[3] As a result the inflation rate observed in the recession phase of these two cycles was substantially higher than in the expansion phase. The marked

difference between the countercyclical behavior of inflation in the 1973-75 and 1980 recessions, and its procyclical behavior in the 1981-82 recession, provides a strong confirmation of the view that supply shocks matter (characteristic 4). These facts serve to refute those who focus narrowly on prior fluctuations in the growth rate of the money supply as the sole explanation of the inflation rate and support a view that inflation depends on both demand factors (summarized in the rate of nominal GNP growth) and on supply factors as well.

There was an additional consequence of supply shocks. Partly as a result of cost-of-living escalators in wage contracts, supply shocks had the effect of permanently raising the rate of inflation at any given unemployment rate. This forced policymakers to choose between prolonged recession and an acceleration in monetary growth to ratify the upward ratchet of inflation caused by the supply shock. During the 1975-78 expansion the choice was made to "ratify" or "validate" the inflation rate. In this sense the postwar peak in the growth rates of money and nominal GNP during the 1975-80 cycle was not simply a perverse action by misinformed policymakers, but rather an indirect consequence of the supply shocks themselves.

Lessons from the Postwar Experience

This brief review of postwar business cycles suggests several lessons that should guide the development of any new approach to dampening business cycles.

1. Policymakers may be tempted to move the economy below the natural rate of unemployment to generate jobs or above that rate to stop inflation, but in doing either they only

breed future instability. By allowing the economy to remain so far below the natural unemployment rate between 1964 and 1969, policymakers of the 1960s indirectly created future business cycles by forcing the policymakers of the 1970s and 1980s to implement restrictive anti-inflationary demand management policies. And by allowing the economy to operate so far above the natural unemployment rate in 1982 and 1983, current policymakers may indirectly be causing "echo" effects in the form of future cycles.

2. While control of nominal GNP growth is an essential prerequisite to the dampening of real cycles, nominal GNP growth should not always be maintained at a single constant rate. If the economy were in full equilibrium, operating with zero inflation and at the natural rate of unemployment, stable nominal GNP growth would be the optimal policy.[4] But in two other circumstances, there is no presumption in favor of stable nominal GNP growth. First, if the economy starts out with actual unemployment far above the natural rate, as in 1983, a sustainable recovery cannot be achieved by stable nominal GNP growth, for reasons discussed below. Second, in the face of a supply shock, policymakers may in some circumstances find that it is optimal to accommodate the shock fully or partially, that is, to allow nominal GNP growth to rise in response to higher inflation in order to insulate real GNP growth.

III. RECONSIDERING THE CASE AGAINST ACTIVISM

The case in favor of a CGMR approach to policymaking has both a positive and a negative component. In favor of such a policy is the argument that by setting a lid on the growth rate of nominal income, a CGMR prevents emergence of the conditions necessary for an acceleration of inflation. There is nothing special about money in this connection, however, since a lid on nominal income can be maintained by a target for aggregate credit, as recently recommended by Benjamin Friedman (1983), and, better yet, by a target for nominal GNP growth itself. More central to the concern of this paper is the negative component of the case for a CGMR policy. This criticizes as utopian the set of assumptions about the policy environment required to justify an activist approach.

Arthur Okun (1972) crystallized the monetarist case by setting out the main characteristics of a hypothetical "activist's paradise" in which stabilization policy could achieve almost perfect control over nominal GNP growth:

1. Policymakers have the ability to forecast perfectly future changes in the private demand for and supply of goods and services.
2. Policymakers can forecast perfectly the future effect of current changes in monetary and fiscal policy.
3. Policymakers possess policy instruments that have a strong impact on nominal GNP growth.
4. There are no costs of changing policy instruments.
5. There are no political constraints on the use of policy instruments for stabilization purposes.

Okun's activist paradise does not and has not ever existed. Knowledge and control techniques are imperfect in numerous ways. But the existence of imperfection does not create a definitive case against activism. The basic question, albeit a hypothetical one, is whether an economy under imperfect activist control exhibits more stable nominal GNP growth than an economy operating under CGMR.

Lags and Forecasting

Milton Friedman (1961) made a centerpiece of the case for a CGMR the argument that "long and variable lags" in the effect of monetary policy or spending are likely to make countercyclical monetary policy actions destabilizing. In that paper he accentuated the negative aspect of the formal stabilization analysis that he had developed a decade earlier (1953). In a subsequent theoretical article Stanley Fischer and J. Phillip Cooper validated part but not all of Friedman's thesis. They found that the variability of lags was a stumbling block that could well allow a CGMR to outperform a more activist policy, but the mere length of the lag called for a more active policy keyed to the rates of change of target variables like inflation and unemployment.

Actually the length and variability of lags in the effectiveness of monetary policy have been substantially exaggerated. Many monetarists believe that lags are short. In fact Milton Friedman now describes the effect of money on output as beginning after only six months. A simple comparison of cyclical peaks in the real money supply with subsequent peaks in the coincident indicators suggests a mean lag in the effect of monetary policy of only 9 months, with a narrow range over five postwar cycles between 6 and 12 quarters.[5]

Lags in the range of two to four quarters seem short enough to be circumvented through the use of forecasts. Despite the much-publicized failures of forecasters during the 1970s that has led some commentators to adopt a skeptical disregard for the value of forecasts, a reconsideration of the evidence does not suggest so pessimistic a verdict. Forecasters failed completely to foresee the enormous upsurge in the inflation rate during the period between early 1973 and early 1975. But nominal GNP growth errors were relatively small, in the range of one to two percentage points on a four-quarter-ahead basis, so that the positive inflation errors (i.e., actual greater than predicted) had their counterpart in negative errors in forecasts of real GNP growth.[6]

Since the basic policy proposal of this paper is for the Federal Reserve to target on <u>forecasts</u> of nominal GNP growth, the relative accuracy of the nominal GNP forecasts in the 1970s is reassuring. For instance, a Federal Reserve policy of maintaining steady 10 percent growth in nominal GNP during the 1975-80 would have required tighter monetary policy much earlier than actually occurred, since the four-quarter-ahead consensus forecast of nominal GNP growth exceeded 10 percent during most quarters between early 1976 and mid-1978. The most serious errors in forecasting nominal GNP growth appear to have occurred during the 1981-82 recession; there was little recognition by commercial forecasters in the fall of 1981 of the sharp decline in velocity growth that was about to occur. This important fact suggests that at least part of the 1982 economic slump was inevitable and could not have been offset by even the most enlightened policymakers.

Uncertain Economic Structure and Policy Multipliers

Perfect knowledge of monetary and fiscal multipliers is the second overly optimistic aspect of the activists' paradise. In a classic paper (1967) William Brainard showed that when policy multipliers are uncertain, the expected gap between actual and target real GNP should be closed by only a fraction of the gap. His demonstration illustrates the danger that a policy stimulus introduced to close a GNP gap may lead to overshooting and an acceleration of inflation, or that policy restraint introduced to eliminate overheating will push the economy into a recession.

Multiplier uncertainty is a double-edged sword. In connection with monetary policy, it can be interpreted as a loose relation between changes in money and changes in nominal GNP. But nominal GNP is the goal variable of concern to policymakers, while the value of the money supply is of no concern independently of its effect on nominal GNP. The discovery that there is a loose connection between the two would imply that a CGMR is a poor way to stabilize nominal GNP, not just that activist fluctuations in money might cause unpredictable changes in nominal GNP.

The monetary control dilemma occurs because there is a loose connection between the monetary instruments that the Fed controls precisely, unborrowed reserves and the discount rate, and the goal variable of ultimate concern, nominal GNP. The money supply is neither an instrument nor a goal variable, but rather an intermediate variable that is often called "irrelevant" in the sense that its numerical value is of no direct concern to the welfare of the population. Multiplier uncertainty can refer equally to the looseness of the link between

unborrowed reserves and the money supply, as well as to the link between money and nominal GNP. Thus there is no presumption that multiplier uncertainty supports the case for a CGMR over a nominal GNP growth target. Instead, such uncertainty implies only that changes in bank reserves do not have a reliable impact on either money or nominal GNP.

Since multiplier uncertainty is a genuine phenomenon, it qualifies the case for a nominal GNP target. If the economy were to revive in the mid-1980s sufficiently for unemployment to approach the natural rate, then, following Brainard, the Federal Reserve should not attempt to close the entire gap between actual and target unemployment within a short period. This qualification is even more important if there is substantial uncertainty about the value of the natural unemployment rate itself.

Uncertainty about the Natural Rate

The ultimate goal of monetary policy is to maintain the unemployment rate at the natural rate of unemployment, and real GNP at the corresponding level of natural real GNP. Recall that this situation with unemployment at its natural rate is defined as one in which the inflation rate remains constant, neither accelerating nor decelerating. If the economy is in the fortunate initial situation that unemployment equals the natural rate, then the Fed can maintain this situation and keep the inflation rate constant by maintaining nominal GNP growth constant at a rate equal to the inherited inflation rate plus the growth in the economy's natural real GNP.[7] If the economy starts off with unemployment far below the natural rate, as in 1966, or far above, as in 1982, then the Fed's job in choosing a nominal GNP path is more difficult.

My best estimate (1982) of the natural rate of unemployment in 1982 is about 6 percent. In the last quarter of 1982 the economy was operating at an output ratio of roughly 90 percent, i.e., achievement of a 6 percent unemployment rate would have required a level of real GNP 11 percent higher than actually occurred. Such estimates, however, are subject to substantial uncertainty. The history of U. S. research on the wage-price process reveals a continuous shift of consensus in a pessimistic direction, with studies in the late 1960s tending to deny Friedman's natural rate hypothesis, and studies in the early 1970s accepting that hypothesis but estimating the natural rate to be in the range of 4.5 to 5.0 percent unemployment. This contrasts with the current retrospective evaluation that the natural rate had already reached almost 6 percent by 1972, and has changed little since then.

Issues involved in estimating the natural unemployment rate can be summarized in terms of a simplified equation that explains the time path of the inflation rate (p_t) as depending on lagged values of the inflation rate (p_{t-1}), the unemployment rate (U_t), one or more variables representing the influence of supply shocks (z_t), and an error term (e_t). The e_t term represents any influences on inflation that have been omitted from the equation:

$$p_t = a + bp_{t-1} - cU_t + dz_t + e_t. \qquad (2)$$

If the fitted estimate of the "b" parameter, the response of inflation to past inflation, is equal to unity, and if supply shocks (z_t) and the error term (e_t) are equal to zero, then (2) can be solved for the unemployment rate (U_t) that will make the inflation rate (p_t) equal to its lagged value (p_{t-1}):

$$p_t = a + p_{t-1} - cU_t,$$

so if $p_t = p_{t-1}$, then

$$U_t^N = a/c. \tag{3}$$

The concept defined in (3) is sometimes called the "no-shock" natural rate of unemployment, since it is defined by assuming that all supply shocks (z_t) are absent. The presence of supply shocks, that is, positive values of z_t, helps to explain why inflation accelerated during the decade of the 1970s despite an average unemployment rate that was higher than the 1950s or 1960s. The natural unemployment rate, taking account of the influence of actual supply shocks and the error term, can be written more generally as:

$$U_t^N = \frac{a + dz_t + e_t}{c} \tag{4}$$

Thus in maintaining the economy at the natural unemployment rate, the Federal Reserve has a difficult, multi-part decision problem to solve. First, it must estimate the no-shock natural rate (a/c) on the basis of the best available evidence. The accuracy of these estimates depends heavily on the use of accurate proxies for the influence of supply shocks (z_t). Second, the Fed must moderate its policy if the economy is experiencing or is expected to experience long-lasting supply shocks, since positive values of z_t in (4) raise the natural rate, while negative values lower the natural rate. Finally, the performance of equation (2) in tracking the actual outcome of the inflation process must be monitored continually, and consistent positive errors, with inflation turning out to be greater than forecast, would call for an upward revision of the current estimate of the natural rate.

My own research provides an example of how the Fed might implement a policy of choosing a nominal GNP growth rate in order to guide the economy to its natural unemployment rate. First, my estimate of a slightly more complex version of equation (2) provides an estimate of the "no-shock" natural unemployment rate, about 6 percent during the late 1970s and early 1980s.[8] The sample period of this equation is the interval between early 1954 and the end of 1980. To test whether the "e_t" error term has been of significant magnitude since the end of 1980, the equation can be used to forecast the inflation rate for 1981 and 1982, using actual values of the independent variables but generating its own values, quarter-by-quarter, for the lagged inflation rate variable. The result is the following forecasting record:

	Four quarters of 1981	Four quarters of 1982	Eight quarters of 1981-82
Actual inflation rate	8.5	4.9	6.7
Predicted inflation rate	7.5	5.1	6.3
Error (actual - predicted)	1.0	-0.2	0.4

Thus the actual inflation rate has turned out to be slightly higher than predicted, indicating that, thus far in the prediction period, my 6.0 percent estimate for the natural unemployment rate may be a bit too optimistic. This prediction record also has another important implication, that the relatively rapid deceleration of inflation observed in 1982 is not "surprising" and does not suggest any important shift in the economy toward greater price flexibility as compared to the 1954-80 period. The downward flexibility of the inflation rate in 1982 reflects the combined influence of high unemployment and beneficial

supply shocks, especially a reduction in the real price of oil and an appreciation of the exchange rate.

While the evidence suggests that the "no shock" natural unemployment rate might be 6.5 rather than 6.0 percent, the band of uncertainty surrounding this question is more important for policymaking in future years than it is in 1983, with an unemployment rate around 10 percent. Another mitigating factor that somewhat eases the Fed's task is the inertia of the inflation process itself. If policy errors do cause unempooyment to slip half a point below the natural rate for six months or a year, no great disaster will occur. Five years with unemployment two percentage points below the natural rate in the 1960s were required to generate an acceleration of inflation from 1.5 percent in 1964 to 5 percent in 1969. More modest errors will have more modest consequences.

The Lucas Critique and the Credibility Hypothesis

Robert Lucas (1976) added a new dimension to the Brainard analysis of policy multipliers by pointing out that both structural coefficients and policy multipliers were endogenous and would respond to the particular policies chosen, thus making the conduct of policy even more uncertain. The "Lucas critique," which holds that agents respond rationally to changes in the policy environment, has applied with special force to the behavior of fnancial markets. Between 1979 and 1982 market participants believed that the Fed was attempting to maintain growth rates of money supply aggregates within relatively narrow bounds. A Friday afternoon announcement of a high outcome for the money supply that week tended to raise interest rates, as

speculators increased their probability that policy would be forced in the following week to shift toward restriction. This positive short-term correlation between monetary growth and interest rates replaced the short-term negative correlation imbedded in standard textbook models of macroeconomics.

Some economists have taken the negative message of the Lucas critique too seriously, as if the possibility of shifting response patterns not only makes activist monetary policy impossible, but also renders any econometric policy evaluation replete with error. Well-informed speculative behavior during the 1979-82 period is important information for anyone studying financial markets but does not imply that monetary policy had become impotent, for market expectations in 1979-82 were conditioned by the knowledge that the Fed was attempting to maintain a particular monetary target. After the Fed announced in October, 1982, that it was abandoning its previous targets for the money supply concept M1, due to deposit shifts caused by financial deregulation, market expectations adjusted. Between October 1982 and April 1983, M1 growth rate jumped to double digits without any significant increase in short-term interest rates.

William Fellner (1979) developed an analogue of the Lucas critique for our characteristic (2) above, the inertia in price adjustment that led many commentators in 1980 and 1981 to predict that a deliberate policy-induced reduction in nominal GNP growth would reduce the inflation rate only at the cost of a very significant loss in real GNP. Fellner, following Lucas, argued that the sticky price adjustment process was an aspect of public behavior conditioned on expectations about the behavior of policymakers; prices responded slowly to a

deceleration in nominal GNP growth only because the public had come to expect policymakers to reverse themselves quickly. Firms were reluctant to cut prices in recessions, because they expected policymakers to overreact to any decline in real GNP, and thus to boost nominal GNP growth after only a short recession. If the government were only to adopt a "credible" policy of consistently slow nominal GNP growth and maintain it for five years or more, Fellner argued, firms and workers would adapt. Seeing that government nominal GNP creation would not bail them out, firms and workers would be more willing to accept price and wage cuts in recessions.

There is a valid element in the Fellner view, that the response of inflation to high unemployment (the c coefficient above in equation 2) is not immutable. Indeed, that coefficient was higher in some earlier historical periods than in the postwar U. S., and higher in some other countries. But there are two problems with Fellner's view. First, the government has no way to convince the public that its determinaton to fight inflation is more serious than in the past, other than actually to carry out a slow-nominal-GNP-growth policy. By the time the public catches on to the new toughness of policymakers, the damage may already have been done in the form of lost output and high unemployment. Second, the historical evidence for the postwar U. S. suggests that the response of inflation to changes in the unemployment rate (the c coefficient) was not very different under the restrictive monetary policy pursued by policymakers in the late 1950s than under the expansive policy pursued after 1967.

These criticisms of the Fellner hypothesis were made prior to the 1981-82 recession. The unexpectedly high level of unemployment ex-

perienced during 1982, combined with the failure of inflation to decelerate faster than predicted, suggests that there was no substantial change in the structure of the wage- and price-setting process. Each economic agent may have believed in the Fed's new toughness, but this belief did not provide the incentive nor the coordination required for all economic agents to decide en masse to alter their long-term contracting arrangements for wages and prices.

The Policy Ineffectiveness Proposition

Lucas, along with Thomas Sargent, Neil Wallace, and Robert Barro, constructed "equilibrium business cycle models" that make changes in output depend on money "surprises," that is, on deviations between the actual and expected growth rate of the money supply. Sargent and Wallace (1976) have used such models to show that a monetary policy that reacts in a systematic way to past events, say a derivative control rule responding to past values of inflation and unemployment, cannot cause the required monetary surprise. Instead, rational agents will incorporate the systematic component of monetary behavior into their estimate of the expected change in money. The Fed has no control over the difference between actual and expected monetary growth, on which the level of real GNP depends in these equilibrium business cycle models. The Sargent-Wallace "policy ineffectiveness proposition" is obviously a startling result, since it denies that a systematic countercyclical monetary policy can have any impact at all on real output.

Ironically, the Sargent-Wallace result, if true, would make systematic countercyclical policy not only futile, but also unnecessary. The proposition is based on equilibrium business cycle

models in which prices are assumed to be perfectly flexible, so that markets always clear and the voluntary supply of labor by workers always equals the voluntary demand for labor by firms. In the Lucas-Sargent-Wallace models the Fed could eliminate inflation simply by announcing that henceforth it would expand the money supply at a rate compatible with price stability. The large output loss in the U. S. recession of 1981-82, in the face of an announced disinflationary monetary policy, does not seem consistent with the equilibrium interpretation of output fluctuations based on errors in forecasting money.

Lucas (1980) has defended the unrealistic assumptions of the equilibrium models by claiming that "equilibrium models of this new class seem to do about as well in fitting time series as do models based on the neoclassical synthesis," where the latter is his label for the traditional Keynesian macroeconomic model combined with a gradual adjustment inflation equation like (2). Yet Lucas' sanguine view, expressed about three years ago, is no longer justified. In detailed analyses of both postwar data and U. S. historical data going back to 1890, Mishkin (1982) and Gordon (1982b) have shown that the policy ineffectiveness proposition is empirically refuted, and that he equilibrium business cycle approach fits the data poorly. Thus far no spokesman for the policy ineffectiveness proposition has shown how an empirical case for that hypothesis can be resuscitated, nor how the behavior of the unemployment rate in 1981 and 1982 (much less 1930-40) can be made consistent with that view. In the end the 1981-82 recession may prove to have been as fatal to the Lucas-Sargent-Wallace proposition as the Great Depression was to pre-Keynesian classical macroeconomics.

IV. MONETARY AND FISCAL CONTROL OF NOMINAL GNP GROWTH

A continuing theme of this paper is the need to distinguish between two separate aspects of the stabilization policy problem, issues involved first, in achieving short-run control of nominal GNP growth, and second, in determining the optimal path for nominal GNP growth in light of the economy's starting value of the unemployment rate. In this section we examine the first issue, that is, how control of nominal GNP growth would actually be carried out, and how the adoption of this new policy target would differ from previous eras in which the Federal Reserve emphasized stabilizing either interest rates or the growth of monetary aggregates.

Sources of Shifts in Velocity Growth

If the growth rate of velocity were constant, quarter after quarter and year after year, there would be no difference between a CGMR and a policy of maintaining nominal GNP growth at a constant rate. But we have seen in Table 1 that most of the difference in the growth rate of nominal GNP between expansion and recession phases of the business cyle has been due to fluctuations in velocity growth, not in money growth. Velocity can shift as a result of decisions made in both the "commodity market" (the market for goods and services) or in the "money market" (the market in which interest rates adjust to equate the supply and demand for money).

The commodity market contributes to velocity shifts through the behavior of fixed investment, inventory changes, and the foreign trade balance. Fixed investment fluctuations are best described by what economists call a "multiplier-accelerator" mechanism. The level of net

investment tends to respond to the growth rate of real GNP; an expansion of consumption spending raises business firm estimates of the amount of plant and equipment that will be needed next year. Investment increases, and this, through the multiplier, raises consumption further. Eventually the process comes to an end and is reversed, but, while it is occurring, the economy can experience a period of rapid velocity growth, as in 1955, 1965, 1973, and 1978. During those years of rapid growth, the share of real GNP taking the form of expenditures on durable goods reaches its highest point of the business cycle.[9] The reverse occurs in recession years.

Inventory changes tend to exaggerate the amplitude of swings in nominal GNP growth and, hence, in velocity growth. Business cycle troughs tend to occur in quarters like 1975:Q1 and 1982:Q4 when inventory liquidation is greatest. In contrast to the 4.4 percent decline in velocity that occurred in 1982 (comparing 1982:Q4 with 1981:Q4), the decline in velocity would have been 2.7 percent if inventory changes had been excluded. Forecasting models tend to miss extreme swings in the process of inventory accumulation and decumulation, and likewise the Fed should ignore such swings in attempting to control nominal GNP growth. In the jargon of national income accounting, ignoring inventory change means that the Fed should control the growth of "nominal final sales," not nominal GNP.

The decline in the foreign trade balance, exports minus imports, played a major role in accounting for the depth of the 1981-82 recession. In an arithmetic sense the decline in real net exports accounted for fully 75 percent ($27/$36 billion) of the decline in the level of real GNP between 1981:Q1 and 1982:Q4. The main cause of this

deterioration was the 40 percent appreciation of the dollar that occurred between 1980 and 1982:Q4, and this in turn was caused in large part by the high level of real interest rates experienced during 1981 and 1982. We recall in this connection the fourth and fifth aspects of Okun's "activist's paradise," the proposition that there are no costs of changing policy instruments nor any political constraints on such changes. Maintenance of either a CGMR policy or constant growth in nominal GNP is likely to require greater fluctuations in real interest rates than a policy of stabilizing interest rates themselves, and this interest rate instability is then likely to be communicated to the exchange rate and to the trade balance. Forecasters missed this channel of influence of monetary policy in 1981-82, largely because exchange rates were fixed during much of the historical sample period typically used to estimate time-series econometric equations.

The money market is also a significant source of instability in velocity growth. Since the late 1970s there have been continuing financial market innovations, spurred by the Depository Institutions Deregulation and Monetary Control Act of 1980. Deregulation has allowed interest to be paid on a growing share of checkable deposits, and this has had the effect of altering the response of the demand for such deposits to changes in interest rates paid on traditional short-term market securities like Treasury bills. In the months following October, 1982, the Federal Reserve announced that shifts among types of deposits had made it impossible to maintain the money aggregate M1 within its previous target growth range. The rapid growth of M1 during this period, with the corresponding decline in velocity, is an extreme example of multiplier uncertainty. That is, the Fed admitted that it no

longer knew how total spending was related to M1. Because total spending matters and M1 does not for the determination of inflation and output growth, the Fed wisely decided temporarily to abandon targeting M1.

Financial market innovations have also altered the response of spending to changes in interest rates. In periods of high market interest rates prior to the late 1970s, deposit rate ceilings at savings banks induced depositors to shift funds to market instruments like Treasury bills. This process was called "disintermediation." In response to this loss of deposit funds, savings banks in turn slammed shut the mortgage window, and mortgage loans could not during some periods be obtained at any price. Through this mechanism only a relatively modest increase in interest rates was required to send the housing industry into a tailspin.

But in recent years, with savings banks allowed to offer depositors close to the market rate through a wide variety of certificates, disintermediation has not occurred on the same scale. Instead, to choke off housing construction, a much higher level of interest rates is required in order to reduce the demand for mortgage funds. In a nutshell, the effect of monetary policy in the old days operated by a strong rationing channel, but now must rely on a weaker price-substitution channel. Much of the volatility of interest rates in the 1979-82 period can be attributed to reliance on the price-substitution effect, combined with the Fed's adoption of monetary growth targets which left interest rates free to float and find their own new levels.

Reassessing the Choice of Targets

In a classic analysis William Poole (1970) showed that an interest rate target for monetary policy was preferable to a money supply target when the demand for money is unstable, and a money-supply target was preferable when the demand for commodities is unstable. This analysis was carried out in a context (the same as Brainard's in 1967) in which the ultimate goal of policymakers is the stabilization of real GNP at a target level, and as such is compatible with the orientation of this paper toward equalizing the actual and natural rates of unemployment. In a formal model like Poole's, it is standard practice to define the concept of "unstable money demand" and "unstable commodity demand" as totally unpredictable random variables which policymakers have no hope of offsetting.

But actually, as Benjamin Friedman (1977) has stressed, the operational content of instability means in practice that the demand for money or commodities drifts away from predicted values not just for a day or a week, but for several quarters or even years at a time. Periods of high durable goods demand like 1955, 1965, 1973, and 1978, tend to persist for four to six quarters. Unexplained swings in the demand for money also tend to persist, as in the famous "case of the missing money" that occurred between 1975 and 1978, when the actual money supply fell far short of predictions based on previously estimated econometric models. Friedman's point is that policymakers can learn about such instability as it occurs, since new data on the state of commodity demand are issued at least monthly, while data on M1 are issued weekly. Policy is more efficient when it utilizes the latest available information that the demand for commodities and/or money has

shifted and adjusts its policy accordingly.

Because both commodity and money demand exhibit instability, there is no simple rule that the Fed can follow for the policy instruments under its direct control, unborrowed bank reserves and the discount rate. The experience of 1981 and 1982 has taught us that the level of real interest rates and of the effective exchange rate has a strong but delayed impact on nominal GNP growth. And growth rates of nominal monetary aggregates, whether bank reserves or M1 itself, must ultimately be related to the growth rate of nominal spending on goods and services. Thus the Federal Reserve can do no better than to use the best recent models and other information to decide what current combination of interest rates, reserve growth, and the exchange rate is compatible with the nominal GNP growth path that it has set.

Poole's analysis reminds us that stabilization of interest rates may be desirable in cases when the demand for money is particularly unstable, as in late 1982 and early 1983 when deposit shifts were pronounced. But stabilization of interest rates would seem on the surface to run aground on the shoals of Milton Friedman's famous (1968) proposition that the Federal Reserve cannot control the nominal interest rate. Friedman pointed out that if the Fed attempted to maintain a fixed nominal interest rate when there was an upward blip in the demand for commodities, it would be forced to print the money to accommodate the increase in the demand for money, and that this would raise the expected rate of inflation and depress the real interest rate, thus further stimulating the demand for commodities and generating an unstable process ad infinitum. But our recommended approach to the setting of monetary policy deals with this problem directly. First, the Fed would

use interest rates as one of several guideposts to the control of nominal GNP. Any sustained upward blip in the demand for commodities would raise forecasts for the next year's growth rate of nominal GNP and, as this predicted rate rose above the Fed's stated target, interest rates would be allowed to increase.

If unexplained shifts in the demand for commodities and money were totally random and had no serial persistence, the Fed would have no hope of controlling nominal GNP growth and could do no better than Poole's procedure of weighting interest rates and money growth as targets according to the respective variances of money demand and commodity demand. But, as B. Friedman recognized, serial persistence in the shifts creates the potential for direct control of nominal GNP growth. The new wrinkle added to the Poole/Friedman analysis by events of recent years has been the important role of flexible exchange rates as a channel of transmission of monetary policy. As it learns more about the response of the U. S. trade balance to major and sustained fluctuations in the effective exchange rate of the dollar, the Fed may find that intervention in foreign exchange markets to dampen excessive swings in the dollar becomes a necessary component of its overall policy of stabilizing nominal GNP growth.

The Role of Fiscal Stabilization

Temporary income tax changes formed the lynchpin of countercyclical stabilization policy in the "new economics" of advisers to the Kennedy and Johnson administrations in the early 1960s. But these changes in tax rates would of necessity be temporary, and it was soon recognized that temporary income tax changes may have little potency (thus viola-

ting the third item in the description of Okun's "activist paradise"). Robert Eisner (1971), using Milton Friedman's permanent income hypothesis of consumption, showed that a temporary income tax cut or surcharge would fail to alter permanent income and thus would have a low spending multiplier. Not only did Eisner thus discredit the temporary tax changes favored by the mid-1960s activists, but also indicated that the lag in the effect of such fiscal changes might be long and variable, depending on the public's assessment of the likelihood that the tax change would soon be reversed. The most recent empirical work on this issue by Alan Blinder (1981) suggests that a temporary tax change does cause a change in consumption spending, but the effect is partial and drawn out over two years.

Eisner's point about temporary income tax changes works in the opposite way for temporary excise tax changes. These are more effective than permanent tax changes in creating an intertemporal displacement of spending. The main qualification here is the familiar political one: the necessity for Congressional debate of such fiscal measures may lead not only to perverse spending effects in anticipation of future tax changes, but also to delays which cause tax changes to be made at the wrong stage of the business cycle. The main tax of this type in the U. S. fiscal stabilization arsenal has been the investment tax credit, and the historical record of tax changes in the 1960s and early 1970s indicates a perversely procyclical impact.

John Taylor (1982) has recently called attention to a quasi-automatic method of fiscal stabilization used in Sweden between 1955 and 1972, the countercyclical investment stabilization fund. The timing of "releases" from the fund to stimulate investment spending in recessions

was not keyed to respond automatically to a particular cyclical indicator, but was based on the decision of a particular government agency. Taylor shows however, that the decisions on releases were prompt and amounted to a countercyclical policy rule. A related type of countercyclical fiscal policy has operated in Japan, where the speed of completion of large public works projects is accelerated or decelerated according to the phase of the cycle.

The fact that such policies have not been successfully implemented in the U. S. says more about the institutional drag imposed by our Constitution than about any inherent defects in such plans. But the Constitutional barrier is severe, since it not only inhibits rapid implementation of countercyclical fiscal policy but also interferes with the coordination of monetary and fiscal policy. Because the Federal Reserve can move quickly, while the fiscal policy process tends to move slowly, I believe that the main burden of dampening the business cycle must fall on the Federal Reserve, and that out of necessity it is forced to base its actions on a guess about the likely future course of fiscal policy, not on any actual influence in a coordinated policy setting.

Political Objections to a Nominal GNP Target

Two contradictory reactions are sometimes heard to the proposal for an explicit nominal GNP growth target. One is that this is what the Fed has been doing implicitly all along, at least before 1979 when it adopted an explicit policy based on monetary aggregates. The poor performance of the Fed in carrying out this implicit policy is then taken as a condemnation of the idea itself. This criticism is unconvincing, however, because there is no evidence that the Fed ever implemen-

ted a nominal GNP target nor that it based decisions on projected deviations of actual nominal GNP growth from any such target.

The opposite criticism is that it is not politically feasible for the Fed to adopt a policy based on nominal GNP growth. "Announcing a GNP target comes close to announcing an unemployment rate--and one that is often unacceptable--whereas a monetary target implies no precise unemployment level because of the variability in velocity. Thus while the Federal Reserve has a nominal GNP target in mind when it announces its money targets, there is no politically embarrassing admission of an associated unemployment rate."[10] Consider, however, a policy approach that attempted to stabilize nominal GNP along a path designed to keep the unemployment rate equal to its natural rate in the long run. In carrying out such a policy, the Fed would not actually be required to announce its current opinion about the value of the natural unemployment rate, but would need only to use that opinion in a behind-the-scenes meeting when considering its target path for nominal GNP over the forthcoming year or two years. There is little reason for the Fed to be concerned over the political repercussions of its choice of a nominal GNP path, judging by the observed behavior of the actual Republican Administration in its economic statements in early 1983, in which it showed no reluctance to announce that the actual unemployment rate would remain above the natural rate until 1988, and that unemployment was likely to be near or above 10 percent throughout 1983.

There is another political consideration. Evaluation of the Fed's performance by Congress and by the public, it is suggested, must be based on something that the Fed can actually control, and no one pretends that the Fed can control nominal GNP growth. The logic behind

this objection sounds as if there were an "either-or" proposition involved. But there is no black-and-white dividing line between macroeconomic variables labelled "money" and those labelled "spending." The Fed controls unborrowed bank reserves and the discount rate directly, but it must rely on indirect channels of transmission to influence either money or spending. Further, the Fed's ability to control money aggregates has been eroded by deregulation. By March 1984 bank reserve requirements on all the nontransactions components of M2 will have disappeared. The political argument thus appears to strip the Fed of anything but nonborrowed bank reserves as a target, yet there are too many slips between the cup of bank reserves and the lip of nominal GNP growth to make this an acceptable alternative.

V. SELECTING A PATH FOR NOMINAL GNP GROWTH

Once the Fed has convinced itself to use its control of interest rates and bank reserves to stabilize the growth rate of nominal GNP around some path, it must choose a number (or range of numbers) for that path. Its choice is constrained by the inertia of inflation and by the obvious fact that this year's unemployment rate depends not just on the growth rate of real GNP achieved by the Fed, but on last year's unemployment rate. The Fed's choice of path involves quite different issues, depending on whether the economy last year experienced an actual unemployment rate near the natural rate, or far away from the natural rate.

When the Economy is Already at the Natural Rate

If the actual unemployment rate is at the natural unemployment rate, then by definition it will stay there if the growth rate of actual real GNP equals the growth rate of natural real GNP ($q = q^N$). Also by definition, there will be no tendency for the inflation rate (p) to accelerate or decelerate from its recent value if there are no supply shocks. Thus the appropriate path for nominal GNP growth (y) is the sum of recent inflation and natural output growth ($y = p + q^N$). If, for instance, inherited inflation is 5 percent and natural real GNP growth is 3 percent, then a nominal GNP growth path of 8 percent would tend to ratify the initial situation. This choice would have to be altered only if a significant supply shock occurred; the issues raised by such an event are discussed in a separate section below.

Some readers will balk at the suggestion that the Fed should announce that it is planning explicitly to ratify an ongoing inflation, 5 percent in the preceding example. Should not the Fed constantly struggle to push the inflation rate toward zero, so that the nation can once again enjoy price stability? The obvious problem is that a further deceleration of inflation, beginning at the natural rate of unemployment, requires the Fed to create a recession. This leads to the familiar short-run cost of lost output. But, more important in the context of our overall objective to dampening the business cycle, anything the Fed does to push the economy away from the natural rate generates instability, overshooting, and "echo effects" far into the future. The Fed, by destabilizing the economy in 1982, bred significant instability far into the future.

The best recent evaluations of the welfare cost of inflation, e.g.,

Fischer (1982), conclude that almost every cost is associated with a particular legislative or institutional rule. For instance, inflation sets up a process of redistribution from creditors to debtors. This problem would be avoided if bonds and mortgages with interest payments fixed in nominal terms were replaced by indexed bonds. Similarly, inflation causes a distortion when companies using historical cost depreciation and FIFO accounting rules are overtaxed. Such distortions would not occur in a fully inflation-adjusted tax system. Passbook savers have been hurt by inflation, but interest rate ceilings on passbook savings accounts are gradually being phased out. The bedrock welfare cost of inflation is the "shoe-leather cost" associated with capital losses on currency and bank reserves. The government could pay interest on bank reserves, and, as Fischer points out, the inflation tax on currency holdings may actually be an efficient means of extending the reach of the tax system to the elusive underground economy. The dependence of inflation's welfare cost on obsolete institutions suggests an additional theme for this paper: monetary policy often is forced into destabilizing actions that aggravate the business cycle, when institutional reform would achieve society's objectives more efficiently, and without aggravating the business cycle.

When the Economy is Far Away from the Natural Rate

The difficulties of managing the economy when the initial unemployment rate is far away from the natural rate can be likened to the problem of a pilot in bringing an airplane in for a smooth landing on a runway. Here altitude corresponds to the unemployment rate, and the runway corresponds to the natural unemployment rate. The problem is to

avoid crashing into the runway. The worst thing the Fed can do is choose a constant growth rate of nominal GNP and stick to it, for this guarantees a crash.

The reason for the crash can be stated in terms of our basic inflation equation (2) above. This states that in the absence of supply shocks ($z_t = 0$), the inflation rate slows down compared to last period's inflation rate if the unemployment rate is above the natural unemployment rate. Starting in a situationlike early 1983, when the actual unemployment rate was 10 percent in contrast to the natural unemployment rate of 6 or 6.5, there was considerable pressure for inflation to continue its deceleration. Yet by definition nominal GNP growth is divided between inflation and real GNP growth. Thus in the 1983 situation a constant rate of nominal GNP growth would be accompanied by a slowing down of inflation and a speeding up of real GNP growth. This speeding up would continue until the economy reached the natural level of unemployment, and so at that point the actual rate of unemployment would be falling so fast that it would be bound to "overshoot," i.e., to fall well below the natural rate of unemployment. In short, the airplane (the unemployment rate) would crash through the runway (the natural unemployment rate).

To avoid this problem there is no alternative to a gradual slowing down of the rate of nominal GNP growth as the economy approaches its natural rate. Just as a quantitative inflation equation like that described in (2) above is needed to learn roughly where the runway is located, so the same equation is needed to calculate by how much nominal GNP growth must be slowed in order to achieve a soft landing. The important point is that momentum or "inertia" in the inflation process

(the second characteristic outlined above) makes the economy as difficult to steer as a large ocean liner; a favorable future free of business cycles will not occur if nominal GNP growth is set at some arbitrary constant number.

VI. SUPPLY SHOCKS AND INSTITUTIONAL RIGIDITIES

Should Supply Shocks be Accommodated?

The problems raised by supply shocks can again be separated into two sub-problems, those that arise when the economy was previously operating at the natural rate, and those that arise when the unemployment rate is far above the natural rate. When the Fed stabilizes nominal GNP growth and an adverse supply shock introduces spontaneous upward pressure on the inflation rate, real GNP growth must decline and the unemployment rate is likely to rise. The Fed must then decide whether to maintain costant nominal GNP growth, to "accommodate" the shock by raising nominal GNP growth to insulate unemployment, or to "extinguish" the shock by reducing nominal GNP growth to insulate the inflation rate.

If the shock is truly temporary, e.g., a freeze in Florida that temporarily reduces the orange crop, then accommodation is the appropriate policy. The lost crop will soon return, and the inflation consequences will soon be reversed. The temporary bulge of inflation has no important welfare consequences, since it is soon to disappear. Maintenance of stable unemployment avoids potential future problems of readjusting after a recession caused by nonaccommodation.

The optimal response to a permanent shock, e.g., the OPEC oil price

increases of 1973-74 and 1979-80, poses a more serious dilemma. If there is a one-time upward ratchet of the relative price of oil, then there is a temporary positive bulge in the rate of change of the relative price of oil. If the nominal wage rate in the rest of the economy were to remain constant, then the aggregate inflation rate would exhibit only a temporary bulge. The Fed could accommodate without fearing a permanent increase in the rate of inflation. But, unfortunately, the nominal wage rate in most countries is implicitly or explicitly escalated in response to changes in the consumer price index. Thus a permanent oil shock causes inflation to ratchet upward permanently to a new higher rate. The Fed must choose between ratifying permanently higher inflation, and causing lost output and higher unemployment if it chooses a non-accommodative policy.

Overshooting and the 1982-83 Policy Environment

There is an additional aspect of the accommodation debate that reflects the benefit of hindsight. Oil conservation is a gradual process. This creates a natural "overshooting" phenomenon, since a jump in the relative price of oil, like that achieved by OPEC in 1979-80, breeds a lagged adjustment process by hundreds of millions of consumers around the world. Eventually after a few months or years the demand for oil relative to real GNP begins to fall, and downward pressure is exerted on the relative price. In this sense an oil shock that appears at the time to be permanent is not permanent, and with sufficient patience the Fed can avoid making the difficult choice among accommodative, constant-nominal-GNP-growth, and extinguishing policies. Patience, however, is eminently lacking from the policy process and from

the political oratory that surrounds it. In early 1980 the Carter Administration introduced ill-advised and destabilizing credit controls as its reaction to a transitory bulge in the CPI inflation rate. When the Fed was created in 1913-14, the term of Governors was set at 14 years to insulate them from short-run political pressure. In the same spirit the Governors should take a long horizon when dealing with supply shocks.

A novel decision problem is created by the decline in the relative price of oil that has occurred in 1982 and 1983, when the economy is far away from the natural rate of unemployment. This "beneficial supply shock" may appear to be an unalloyed blessing, in that it allows a more rapid growth rate of real GNP for any path of nominal GNP growth. And the example of Figure 2 suggests that real GNP growth should be as rapid as possible at the beginning of the recovery in order to minimize the cost of high unemployment while allowing for a slowdown later on.

The main argument for resisting rather than enjoying the decline in the relative price of oil is not monetary, but fiscal. The interval of declining relative oil prices provides an ideal environment for introducing a substantial excise tax on imported oil. This policy, endorsed by many economists as early as 1974, takes on an added appeal in 1983 in light of large projected structural fiscal deficits.

Effect on Supply Shock Policy of Institutional Rigidities

If all tax rules, regulations, and institutions had been inflation-neutralized, there would be no problem. It would be optimal to ratify the faster inflation. Critics could claim rightly that the process of inflation-adjusting the institutions had actually caused the faster

inflation, but defenders of the Fed's accommodation would point out that this criticism was now irrelevant because the inflation rate no longer mattered, at least within limits.[15] And defenders of accommodation would point out that the extra unemployment caused by failure to accommodate has not just been a short-run cost, but also has created a long-run cost by causing future economic instability and making a future soft landing more difficult to achieve.

Not only do tax rules and regulations and financial institutions matter in the consideration of supply-shock policy, but the nature of labor market institutions is also crucial. A contrast can be drawn between two extreme forms of labor contracts, with contract forms in most real-world industrialized nations falling between the two extremes. The first paradigm would be a three-year contract that sets in advance the exact growth rate of the nominal wage rate over the full three-year period. This type of contract allows the real wage to be extremely flexible, since the nominal wage rate does not respond at all to the extra inflation caused by a supply shock. The inflexibility of the nominal wage rate allows the central bank to accommodate the supply shock without the need for any concern that inflation will accelerate beyond the extra amount directly attributable to the supply shock. And the corresponding flexibility of the real wage rate provides an incentive to employers to maintain employment at a relatively high level, thus minimizing the unemployment caused by the supply shock. It is generally agreed that the United States, while experiencing some acceleration of nominal wage growth in response to the 1974 and 1979-80 supply shocks, is closer to this first contract paradigm than any other industrialized nation.

The second paradigm would involve contracts that call for prompt 100 percent escalation of nominal wage rates in response to changes in the consumer Price Index. Such contracts would rigidify the real wage rate. Accommodation of a supply shock would then be extremely risky for the central bank, since its accommodative policy would supplement the initial round of inflation directly caused by the shock with additional rounds of inflation as nominal wage rates are marked up through the indexation formula. Further, such real wage rigidity would be harmful for employment. The oil shocks of the 1970s reduced the growth rate of labor productivity, both by cutting energy consumption and by making many tpes of capital goods obsolete. However, in nations with rigid real wage growth, the real wage quickly became excessive relative to labor productivity. Labor's share in national income increased, and the share of profits was squeezed. This caused firms to reduce the employment of overpaid labor, and in addition to cut back on capital investment and thus to cause a further slowdown in productivity growth. There is considerable controversy about the applicability of this second contract paradigm. Most observers feel that it applies accurately to the U. K., with other major European countries experiencing milder cases. Certainly ther is little doubt that unemployment has increased far more since 1973 in Europe than in the U. S., and the relatively greater rigidity of real wage rates in Europe as compared with the U. S. is a prime candidate to provide an explanation.

More General Effects of Institutions on Monetary Policy

A wide range of society's institutions constrain monetary policy. Instead of allocating to monetary and fiscal policy the dominant role in

discussions of business cycles, increased attention should be devoted to possible shifts in institutions to improve macroeconomic efficiency and place less of a burden on traditional policy tools.

The list of institutions that matter for macroeconomic policy is a long one. Three-year union wage contracts in the U. S. contribute significantly to wage and price inertia and raise the output cost of disinflation (albeit while facilitating the accommodation of supply shocks and reducing the short-run inflation cost of an output boom that pushes unemployment beneath the natural rate). Deposit rate ceilings and usury laws prevent the adjustment of interest rates to inflation, contribute to inflation's redistribution of wealth from creditors to debtors, and thus raise the welfare cost of inflation. Similarly, the failure to index tax brackets and set other tax rules in real terms, and the failure of the government to offer an indexed bond, add to inflation's welfare cost.

The absence of a national value-added or sales tax prevents policies, recommended by Arthur Okun and myself in 1974-75, to insulate the price level from adverse supply shocks by taxing the shocked product and reducing the sales tax on the unshocked sector. Improved labor market institutions could lower the natural unemployment rate itself, which should not be viewed as truly natural, optimal, nor immutable.

Our constitutional system and its associated legislative lags inhibit adoption of well-timed countercyclical fiscal policies, like the Swedish investment fund and the Japanese practice of variable timing for public works. Our constitutional system also bears some blame for the fiscal policy impasse that has caused large Federal budget deficits to be projected into the foreseeable future after 1983.

Institutional reform is a slow process, and economists have not advanced very far in understanding why apparently counterproductive institutions exist. Thus the conduct of monetary policy, while welcoming reform, must continue to operate within the framework of constraints set by existing institutions.

CONCLUSION

This paper has examined the background of the debate between monetarists and Keynesians on the conduct of stabilization policy. It has criticized the "CGMR" policy recommendation of the monetarists for two basic reasons. First, the growth rate of velocity has been quite variable over the postwar period and especially so since 1981. This weakens the case for making the growth rate of a monetary aggregate the primary focus of monetary policy. Second, the element of constancy in the monetarist CGMR recommendation is inappropriate when the economy begins from a situation like that of 1983, with its actual unemployment rate far above its natural unemployment rate.

Just as it criticizes the monetarists, the paper also does not support the standard policy recommendations of Keynesians. The use of fiscal policy for the purposes of countercyclical stabilization policy is severely handicapped, because our Constitutional system precludes prompt and decisive coordinated action by the President and Congress in most situations. A second problem is that some Keynesians have suggested that monetary policy should stabilize real variables like output or unemployment in the short run. This conflicts with the notion that the basic business of the central bank is to stabilize something <u>nominal</u>. By stabilizing the growth rate of a nominal variable, the Fed would automatically allow real economic activity to weaken in response

either to a supply shock or to a discovery that inflation is proceeding at a more rapid rate than had previously been forecast to occur at that level of unemployment.

The paper provides numerical examples of a policy which stabilizes the growth rate of nominal GNP along a path designed to achieve a "soft landing" of the actual unemployment rate at the natural unemployment rate. Such an approach would be "activist" in two senses. First, it would involve attempting to use monetary policy to offset sustained movements in velocity above its trend (as in 1978-79) or below trend (as in 1981-82). This role for monetary policy would not be feasible if the lags of monetary policy effects were long and variable, as has sometimes been suggested, but the postwar record demonstrates that monetary policy seems able to alter the course of real economic activity within the relatively short time period of six to nine months. The ability of the Fed to counteract velocity swings also depends on the availability of accurate advance forecasts of those swings, which appears from past evidence to be feasible in some situations and difficult in others.

Consider as an example a situation in which the best available forecast of future nominal GNP growth has fallen below the target that has been set to achieve a "soft landing"? Nominal spending would be stimulated by a Fed policy of encouraging lower interest rates, faster growth of bank reserves, and a depreciation in the exchange rate. The reverse actions would occur when the forecast rises above the target path. Since excessive short-term volatility in interest rates and the exchange rate imposes direct costs on private decisionmakers, actions to guide nominal GNP growth back on track would be taken gradually. Caution would be required in taking such actions, since econometric

estimates of the natural rate of unemployment, or of the response of nominal spending to specified monetary actions, are of necessity based on a sample period extending back 20 or 30 years and cannot adequately incorporate more recent phenomena. Thus input on recent changes in institutions, e.g., the process of financial deregulation and the impact of flexible exchange rates, would be required as a supplement to econometric forecasts. Such an approach would combine a "judgmental" technique of monetary control with an explicit set of medium-term targets for nominal spending.

FOOTNOTES

1. Lucas and Sargent (1978).
2. Friedman's seminal articles on economic policy (1948, 1953) recognized that there was an irreducible error term which guaranteed continuing fluctuations. The most complete statement of the case for a CGMR is contained in Friedman (1959).
3. This empirical interpretation of inflation in the 1973-75 period was introduced in Gordon (1975b) and confirmed later by Blinder (1979) (1982) and Eckstein (1980). A simple theoretical analysis showing the conditions necessary for a supply shock to create a recession in the rest of the economy is developed in Gordon (1975a) and Phelps (1978).
4. Here I ignore the analyses of Hall (1976), Phelps (1973), and Okun (1981), all of whom provide reasons why the optimum rate of inflation might be higher than zero, and why a policymaker confronted with the "full equilibrium" described in the text might rationally choose to accelerate nominal GNP growth.
5. This comparison is exhibited in Gordon (1981, p. 494) and seems to be confirmed at the 1981 cyclical peak, when the respective high points for real money and the coincident indicators were separated by only four months.
6. This evidence is summarized in Gordon (1981, p. 380-1), on the basis of a continuing effort by Stephen McNees to collect forecasts of the leading commercial forecasting firms (1979).

7. By definition from equation (2) $y = p + q$. But unemployment remains constant at its natural rate if real GNP growth (q) is set at its natural growth rate (q^N). Thus the Fed's job is to set $y = p + q^N$.

8. See Gordon (1982). The equation differs from (2) in several respects, including the use of a long series of lagged values of inflation rather than just a single lagged value; the use of George Perry's (1970) demographically weighted unemployment rate rather than the official rate; the inclusion of the change in that unemployment rate as well as the level; and the inclusion of a long list of additional supply shift variables, including the deviation of productivity growth from trend, and changes in the relative price of imports, food, and energy, in the effective exchange rate of the dollar, in the effective minimum wage, and in the effective social security payroll tax rate. Allowance is also made for the impact of the Nixon-era price controls in holding down inflation in 1971-72 and raising the inflation rate in 1974.

9. Table 1 above shows that the velocity of M1 grew on average at 3.4 percent per annum between 1949 and 1982. The growth rate of velocity during the four quarters of the "durable goods boom years" 1955, 1965, 1973, and 1978, were, respectively, 6.9, 5.9, 5.5, and 6.0.

10. Albert Wojnilower in "Discussion," Brookings Papers on Economic Activity, vol. 13 (1982, no. 1), p. 269.

11. Arnold C. Harberger, in a recent conversation evaluating general lessons of Latin American inflation, reports that the public used to act as if inflation was costly at a 100 percent rate, but

further institutional adjustments have raised this threshold of pain to a 400 percent rate.

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