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Gradualism: A Mid-Course View

THE IMPLEMENTATION of the economic policies labeled "gradualism" may be said to date from the enactment of the income tax surcharge in June 1968. But the original expectations, in retrospect called "hopes," that the gradualist policies would have "worked" by the summer of 1970 have not been fulfilled. It now appears that the real test of the gradualist policies will be economic performance over the next several years. Unfortunately, therefore, a mid-course rather than a retrospective view is all that can now be attempted.

This examination of gradualism will be limited to the aggregate output and price level goals of policy; balance-of-payments and other goals are completely neglected. The first section will be devoted to a general discussion of the issues, with special emphasis on the distinction between goal-gradualism and instrument-gradualism. Goal-gradualism refers to policies designed, in the present context, to achieve a gradual reduction in inflation and thereby to avoid the high level of unemployment that a rapid reduction of inflation would require. Instrument-gradualism refers to policies involving gradual adjustment of the instruments of fiscal and monetary policy, that is, of government expenditures and tax rates, and of the money stock and other financial variables.

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In the second section the topic is the nature of the monetary policies consistent with a goal-gradualist result. The analysis is based on simulations of the FRB-MIT-Penn econometric model of the United States, hereafter referred to simply as "the model."[1] In order to concentrate on the broad, long-range problems of adjusting to a lower rate of inflation without creating excessive unemployment, the simulations are run for a seven-year period, from the first quarter of 1969 through the fourth quarter of 1975. Simulation over this period requires that numerous assumptions be made about the behavior of the exogenous variables. The assumptions used are considered reasonable for the purposes of the broad view intended, but no effort has been spent on the details of time paths of exogenous variables or on making the minor adjustments in constant terms in equations, and so on, that are necessary when the model is used for short-run forecasts.

While the primary purpose of the section is to provide a broad view of the problems of achieving gradual adjustment, the first part briefly reviews the 1969:1–1970:2 period. Simulation of the model over this period using the actual values of the exogenous variables suggests that aggregate demand has been stronger than would have been expected from past experience as incorporated in the model.

An examination of instrument-gradualism appears in the next section. While the concept of goal-gradualism is clearly more fundamental, instrument-gradualism nevertheless raises important issues. No one would be opposed to abrupt alterations in the settings of the policy instruments if it were certain that they would achieve the desired gradual adjustments in the goal variables. But the whole case for instrument-gradualism is based on uncertainty, and it is a case that cannot be ignored.

It should be emphasized that all of the analysis based on the model is

1. The model used in this study is the new version of the FRB-MIT-Penn model that was completed in the spring of 1970. The behavior of this model is not completely understood since the large number of simulation experiments needed fully to investigate its properties have yet to be run. At this time no published description of the model is available, although a monograph is in preparation. The current version of the model, however, shares many of the features of earlier versions. For a description of these earlier versions see Frank de Leeuw and Edward Gramlich, "The Federal Reserve-MIT Econometric Model," *Federal Reserve Bulletin*, Vol. 54 (January 1968), pp. 11–40; Robert H. Rasche and Harold T. Shapiro, "The F.R.B.-M.I.T. Econometric Model: Its Special Features," in American Economic Association, *Papers and Proceedings of the Eightieth Annual Meeting, 1967* (*American Economic Review*, Vol. 58, May 1968), pp. 123–49; and Albert Ando and Franco Modigliani, "Econometric Analysis of Stabilization Policies," in American Economic Association, *Papers and Proceedings of the Eighty-first Annual Meeting, 1968* (*American Economic Review*, Vol. 59, May 1969), pp. 296–314.

speculative, in the sense that it is not known how faithfully the model represents the economy. Nevertheless, there will be relatively little discussion of the model per se, but rather the simulations will be used to suggest policy approaches. To proceed otherwise would make this paper an examination of the model rather than of the policy of gradualism.

The Meanings of Gradualism

The policy of gradualism represents a new advance in public understanding of economic stabilization policy. Unlike their approach to previous anti-inflation crusades in the postwar period, politicians and the informed public now clearly recognize that excessive zeal in fighting inflation will produce excessive unemployment. This public concern about how economic policy instruments ought to be adjusted is the logical sequel to public acceptance that policy instruments exist and ought to be used.

The prescription of gradualism involves the maintenance of firm but mild restraint until the objectives of anti-inflationary policy are realized. Real output is to be maintained somewhat below potential until the rate of inflation declines to an acceptable level. But no one knows what adjustments of the policy instruments are required to achieve this gradualism in the paths of the goal variables. And some have confused goal-gradualism with instrument-gradualism. "Firm but mild restraint" strongly suggests gradual and moderate changes in the settings of the instruments of policy, but such changes may not lead to the desired reduction of inflation while simultaneously avoiding excessive unemployment.

It may, of course, be true that goal-gradualism requires instrument-gradualism. This view is reinforced by the diagnosis of the current inflation. The problem was not that economic policy failed to offset some series of disturbances in the private economy; rather, fiscal policy became excessively expansionary because expenditures for the Vietnam war were not offset by tax increases or reductions in other expenditures; and monetary policy, as measured by the rate of growth of the money stock, became excessively expansionary in an attempt to prevent interest rates from rising too sharply. A tax increase in 1966 to cover the war expenditures and a moderate, steady rate of growth in the money stock in the 1965–68 period would have helped immensely. If government economic policies, as measured by the full employment surplus and the rate of growth of the money

stock, had been steady, or had changed relatively little and then only gradually rather than abruptly, the economic picture would have been much brighter in January 1969.

But even if it is agreed that large and abrupt changes in the settings of policy instruments contributed to the inflationary problem, it is by no means clear that gradually restoring the instruments to "normal" settings is required to rectify the situation. Given the state of the economy in January 1969, abrupt changes in the policy instruments might have been required to produce gradual adjustment of the goal variables. In fact, I will argue that the shifts in the settings of the policy instruments between 1968 and 1969 must be viewed as the most deflationary change in policy since 1947. I will also argue that this sharp deflationary change was broadly justified by the conditions facing policy makers in January 1969. But the abrupt change in policy was justified only because the initial conditions were so unsatisfactory. The distinction between goal-gradualism and instrument-gradualism is, therefore, essential if improper inferences about the *general* appropriateness of abrupt changes in policy instruments are to be avoided.

Although the distinction between goal- and instrument-gradualism is obvious enough to most professional economists, the confounding of the two concepts in public debate is readily apparent. The confusion may be illustrated by statements from the Joint Economic Committee hearings on the 1969 Economic Report of the President, held in February 1969. In his statement, Paul W. McCracken, Chairman of the Council of Economic Advisers, consistently uses the gradualism concept in the goal sense. For example, McCracken says that the third, and preferable, of three alternative courses of action is "to embark upon a course of gradually and persistently reducing the rate of inflation and thereby generating the expectation of diminishing rates of inflation in the future."[2] But later, in response to committee questioning, McCracken is not quite so clear when he says, "We are hopeful that if we pursue a careful and gradual approach to this problem that the adverse effect on unemployment will not be large."[3]

While McCracken's position is generally one of goal-gradualism, others are quite clearly thinking of instrument-gradualism. In the same hearings,

2. *The 1969 Economic Report of the President*, Hearings before the Joint Economic Committee, 91 Cong. 1 sess. (1969), Pt. 2, p. 291. (Hereafter, this document is cited as *1969 JEC Hearings*.)

3. *1969 JEC Hearings*, Pt. 2, p. 325.

David M. Kennedy, Secretary of the Treasury, says, "We are all conscious of the risks of abrupt and blunt action that could bring unnecessary unemployment. We mean to avoid that. But we are equally conscious of the risks of not moving decisively. . . ."[4] In a similar vein, George L. Bach, professor of economics at Stanford University, in his testimony said, "One may hope that the Fed has learned from these experiences [in 1966–68] the dangers of abrupt large shifts in policy, and the virtues of gradualism."[5]

Since the two concepts of gradualism were not sharply distinguished in the hearings, it is not surprising that they are confused in the report of the Joint Economic Committee. While the majority views never adequately distinguishes the two concepts, the confounding is most obvious in the minority views. In this section nearly adjacent sentences on the same page read as follows: "Inflation can and must be reduced in a manner consistent with high employment." "*Fiscal policy restraint, firm but gradual, is essential.*" [emphasis in original] "Monetary restraint should be applied gradually until there are visible signs that inflation is slowing, and must avoid another 'credit crunch.' "[6]

The simulations in the following sections demonstrate the great importance of distinguishing goal-gradualism from instrument-gradualism. They reveal that instrument-gradualism produces abrupt changes in the goal variables, while gradual adjustment of goal variables requires abrupt changes in monetary policy. As is emphasized below, these results stem primarily from the abnormal conditions at the beginning of the simulation period, and thus cannot be interpreted as providing evidence for the desirability of abrupt policy changes under normal circumstances.

Goal-Gradualism

What sort of monetary policy would have been necessary starting in the first quarter of 1969 to achieve a gradual reduction of inflation while avoiding excessive unemployment? To explore this question the model has been simulated from 1969:1 through 1975:4 under assumptions about the values

4. *Ibid.*, Pt. 2, p. 388.
5. *Ibid.*, Pt. 3, p. 541.
6. *1969 Joint Economic Report*, Report of the Joint Economic Committee on the January 1969 Economic Report of the President, 91 Cong. 1 sess. (1969), p. 91.

of exogenous variables that policy makers might reasonably have made in January 1969.

A REVIEW OF 1969–70

First, however, it is interesting to examine a simulation that attempts to determine whether the economy remained stronger from 1969:1 through 1970:2 than would have been expected from past experience as incorporated in the model. This simulation, called simulation A to distinguish it from those examined later, uses the actual historical values of all of the exogenous variables with one exception. The exception is the tax surcharge, which is assumed to expire January 1, 1970, instead of June 30, 1970, on the grounds that the model was estimated under the assumption that taxpayers considered all tax rates to be permanent, while the surcharge was known to be temporary. A special import adjustment was also necessary, since imports, being endogenous in the model, are not affected in the simulation by the dock strike that substantially affects exports (an exogenous variable) in 1969:1. This adjustment arbitrarily reduced the annual rate of imports by $5 billion in that quarter.

The import and tax adjustments produce, if anything, an upward bias to simulation A. Even so, it is clear from Table 1 that simulation A involves a much more severe economic downturn than actually occurred. And the model results are not at variance with the predictions of most economists, both monetarists and fiscalists, in early 1969. In simulation A the downturn in real output in the third quarter of 1969 occurs four quarters after the imposition of the surcharge, and two quarters after the reduction in the rate of monetary growth; these lags seem about in line with past experience. The actual downturn in real output did not occur until 1969:4, and then was quite small. This lag, while not completely outside the bounds of previous experience, appears to be longer than the average.

A possible explanation for this longer lag is that the extensive discussion of gradualism reduced fears of recession and thereby reduced the speed of adjustment. Another explanation, however, is that the current situation is outside the realm of previous experience. Except for those in which wartime controls were in effect, no period in twentieth century U.S. history exhibits both unemployment almost continuously below 4 percent and persistent inflation, as the interval from mid-1965 through 1968 does. The closest parallel is probably with 1955–57, but at that time unemployment was

Table 1. Selected Economic Indicators, Actual and Simulation A, First Quarter 1969 through Second Quarter 1970

Dollar amounts in billions, seasonally adjusted annual rates

	1969				*1970*	
Economic indicator	*1*	*2*	*3*	*4*	*1*	*2*
Gross national product in 1958 dollars						
Simulation A	$722.3	$729.1	$727.6	$721.5	$714.6	$709.1
Actual	722.1	726.1	730.9	729.2	723.8	724.9
Gross national product in current dollars						
Simulation A	907.0	929.4	939.4	943.0	945.5	949.4
Actual	907.6	923.7	942.6	951.7	959.5	971.1
GNP deflator (1958 = 100)						
Simulation A	125.6	127.5	129.1	130.7	132.3	133.9
Actual	125.7	127.2	129.0	130.5	132.6	133.9
Three-month Treasury bill yield						
Simulation A	6.30%	7.03%	6.98%	6.49%	5.90%	5.91%
Actual	6.09	6.19	7.01	7.35	7.21	6.67

Sources: Actual—*Economic Indicators* (September 1970), p. 2, and *Federal Reserve Bulletin*, Vol. 56 (March and August 1970), p. A-33; simulation—see text for assumptions.

almost continuously above 4 percent and the rate of inflation (in terms of the GNP deflator) below 4 percent. It may be argued, then, that there is no way to judge whether the lag in 1969 was longer than normal because no comparable period is available on which to form judgments about the length of "normal" lags under such conditions.

Given the inflationary situation in early 1969, it seems likely that investment remained stronger than anticipated in the face of restrictive monetary and fiscal policies as a result of the strength of inflationary expectations and the extent of investment backlogs. For example, in the third and fourth quarters of 1969, when simulation A shows a weakening economy, the simulated spending on producers' structures (in constant dollars) is about 6 percent below actual, while that on producers' durable equipment is over 2 percent below actual. Similarly, nonfarm inventory investment is simulated almost $5 billion (annual rates in 1958 dollars) too low on average for the same two quarters.

FRAMEWORK AND KEY ASSUMPTIONS

The remainder of this section explores what sort of policy would have been required starting in 1969:1 to achieve goal-gradualism, that is, the attainment of a desirable path for real GNP. The exercise serves to press home the fact that goal-gradualism may require abrupt or even violent changes in the policy instruments. The analysis will take place within the context of the model and against the background of the world as it appeared at the beginning of 1969.

As will be seen below, the monetary policy required for goal-gradualism from 1969:1 through 1970:2 is at first more restrictive, and then less restrictive, than the policy actually followed in that period. In addition, the monetary policy required from 1970:3 to 1975:4 is substantially more expansionary than anyone seems to contemplate. These results must be interpreted primarily as an exercise, because of the unknown reliability of the model and because of the numerous assumptions that must be made about the exogenous variables.

Explicit assumptions about fiscal policy underlie the simulation. These are basically taken from the *1970 Economic Report*.[7] The assumed federal expenditures are taken from Table 14 (p. 80), and the federal tax rates assumed involve tax cuts in order to produce a full employment surplus of 1.1 percent of GNP in 1973–75. It must be recognized that the fiscal assumptions are quite restrictive since real federal purchases of goods and services are assumed to decline out to 1975 and the full employment surplus is substantial. The decline in purchases is, in fact, unlikely to occur, and indeed in the *Report* the Council of Economic Advisers explicitly recognizes that, starting in 1973, resources will be available to permit either increases in federal spending or reductions in taxes. In the simulations, it was assumed that the latter course will be taken. These fiscal policy assumptions, although not completely realistic, provide a useful base from which to explore alternative monetary policies, and it is necessary only to keep the nature of these assumptions in mind in judging the reasonableness of the simulations of alternative monetary policies.[8]

7. *Economic Report of the President together with the Annual Report of the Council of Economic Advisers, February 1970*, referred to here as the *1970 Economic Report*, or simply the *Report*.

8. Simulations were also run using several assumptions about expenditures increases. Since using these assumptions produces only minor differences in the nature of the monetary policy consistent with the desired output path, these simulations are not discussed below.

In simulating the model to 1975, numerous assumptions about other exogenous variables are required. Every effort has been made within the time constraints to assure that these assumptions are reasonable, with the most effort being spent on the variables that have a relatively large impact on the results.[9]

It has also been necessary to choose between alternative forms that have been estimated for several equations of the model. And finally, the standard equation for the long-term corporate bond rate has been altered in an ad hoc fashion in order to make the rate react more quickly to changes in short-term interest rates. This change makes the results less deflationary than they otherwise would be over the 1969–75 simulation period.

The assumed desired output path is one very close to the real GNP projected in the *1970 Economic Report*, Table 13 (p. 79). In the *Report* this path is called a "projection," but the surrounding discussion makes clear that the projection is thought of as the desired path. Minor differences between the desired path used in this paper and that used in the *Report* arise, first, from constructing a smooth quarterly path from the annual projections in the *Report*, and, second, from specifying a quarterly path for 1969. The 1969 path was constructed in such as way as to be consistent with the 1970–75 path in the *Report* and also, in so far as possible, with the testimony, which lacked explicit numbers, of members of the Nixon administration before the Joint Economic Committee in February 1969.[10]

The desired path of real GNP in the *1970 Economic Report* is not exactly the path that would have been specified in early 1969. By late 1969, when the *Report* was being written, the output gap was somewhat larger, and the progress in slowing inflation somewhat smaller, than had been hoped early in the year. Nevertheless, these differences are minor for the purposes of this paper, and so no attempt has been made to adjust the projections of the *1970 Economic Report* to what they might have been had they been made in early 1969.[11]

9. Details of the various assumptions used in the simulations are listed in a mimeographed appendix available from the author.

10. *1969 JEC Hearings*, Pt. 2.

11. In principle the desired path should itself be the result of an optimization procedure. For example, if a loss function were specified in terms of the output gap and the rate of inflation, it might well be that the total loss would be lower if the output gap were smaller but maintained longer, or larger but maintained not as long, than assumed by the desired path for purposes of this paper. Since less inflation and more output are both desired, the problem should always be approached in terms of finding the optimal trade-

The desired path has real GNP moderately below potential until 1973:1, at which time it begins to follow the path of potential GNP as defined in the *1970 Economic Report*.[12] The simulation was then used to find the path for the money stock required to achieve the desired path of real GNP, given the assumptions discussed above. (Money stock is defined throughout this paper as demand deposits plus currency and is assumed to be the exogenous monetary policy variable in the model.) The procedure used was purely one of trial and error: The money stock was adjusted from one trial simulation to the next until the desired GNP path was obtained. The end result of this process will be called "simulation B" and the path of the money stock in this simulation will be called "money path B." The results of simulation B are shown in Figure 1.

The approach underlying simulation B places greater emphasis on output than on the rate of inflation, even though in principle equal attention should be paid to both. One reason for this greater emphasis is that the exposition is easier if it starts from a desired output path and then examines the implication of that path for the rate of inflation. A second reason is that the political realities seem to point primarily to the maintenance of output at levels close to potential and secondarily to the reduction of the rate of inflation. In other words, it seems likely that output goals will be changed only *marginally* if necessary to obtain a more rapid reduction in inflation, while inflation rates much higher than expected would be tolerated if necessary to maintain output.[13]

RESULTS OF THE SIMULATION

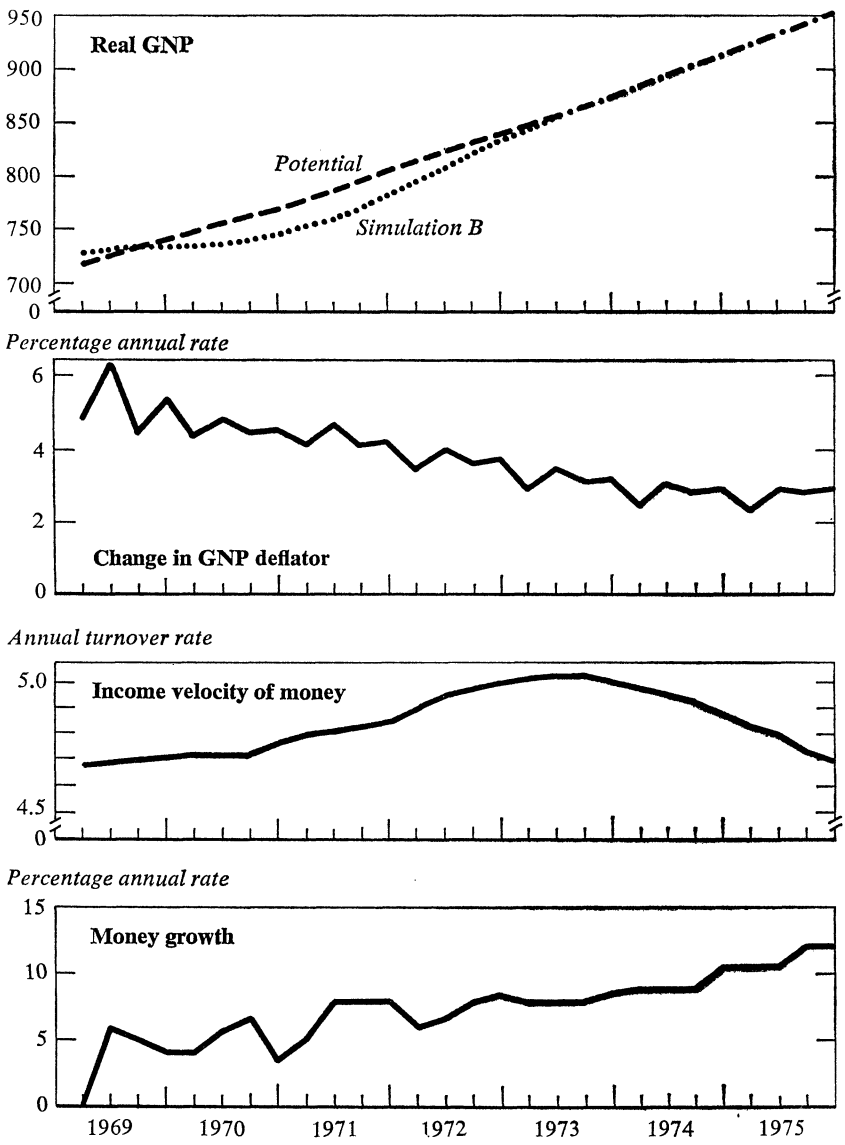
In money path B, which is shown at the bottom of Figure 1, the level of the money stock is below the actual level in the first and second quarters of 1969 and above the actual level in the next four quarters. But in 1970:2, money path B is only $3.8 billion above the actual money stock for that quarter, a difference in growth rates during the six quarters 1969:1–1970:2

off, rather than in terms of finding an "acceptable" trade-off. An acceptable trade-off simply may not exist if what is thought to be acceptable is beyond the realm of the possible. Discussion of the optimality of the projections in the *1970 Economic Report* is, however, beyond the scope of this study.

12. Pp. 79 and 85.

13. This view is reinforced by the fact that the *1970 Economic Report* provides an explicit output projection but is rather vague about the inflation rate expected.

Figure 1. Goal-Gradualism Simulations of GNP, Change in GNP Deflator, and Velocity and Growth Rate of Money, 1969–75



Source: See text.

of only 1.3 percent. Thus it appears that actual monetary policy in that period, while not precisely conforming to money path B, nevertheless has the same general level of restrictiveness.

In qualitative terms, the difference was relatively minor. In part, in the first half of 1969, the actual path was probably higher than intended, and therefore higher than money path B, as a result of errors in the preliminary data on the money stock. Except for these errors, policy might well have produced slower monetary growth in the first half of 1969. Also, going from the 7 percent growth rate of 1968 to the zero rate in money path B for 1969:1 might have produced excessive strains in the financial markets.

Money path B may be described as a policy of stringency for four to six quarters followed by ease, although some may quarrel with attaching the label "stringent" to the initial part of this path. But the argument would be that, given a rate of inflation of about 5 percent in 1969, and given an average growth rate of money of 6.7 percent for the two years ending December 1968, the initial part of money path B is indeed very restrictive, even though the money growth rates are not low by historical standards.

The logic of a policy of stringency followed by ease can be readily understood. The sooner some excess capacity develops, the sooner inflation will begin to subside. Once the rate of inflation slows, inflationary expectations begin to be revised downward, which tends to dampen inflation even further. But as this process of slowing inflation and dampening of expectations gets underway, considerable monetary ease is necessary to prevent output from falling far below potential. For while the *rate* of inflation is declining, the *level* of prices is still rising substantially. Thus if the economy is to remain on the desired output path, money balances must be provided to compensate for the higher price level. Keeping the money stock constant when the price level is rising at a 5 percent rate has roughly the same depressing influence on output as a money stock that falls at a 5 percent rate when the price level is constant.

The high growth rates in money path B in 1971 and 1972 are required, first, because the growth rate of output must be greater than the growth rate of potential output in order to eliminate the GNP gap, and second, because the price level is still rising significantly, though at a steadily declining rate. The high growth rates of money in 1971 and 1972 are not surprising considering that desired real output grows by 4.9 percent between 1970:4 and 1971:4, and then by 6.8 percent in the following year. As can be seen in Figure 1, the income velocity of money is actually rising over

this period from 4.77 in 1970:4 to 5.00 in 1972:4. These figures may be compared with an actual income velocity of 4.76 in 1970:2.

Once potential output is approached in 1973, it would seem that monetary growth could slow down, since the desired rate of growth of output is about 4 percent. The fact that the growth rate of money path B actually rises may be a spurious result; the high and rising growth rates in 1974–75 are especially suspect. But the general result of a higher growth rate in 1973–75 than in 1971–72 is not unreasonable, and the forces in the model producing this result are identifiable. First, the assumed fiscal policy is quite restrictive, but this factor should not be overemphasized. In simulations run without assuming the tax cuts of simulation B, the full employment surplus came out more than double that of simulation B in 1973–75, and yet the money growth rates were less than a percentage point higher. As a rough guess, fiscal assumptions involving a zero full employment surplus might lower the money growth rates by 1.0 to 1.5 percentage points from money path B.

Probably more important than "fiscal drag" is the interaction of monetary and real forces affecting investment. First, inflation is continuing, although at declining rates, thus absorbing nominal money balances. Second, short-term interest rates, after rising with the rapid growth of output in 1971 and 1972, begin to fall after 1973, thereby absorbing more money balances through the interest elasticity of the demand for money. Third, since the corporate bond rate in the model is an eighteen-quarter distributed lag on the commercial paper rate, the bond rate lags behind short-term rates and so investment is not stimulated very much in the short run by the monetary ease.

Of crucial importance is the interaction of the slow movement of the corporate bond rate with the declining rate of inflation. A key term in the cost of capital determining expenditures on producers' durables is the corporate bond rate minus the expected rate of inflation. And the expected rate of inflation is a twelve-quarter distributed lag on the actual rate. It is difficult to get the bond rate to move down as fast as the decline in the rate of inflation. With insufficient monetary ease, the cost of capital actually rises, thus reducing investment and depressing aggregate demand.

A few numbers may illuminate the operation of the model. For simulation B the commercial paper rate reaches a peak of 7.87 percent in 1973:2 and thereafter declines to 5.90 percent in 1975:4. The corporate bond rate reaches a peak of 8.24 in 1973:3, but declines very slowly to 7.92 in 1975:4.

As a result of the long distributed lag in the bond rate equation, the bond rate in 1975 is still being affected in an important way by the *rising* commercial paper rate in the period from 1971 to 1973. With the combination of the sluggish movement of the corporate bond rate and the declining rate of inflation, the real rate of interest that influences the cost of capital for producers' durable equipment moves hardly at all. The expected rate of inflation reaches a peak in 1970:4 and declines steadily thereafter. The real rate of interest does not reach a peak until 1975:1 and then declines slightly. This result occurs in spite of the ad hoc adjustment (noted above) made to speed the response of the corporate bond rate equation.

Although the monetary ease represented by money path B does not stimulate spending by reducing the real rate of interest, it has a substantial effect through the stock market sector of the model. The growth rate of the money stock is a variable in the equation determining the dividend-price ratio, which in turn affects the cost of capital for producers' durable equipment and structures, and also affects household net wealth and thereby consumption. The steady decline in the dividend-price ratio softens the impact of the decline in the expected rate of inflation, but even so the cost of capital for producers' durable equipment does not reach a peak until 1975:1. The impact on the cost of capital for producers' structures is, however, much greater and this variable declines over the whole simulation period.

Whatever the validity of these features of the model, it appears that simulation B does not involve an unreasonable increase in consumption. For 1975:4 the simulated ratio of real consumption to real GNP is 0.663, whereas this ratio stood at 0.642 in 1969:4.[14] Nevertheless, there is some reason to believe that, if permitted to run long enough, the model might exhibit anti-damped oscillations if all of the exogenous variables were growing at steady rates. Unfortunately, not enough experimentation has been done with the model either to confirm or to reject this conjecture. If the model is indeed going through the downward phase of an oscillation in 1974–75 in simulation B, as seems not unlikely, then there is a ready explanation for the surprisingly high growth rates in money path B in those years.

But if the model exaggerates the effect on investment of a declining rate of inflation, this effect is nevertheless likely in the years ahead to be an im-

14. The consumption variable referred to is the definition of consumption in the national income accounts. It is calculated from the model's basic consumption variable, which has a somewhat different definition.

portant one tending to reduce velocity. From the fourth quarter of 1964 to the fourth quarter of 1968, nominal GNP rose by 38 percent, while the money stock rose by 22 percent. Given the rapid development of inflationary expectations in this period, interest rates did not rise fast enough to prevent a capital expenditures boom. In the years ahead it appears likely that the economy will go through the reverse of the 1964–68 process. As inflationary expectations wane, monetary growth will have to be greater than nominal income growth to obtain interest rates low enough to support investment.

It is helpful to look at the detailed implications of these results for velocity. With the rapid expansion of the money stock in money path B, velocity falls from 5.00 in 1972:4 to a 1975:4 level of 4.69, only slightly below the actual velocity in 1970:2. While the fluctuations in the growth rate of money path B should not be taken too seriously, the velocity calculations show that the 7.4 percent growth rate of money path B, taking the 1969–75 period as a whole, can be viewed as unreasonably high only if it is successfully argued that (a) the income elasticity of the demand for money in the model—assumed to be unity—is too high, and/or (b) the estimated rate of inflation is too high.

The income elasticity of the demand for money is subject to controversy. Using postwar data alone, one can easily obtain estimates below unity.[15] But most of the argument within the economics profession has been whether or not the income elasticity is *greater* than unity. This issue cannot be resolved at this time.

It is a simple matter, however, for the reader to adjust the simulation B results for a different income elasticity of demand for money. An elasticity of 0.8, for example, is one-fifth below that assumed in the model; money path B would thus have its growth rates adjusted down accordingly by one-fifth. A 5 percent money growth rate would be adjusted to 4 percent, a 10 percent rate to 8 percent, and so on.[16]

Now consider the possibility that the simulated rate of inflation is too high. If this rate were in fact 1 percentage point lower than the simulation

15. David E. W. Laidler, *The Demand for Money: Theories and Evidence* (International Textbook Co., 1969), p. 106.

16. This argument is not strictly correct since the assumption of an income elasticity of, say, 0.8 would lead to a lower estimate for the interest elasticity of demand using postwar data. In the 1970–72 period of the simulation, when interest rates generally rose, the growth rates in money path B would be reduced by less than one-fifth, while the growth rates in 1973–75, a period of falling interest rates, would be reduced by more than one-fifth.

results for the entire period, then money path B could have a growth rate about 1 percentage point lower. The result would not be a full percentage point lower, however, since a lower rate of inflation would require a more rapid fall in nominal interest rates that would in turn absorb more nominal balances through the interest elasticity of the demand for money.

Many observers will feel, however, that, if anything, the inflation rate in simulation B is optimistic. In simulation B the maximum output gap, which occurs in 1971:2, is only about 3.6 percent of potential output, compared with an actual gap of about 9.3 percent in 1958:2. Furthermore, past business cycle experience would not in general support the result of a declining rate of inflation both during the 1971–72 period of rapid output expansion and during the 1973–75 period when the output gap is zero.

The progress in reducing inflation shown in Figure 1 will strike many as disappointingly slow. However, the fact that the model shows continuing progress even after output returns to potential in 1973 is quite encouraging. The basic reason for this result is the Phillips curve in the model. In simulation B the unemployment rate in 1973–75 settles down to about 4.6 percent on the conventional definition of the unemployment rate. At this rate the model's Phillips curve produces a steady-state rate of inflation of about 2.6 percent, thus explaining the gradual decline in the rate of inflation in simulation B. The fact that unemployment in the simulation in 1973–75 is somewhat higher than the 3.8 percent assumed consistent with the definition of potential output in the *Economic Report* is partly a result of minor differences in the assumptions about population growth and productivity growth between the *Economic Report* and the model. It is also partly a result of the long lags influencing labor force participation in the model, which prevent the simulation from reaching a steady state even by 1975. Given the Phillips curve, the only way to obtain a more rapid reduction of inflation in the model is to accept greater unemployment.

Some may feel that greater unemployment should be accepted in order to obtain a more rapid reduction in inflation.[17] In spite of the importance

17. For example, in the Aug. 26, 1970, issue of "Quarterly Economic Trends," a publication of the Federal Reserve Bank of St. Louis, simulations based on the St. Louis model are presented for three alternative growth rates of the money stock—6 percent, 3 percent, and 0 percent. In the text of this release (p. 5), the simulated inflation rates are discussed and by implication the 3 percent money growth rate favored. However, the text does not make clear that in early 1972 the output gap simulated by the St. Louis model (p. 6) would be about 10 percent of potential with the 3 percent money growth policy and over 6 percent of potential with the 6 percent policy. Any discussion of policy alternatives ought surely to point out at least the estimated implications for both output and inflation of the alternatives examined.

of this issue, value judgments on the desirability of a particular inflation-unemployment trade-off have been deliberately avoided in this paper; in addition, there has been no effort to explore systematically the implications for inflation of alternative output paths. However, some notion of the extent of the output loss in the model that is required to achieve a lower rate of inflation may be obtained below.

One final way of looking at simulation B is to compare it with United States historical experience since 1867, the first date for which reasonably complete monetary data are available. Historical periods with relatively high monetary growth are reported in Table 2.[18] The two intervals after the Second World War do not involve high growth rates by historical standards, but have been included in the table simply to offer some recent periods. These historical growth rates may be compared with money path B which, using continuous compounding, has a growth rate of 5.8 percent from 1968:4 through 1972:4; of 9.5 percent from 1972:4 through 1975:4; and of 7.4 percent over the whole seven-year period. The growth rate in

Table 2. Periods of Rapid Monetary Expansion in the United States, 1878–1969

Annual rate of growth in percent

Period	*Growth of money stock*[a]
1878–1883	11.7
1884–1892	6.0
1896–1907	9.0
January 1915–January 1920	13.8
January 1922–January 1926	6.1
March 1933–March 1937	12.2
January 1938–January 1946	15.5
January 1950–January 1953	4.4
January 1963–January 1969	4.7

Sources: 1878–1946—Milton Friedman and Anna J. Schwartz, *A Monetary History of the United States, 1867–1960* (Princeton University Press for the National Bureau of Economic Research, 1963), Table A-1, pp. 704–18; 1950–69—Board of Governors of the Federal Reserve System.

a. Calculations for 1878–1907 are based on annual data for money stock broadly defined (currency plus both demand and time deposits at commercial banks). Calculations for 1915–69 are based on monthly data for money stock narrowly defined (currency plus demand deposits).

18. The periods selected are all of substantial duration—at least three years. Much higher growth rates occurred over certain shorter intervals. Also, the periods were defined over full years. In most cases, slightly higher growth rates could have been reported by defining periods as a few months longer or shorter than a full year. All the growth rates in Table 2 were calculated under the assumption of continuous compounding.

money path B, while not unprecedented in peacetime, is clearly abnormally high, judged by experience since the Civil War. This observation alone would seem to discredit simulation B.

But the examination of the historical record cannot end with the comparison of money growth rates. For there is no historical parallel to the situation in simulation B, with its maintenance of essentially full employment following an extended period of accelerating inflation. Previous inflations of substantially lesser magnitudes have generally been followed by protracted slumps. Money path B can be compared with past money paths only if the difference between the output path in simulation B and past output paths is also kept in mind.

Instrument-Gradualism

In his *Newsweek* column of January 20, 1969, Milton Friedman wrote: "I therefore now recommend a two-step move—first, to about 7 percent a year [monetary growth] and then to 4 or 5 percent a year." This recommendation is an example of instrument-gradualism, and is motivated by the argument that, given the high rate of growth of money in 1967–68, it would be too great a shock to reduce the growth rate of money in one step to a steady long-run rate.

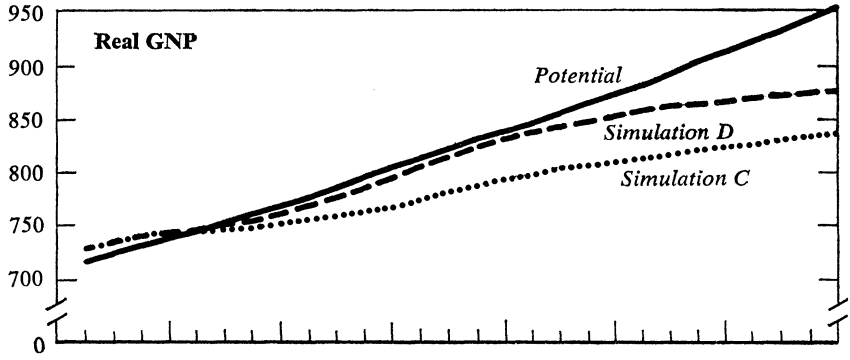
SIMULATION RESULTS

In order to obtain some feel for what Friedman's policy would have meant had it been followed starting in 1969, the model was simulated under two assumptions of a gradually falling money growth rate. In simulation C the assumed growth rate is 6.5 percent in 1969:1, 6.0 percent in 1969:2, and so on with reductions of 0.5 percentage point every quarter until a 4.0 percent rate is reached in 1970:2. Thereafter, through the end of the simulation period in 1975:4, the growth rate of money is held steady at 4.0 percent. In simulation D the growth rate of money is 6.5 percent in 1969:1, and 6.0 percent from 1969:2 through 1975:4. Since the growth rate of money from December 1967 to December 1968 was about 7 percent, the two assumed policies with gradual adjustment starting at 1969:1 seem to follow the spirit of Friedman's recommendation as well as bracketing its numerical extremes.

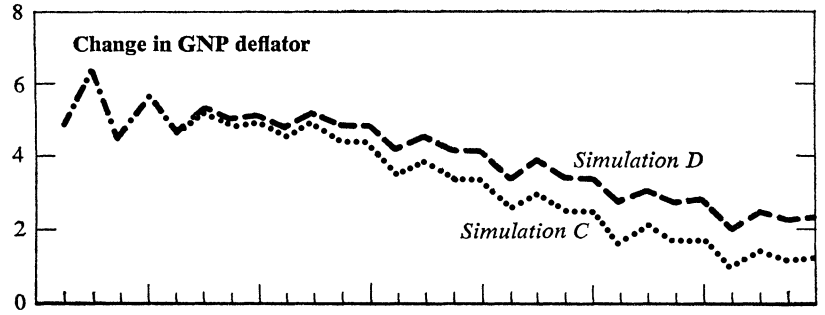
Within the model the results of either policy can only be regarded as disappointing. Figure 2 shows the simulated paths of real GNP, of the

Figure 2. Instrument-Gradualism Simulations of GNP, Change in GNP Deflator, and the Growth Rate of Money, 1969–75

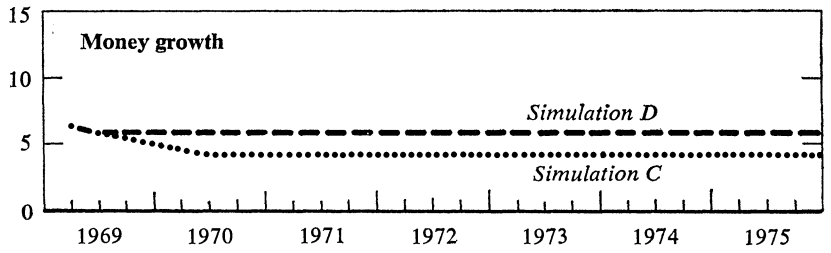
Billions of 1958 dollars



Percentage annual rate



Percentage annual rate



Source: See text.

rates of change of the GNP deflator, and of the growth rates of the money stock for the assumed instrument-gradualist policies.[19] In simulation C, real GNP rises by $108 billion over the entire seven-year period, but by the end of the period is $116 billion, or 12.2 percent, below potential output; the rate of increase in the GNP deflator declines from about 5 percent in 1969 to about 1 percent in 1975. The output path in simulation D is, of course, higher, but real GNP in 1975:4 is still $75 billion, or 7.9 percent, below potential. It may be recalled that at the bottom of the 1958 and 1961 recessions, output was 9.3 percent and 9.4 percent, respectively, below potential.

The forces in the model producing these results are, of course, largely the same as those analyzed at length in connection with simulation B. It is useful, however, especially in connection with simulation C, to examine the simulated inflation rate carefully.

In simulation C a significant GNP gap does not develop until 1970:2. It then widens steadily to 5.8 percent in 1973:1 and ultimately to 12.2 percent in 1975:4. Since inflation seems remarkably obstinate in the model, one might question whether the model overestimates the amount that would occur with such a large gap maintained for so long a period. Perhaps the model does overestimate the inflation that would occur in these circumstances, but this conclusion is by no means clear. In simulation C the gap does not lie very far outside its range during the period used to estimate the model, and therefore there must be at least a presumption that the model correctly represents what would happen in such circumstances. For purposes of comparison, it may be noted that, after reaching 9.3 percent in 1958:2, the output gap fell to 4.7 percent in 1960:1, rose again to 9.4 percent in 1961:1, and was still as high as 5.2 percent in 1963:1 before falling steadily to near zero in 1965:3. Even with this output gap it took five years for the inflation rate to fall 2.6 percentage points from the 3.7 percent rate in 1957 to the 1.1 percent rate in 1962; after 1962, even though an output gap persisted until 1965, the inflation rate stopped declining and actually crept up slightly.[20]

Since the output gap in simulation C remains fairly small until 1973, the

19. To prevent the figure from becoming cluttered, velocity has not been graphed. In simulation C, velocity is 4.61 in 1969:1, rises to a peak of 5.09 in 1973:4, and then falls to 5.00 in 1975:4. In simulation D, velocity is 4.61 in 1969:1, rises to 5.07 in 1973:2, and then falls to 4.85 in 1975:4.

20. All of the inflation rates cited in this sentence refer to the change in the GNP deflator for the year in question over the previous year.

reduction in inflation that occurs in the simulation in the 1970–72 period does not seem excessively slow. Any argument that the simulated inflation is too high must focus on 1973–75. Even if this view is taken, however, and a zero rate of inflation is assumed for 1973–75, the 4 percent money growth in simulation C would then permit real GNP simply to grow at about the same rate as potential, maintaining the gap already existing in 1973:1. All of this analysis would, of course, be altered by assuming a lower income elasticity in the demand for money function.

Another interesting aspect of these simulations is the price level advantage gained by money path B as compared with money paths C and D. The figures are dramatic: The *rate* of inflation (GNP deflator) in B is below that in C from 1969:1 through 1972:1, and below that in D from 1969:1 through 1974:2; the *level* of the deflator in B is below that in C from 1969:1 through 1973:4, and below that in D for the entire simulation period.

When analyzed carefully, these results make perfectly good sense. The advantage realized by B arises because the output gap in B appears early in the simulation period. In simulation B real GNP falls below potential in 1969:3, while in C and D a gap does not appear until 1970:1. In B real GNP is below that in C from 1969:1 through 1971:2, but only by a maximum of $13.5 billion (1.8 percent of potential) in 1970:2. Similarly, real GNP is lower in B than in D from 1969:1 through 1972:3, with a maximum difference of $19.4 billion (2.5 percent of potential) in 1971:2. In accord with the McCracken statement cited earlier and the views of many other economists, the early reduction in inflation reduces inflationary expectations, thereby tending to reduce inflation still further in subsequent quarters.

The mechanism producing this result in the model is fairly simple. Changes in the wage rate depend primarily on the current unemployment rate and on the lagged inflation rate. In turn, the inflation rate depends primarily on a distributed lag of current and past changes in the wage rate. Thus, an early increase in unemployment reduces the increase in the wage rate, which in turn reduces the inflation rate for subsequent quarters. This timing effect is magnified by the fact that the lower output in 1969–70 in simulation B as compared with C and D occurs at a strategic time when unemployment is especially low, and therefore the model is operating in a relatively steep section of the Phillips curve. For example, in 1970:2, the quarter of the maximum output difference between B and C in this period, the model's unemployment rate for B is 4.0 percent while the rate for C is

3.7 percent, a small but important difference given the steepness of the Phillips curve at these unemployment rates.

A REFORMULATION OF INSTRUMENT-GRADUALISM

Where does this analysis leave the policy of instrument-gradualism? First, it is important to recognize that such a policy is designed to cope with uncertainty. The argument is that there is too much uncertainty about the structure of the economy, including the response lags to policy changes, and about the occurrence of random shocks to permit an active, aggressive stabilization policy. This view clearly has great merit; even policy activists do not claim that policy makers can hope to forecast and then offset every small disturbance. The debate is not over a matter of principle but rather over the degree to which an aggressive stabilization policy can be successfully pursued.

However attractive the instrument-gradualist argument, it simply does not fit the current situation without careful amendment. In early 1969 economists of all persuasions agreed that the 1965–68 inflationary experience produced initial conditions for 1969 that guaranteed continued inflation for some period of time. There was practically no uncertainty over the forecast that inflation would continue to be a serious problem for several years.

In this situation a normative argument arose as to how large an output gap ought to be accepted in exchange for reduction in inflation. But more important for the instrument-gradualist approach was the positive argument over how much inflation would occur, and for how long, and over the amount of reduction in inflation associated with a given output gap. The uncertainty relevant for the instrument-gradualist argument, therefore, was considerably influenced by the unfavorable initial conditions of 1969.

Friedman recognized these unfavorable conditions and therefore modified his prescription of steady monetary growth by urging a two-step reduction in the rate of money growth to a steady long-run rate. The simulations above suggest that this recommendation was faulty in two respects. First, a sharp reduction in the money growth rate followed by a subsequent increase appears to promote better GNP and price level paths over time. Secondly, the simulations suggest that the 4 percent rate, and perhaps even the 6 percent rate, of growth of money is too low over the next few years.

These results flow from the unsatisfactory initial conditions and the long adjustment lags in the model.

The conviction that adjustment lags are long, variable, and uncertain is at the heart of the instrument-gradualist position. If much weight is given to the "long" part of this position, then the instrument-gradualist recommendation ought not to involve the same sort of policies that might have been appropriate in a year with favorable initial conditions, such as 1965. Instead, the recommendation might be to start with money path B, smooth it, and then substantially reduce rates of growth compared with it in the 1973–75 period, unless evidence accumulates before 1973 suggesting that its high rates are really necessary. This recommendation recognizes that money path B was determined by experimenting with a deterministic model; the introduction of uncertainty clearly argues for smoothing and avoiding extremes.

The simulation results discussed above do not destroy the case for instrument-gradualism, but rather require that it be stated more generally than it has been in the past. Some minimum allowance ought to be made for important factors known to be operating, such as the initial conditions facing policy makers in early 1969. The general problem, of course, is to decide when something is "known to be operating," but in the specific instance of early 1969 the existence and prospective persistence of inflationary pressures were known.

THE SHIFT OF POLICY IN 1969

In any event, it is clear that actual policy has not been instrument-gradualist. Indeed, it can be argued that, considering monetary and fiscal policy together, the shift in policy in 1968–69 was the most deflationary since 1947.

By the beginning of 1969 the economy had gone a long way toward adjusting in real terms to a higher rate of inflation. Interest rates had risen to reflect the inflation, wage contracts provided for future wage increases high enough to offset much of the expected inflation, and the rate of growth of real output had declined to more or less normal levels from the above-normal rates of increase previously prevailing. From the second quarter of 1967 through the second quarter of 1968, real GNP grew at a 5.0 percent annual rate, whereas the rate was 3.5 percent from the second to the fourth

quarters of 1968. By the beginning of 1969 the adjustment to inflation was far from complete, but it had made considerable progress.

Probably the best measure of the shift in monetary policy is the extent to which the rate of growth in the money stock has declined. The change, rather than the level, of the rate of growth seems to be the appropriate measure, because after a sufficiently long adjustment period, it appears that the monetary growth rate determines primarily the rate of inflation and has relatively little effect on the rate of growth of real output.

The tax surcharge of 1968 and the sharp reduction in the rate of monetary growth starting in early 1969 started the process of adjustment to a lower rate of inflation. Initially there was little noticeable effect because the forces tending to produce less inflation were overwhelmed by the continuance of the previous adjustment to higher inflation. Furthermore, as noted in the previous section, the extensive talk about gradualism may have slowed down the response to the restrictive policies.

That monetary policy did become very restrictive can be seen from the following figures. From February 1968 to February 1969, the money stock grew at a 6.85 percent annual rate, but in the next twelve months—from February 1969 to February 1970—the money stock grew at a 1.52 percent rate, a difference of 5.33 percentage points in the growth rates. Such a decline in growth rates, measured by comparing twelve-month periods to eliminate temporary aberrations, has been exceeded only on rare occasions since 1947: in January 1948, when the decline was 5.46 percentage points; and in several months of 1959, when the maximum difference in twelve-month growth rates was 6.64 percentage points in July.[21] If the comparison is made for the twenty-four months ending, and the twelve months following, February 1969, then the deceleration of monetary growth is found to be 5.15 percentage points. Based on this method of calculation, this deceleration is greater than that for any other month in the postwar period[22] except for the figure for July 1959, which is nearly identical at 5.13 percentage points.

21. The dates refer to the last month of the first twelve-month period. With this method of dating, the 1969 slowdown described at the beginning of the paragraph would be dated February 1969.

22. Since the money stock series used for this analysis begins in 1947, the first month for which the twenty-four/twelve-month calculation can be made is January 1949. All of the growth rates reported in this paragraph are based on the assumption of continuous compounding.

The shift in fiscal policy has also been substantial. According to estimates of the Federal Reserve Bank of St. Louis, the full employment federal government budget surplus has gone from minus $12.0 billion in 1967 to $9.7 billion in 1969 (calendar years used throughout).[23] The full employment surplus estimates for the same two years appearing in a paper by Okun and Teeters are quite similar, even after the authors make a number of adjustments designed to improve the conventional full employment surplus measure.[24] However, the full employment surplus is declining in the first half of 1970 to an estimated level of $3½ billion.[25]

It appears, then, that the full employment budget surplus rose by over $20 billion between 1967 and 1969, a swing of roughly 2.5 percent of potential. This dollar increase was the largest for any three-year period since 1947, and may be compared with the increase from $3.3 billion in 1958 to $13.2 billion in 1960, a change of $9.9 billion (1.8 percent of potential), and the increase from minus $7.9 billion in 1953 to $6.3 billion in 1956, a change of $14.2 billion (3.4 percent of potential).[26] Thus while the level of the full employment surplus for 1969 was not as high as that for 1960, the change in the surplus for the three-year periods was about twice as large.

Thus, whatever the advantages of instrument-gradualism—and the simulation results suggest that such advantages are nonexistent in the current economic situation—there can be no doubt that it is impossible to describe economic policy since 1969 as instrument-gradualist. The problem facing policy makers in 1970–71 is to follow expansionary policies long enough to undo some of the deflationary impact of the 1969 policies but not so long as to encourage a resumption of inflationary boom conditions.

23. Federal Reserve Bank of St. Louis, "Federal Budget Trends, Period Ending 2nd Quarter 1970," p. 2.

24. Arthur M. Okun and Nancy H. Teeters, "The Full Employment Surplus Revisited," *Brookings Papers on Economic Activity* (1:1970), pp. 77–110; see esp. Table 3, p. 106.

25. Nancy H. Teeters, "Budgetary Outlook at Mid-Year 1970," this volume, pp. 303, 305. The Teeters estimates may be compared with the $6.5 billion estimate of the full employment surplus for 1970 made by the Federal Reserve Bank of St. Louis, "Federal Budget Trends . . . 2nd Quarter, 1970," p. 2.

26. The 1958–60 estimate is based on the full employment surplus (unadjusted) estimates in Okun and Teeters, "Full Employment Surplus Revisited," Table 2, pp. 104–05; the 1953–56 comparison and other data prior to 1955:3 are from Keith Carlson, "Estimates of the High-Employment Budget: 1947–1967," *Federal Reserve Bank of St. Louis Review*, Vol. 49 (June 1967), p. 10.

Comments and Discussion

R. A. Gordon: I must confess to a certain amount of puzzlement about this paper. For one thing, I am not sure I know what is intended by the word "gradualism." With respect to gradualism on goals, in what sense did this begin in 1968? Walter Heller's lectures at Harvard stressed the need for continuous adjustment of the level of activity: Full employment was the chief job of the Council of Economic Advisers and the council, in effect, knew more or less how to do it.

In that sense, the council has espoused gradualism on goals for quite some time. It was merely a question of getting close to full employment in order to be able to practice it. I get the feeling that what is actually meant by gradualism on goals is simply what I would call the operation of the ratchet effect on the goal of full employment. The longer the period of high employment, the more difficult it becomes for the policy makers to accept, or to risk the possibility of, a large increase in unemployment. As I see it, the emergence of gradualism with respect to goals is simply the increased importance of the full employment goal.

Simulation A—the postmortem of 1969–70—illustrates that we have no comparable experience with prolonged periods of unemployment of 4 percent or less. Indeed, I would like to emphasize a favorite theme of mine: We need to pay more attention to the time sequence of observations in our econometric work. An unemployment rate of 3.9 percent may mean one thing if it is an isolated observation. It may mean an entirely different thing if it follows four consecutive years of 4 percent or lower unemployment. The period from December 1965, when 4 percent was reached, to January 1970 was the longest period of 4 percent or lower unemployment in American history—outside of total war. We need to develop techniques for taking account of this in our econometric work.

In simulation B, the projected increase in the money supply for 1974–75 is simply not credible. The 1971–73 figures, however, look to be in the right ball park. Interest rate expectations will change in the seventies. I wonder whether the long-term interest rate still involves too long a lag on the short-term interest rate and whether that is part of the problem in the money supply projections. I am also skeptical about the future behavior of velocity implied by the model.

In simulations B, C, and D, the wage and price equations of the model play a key role; and I am not convinced of their validity. Finally, the labor force and productivity assumptions that give the high unemployment figure for 1973–75 in simulation B are not clear.

If I may sum up on the general theme, I do not think a reference to a new gradualism on goals is the appropriate way of describing the subject. Instead, I would put part of the argument as follows: Political forces have imposed what is called gradualism in goals on the federal government. This takes the form of a greatly increased emphasis on the goal of full employment. Even though the monetary authorities may wish to control inflation, the thinking of the Federal Reserve Board about how far it may go in risking a sharp rise in unemployment is far different today from what it was, say, in 1959–60.

With respect to instruments, I do not know that anybody has argued that we must never use a nongradualist approach. Certainly, the changes in monetary policy that took place from 1968 to 1969, and the reversal in the latter part of 1969 to the spring of 1970, represent large changes in the use of monetary instruments, and similar cases can be found in the past. The same things could be said for fiscal policy. I do not know any law of economics that says large changes in monetary and fiscal policy should not be used, and they have been used in the past. They are entirely consistent with the gradualist approach to goals.

David Fand: I think that William Poole's paper is thoughtful and stimulating; if the value of the *Brookings Papers* is to make people think in a concrete way about these problems, I think it serves the purpose very well. He forces us to work through the exercise and see how one deals with an inflationary economy and how one might go about trying to achieve the administration's goals.

Poole focuses on a discrepancy between gradualism in tools and gradualism in goals—a discrepancy that can come about for different reasons. It

could happen because the wrong instrument was used. For example, stabilizing the federal funds rate may be viewed as a gradualist policy, but it could easily result in putting out a lot of money. Monetary policy would then be viewed as gradualist when it was not. Thus when market interest rates are used as an indicator of policy, the authorities may believe that they are following gradualist policies when in fact they are not. This is not the kind of discrepancy that Poole is talking about. He is talking about a case where the right instrument is being used but a discrepancy still develops between gradualism in tools and in goals. This comes about because the economy is different: What looks like a very tough policy viewed in isolation may, in a very hopped-up economy, be in fact a mild policy. The point is to distinguish this kind of discrepancy between tools and goals from that in the first example.

It seems to me the case for gradualism in the use of instruments is made partly on the grounds of uncertainty. But it may also be made on the grounds that the real world is relatively stable and that a lot of the instability comes from destabilizing policies.

I was puzzled that the policy of 4 percent growth in the money supply resulted in so little real growth, so much inflation, such high velocity, and such high interest rates. I tried the same policy in the St. Louis Federal Reserve's model and the results were also surprising. They were somewhere in between Poole's results and what I expected. Why do we get these seemingly strange results?

The St. Louis model extrapolates a very high marginal velocity, which makes me wonder whether it is reliable for long projections into the future. For example, if velocity right now is approximately 4.8, eventually the St. Louis model will pull it up to about 5.8. But the FRB-MIT-Penn model does something very similar in Poole's projections, raising average velocity into 1974 on a policy of 4 percent money growth. Clearly, even quite differently specified equations fitted to the fifties and sixties give that kind of result. So the question is, do we want to extrapolate the uptrend of velocity? I think there is reason to be cautious.

If inflation slows to a rate between 2.5 and 3 percent a year, it would be reasonable to expect a decline in interest rates of about 20 percent. Such a decline in interest rates, assuming an elasticity of money balances of about 0.5, would reduce velocity by about 8 to 10 percent, or to 4.4 from the current 4.8. This implies a different sequence from that given by the model, if this tendency for velocity to decline is partially offset by other tendencies.

Most of the models have not had a good record predicting prices and

interest rates, underpredicting both in recent quarters. These may be two different manifestations of the same mistake: The economy has had more inflationary momentum in it than the models have captured. Because of this the models underpredict prices and, in turn, price expectations and market interest rates. On the other hand, the rise in market interest rates in recent years may constitute a rise in real rates as well as an inflation premium. Those who argue that it is, essentially, an inflation premium have difficulty explaining the decline in the stock market. Those who argue that it is mostly an increase in real rates have difficulty explaining price level behavior. Both explanations leave something to be desired.

If velocity does decline, monetary policy will be tighter than it will appear to be from the money supply figures. That is to say, a period may be approaching when the dollar may be doing the work of only ninety or ninety-five cents.

William Poole: Of course gradualism is not new. What is new is the greater public acceptance of the fact that in fighting inflation policy makers have to be careful because they may have a big impact on employment. I think there is a change from the fifties when the nation had a similar problem.

I share the misgivings of those who are presented with results of a model whose characteristics and structure are hard to understand. It is very difficult to figure out what is going on in something as big as the FRB-MIT-Penn model. I know the characteristics of a few of the equations and that is about the best I can do. I had to decide whether to spend time on the model or on a discussion of economic policy. It seemed better to talk about policy.

I agree that the bond rate equation is a problem. An eighteen-quarter distributed lag is a long time. As I noted, I changed the original equation, which had an even slower response, but I am still unhappy with it. I don't know exactly what is causing the unemployment in the later years. And there are other things about these simulations that I do not like. What I tried to do, within my time constraint, was to run the model to see what it showed.

I was surprised that R. A. Gordon wondered who argued the instrument-gradualist case, because Milton Friedman has been arguing it for years. So have a lot of other monetarists. And it is certainly true that my approach is very monetarist. I think there is a lot to be said for paying much more attention to the money stock in policy formulation. But if 4 percent growth of the money stock were adopted as a policy rule, I think

it would produce a very serious output shortfall and do very serious long-run harm to this whole cause.

My reaction to David Fand's comment that in a hopped-up economy a policy may look severe but in fact is mild is to state the matter quite the other way around. In a hopped-up economy a very tight policy will result from a growth rate for money that is historically reasonably high. A 4 percent growth rate of money, which might look like a neutral or even expansionary policy, would in fact produce a considerable shortfall of output. His comments on velocity come from calculations that he made with the 4 percent growth path of money. With the growth path of simulation B, velocity in fact returns to the 1970 level by 1975. I do not think that there is anything in this model that provides for a secular increase in velocity. The results with the 4 percent path simply reflect the long lags in this model. These keep long-term interest rates high and hold down expenditures.

General Discussion

Warren Smith said that he did not consider the Poole paper a monetarist analysis except in the sense that monetary aggregates were used to measure monetary policies. He was surprised that an even faster growth in the money supply was not required. He reasoned that this was a period in which the initial situation is one of rapidly rising prices, with continuing increases throughout the period; fiscal policy is tight throughout the period. Therefore, the demand for money is determined by the growth in real output plus the increase in prices. What did surprise him is that the rapid increase in the money supply had so little effect on interest rates. The model apparently has such long lags that, even over five years, interest rates do not come down. This has some unhappy results. Both business and residential construction are depressed and the rapid increase in the stock of money seems to benefit only the stock market. He would question whether any monetary variable, working through the stock market, would be powerful enough to drive the economy all by itself.

Otto Eckstein found the distinction between instrument- and goal-gradualism an excellent one, but did not agree with the inflation-unemployment trade-off implied by the projections. It seems to take 6½ percent unemployment to bring the economy back to reasonable price stability *by 1975*. The implicit trade-off is not only disappointing, but the initial conditions domi-

nate the next five years. The initial conditions disturb other models also but, by 1975, most of them return to normal.

James Duesenberry pointed out that all the models have been fitted to data covering only the past twenty to twenty-five years, a period of relatively slow growth in money and rising interest rates, while historically there have been periods of sharply different rates of growth in money. The models cannot analyze what happens if the recent slow growth process is reversed. There is no base line for knowing what is the right growth in the money supply.

Lawrence Klein said that the message he got from the projection was that the money multiplier was not as large as many monetary economists believe. It takes a big input of money, when that is the only policy variable, to achieve full employment.