Fast vs. Gradual Policies for Controlling Inflation

By William G. Dewald

High rates of monetary growth and inflation in 1979 prompted the Federal Reserve to announce on October 6 a new anti-inflation policy package. Included in the package was an increase in the discount rate to a record 12 per cent, an increase in required reserve ratios on liabilities of banks previously not subject to requirements, and, most importantly, a change in operating procedures. That change promises to direct Federal Reserve open market securities transactions toward control of monetary growth directly, rather than indirectly as previously by control of the Federal funds rate. Whether or not these policies succeed, it was clear that the Federal Reserve was trying to reduce monetary growth for the purpose of damping inflation.

But how long might it take to control inflation and at what cost in economic growth and unemployment? And what are the economic consequences of taking a fast or a gradual approach to controlling inflation? The purpose of this article is to contribute to answers to these questions. The first section identifies the basic cause of inflation as excess demand propelled by rapid monetary growth. The second section presents a model of the economy that can be used to analyze alternative approaches to controlling inflation. The economic impacts of fast and gradual approaches are then evaluated in the third section.

William G. Dewald, professor of economics at the Ohio State University, was formerly a visiting scholar at the Federal Reserve Bank of Kansas City. Assistance in preparing this article was provided by Peggy Brockschmidt. The views expressed in this article are those of the author, and do not represent the views of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

THE SOURCE OF INFLATION

This article adopts the view that inflation is caused mainly by excess economic demand and that rapid monetary growth is the major factor giving rise to excess demand. As to the linkage between demand and inflation, it is held that the rate of inflation in the long run reflects the growth of the nominal demand for goods and services relative to the growth of the economy's capacity to supply goods and services. For example, if nominal demand grows at a rate of 10 per cent and capacity grows at a rate of 3 per cent, the inflation rate will be 7 per cent.

It is also held that in the long run, the growth in real demand—nominal demand

adjusted for inflation—is constrained by the growth in capacity. And, because actual economic growth is equal to the growth in real demand, actual growth is equal to the growth in capacity. In the above example, real demand grows at a rate of 3 per cent (10 per cent growth in nominal demand minus 7 per cent inflation), and this gives rise to a growth in the actual output of goods and services at a rate of 3 per cent, the same as the growth in capacity.

Furthermore, because inflation in the long run reflects the growth in nominal demand relative to capacity growth, a reduction in the growth of demand will reduce inflation. Also, because inflation is reduced, the decline in the growth in nominal demand will not reduce the growth in real demand, and therefore will not reduce the growth in real output. Thus, the growth in real output will continue to equal the growth in capacity. In the example, if a decline in the growth in nominal demand from 10 to 3 per cent occurs, the rate of inflation will decline from 7 to 0 per cent. The growth of real demand and of output will remain at 3 per cent, equal to the growth rate of capacity. In the long run, then, a decline in nominal demand will reduce inflation without reducing economic growth.

In the short run, though, because wage and price contracts tend to reflect past information about economic performance, a decline in nominal demand, instead of reducing inflation, will reduce the growth of real demand and real output. As the growth of output is reduced, output will fall below capacity, growth in the demand for workers will decline, and unemployment will increase. The gap between output and capacity and the rise in unemployment will eventually lead to adjustments in wage and price contracts and to declines in the rate of inflation. As the rate of inflation declines, the growth of real demand will recover, leading to a recovery in the growth of output and in the demand for workers, and to a reversal in the upward movement in unemployment. These adjustments will continue until the growth of output is equal in the long run to the growth in capacity and the rate of inflation is equal to the growth in nominal demand minus the growth in capacity.

A reduction in the growth in nominal demand, then, will lead to economic slack in the short run and a reduction in inflation in the long run. But what determines the growth in nominal demand? Demand depends on a number of factors, including spending by the Federal Government and the demand for exports. This article, however, adopts the view that the rate of growth of the money stock is, in the long run, the most important determinant of the growth of nominal demand. It is held that there is a direct systematic relationship between the growth rate of nominal demand and the monetary growth rate.

Due to the relationship between demand and money, the inflation rate can be reduced by reducing the rate of growth in the money stock. A reduction in the monetary growth rate, however, will be accompanied by a period of economic slack and rising unemployment. The length and severity of this period of economic slack will depend in part on the approach that monetary authorities adopt to reducing the monetary growth rate. This article analyzes and compares the potential results of two alternatives—a fast approach and a gradual approach. To undertake the analysis, the article utilizes a small model of the economy that is based on the theory that inflation is determined by demand and supply and that the money stock is an important determinant of demand.

THE MODEL

The article uses a modification of the quarterly econometric model developed by the Federal Reserve Bank of St. Louis, which is a

model of the aggregate demand for and supply of goods and services. In the model, changes in aggregate demand and supply determine the rate of inflation, the real growth rate, the unemployment rate, and interest rates.

The aggregate nominal demand for goods and services, measured by changes in nominal gross national product (GNP), is assumed to be determined by variables outside the model, referred to as exogenous variables. The most important exogenous variable is monetary policy, which is measured by the annual growth rate of the money supply, M1, defined as currency and demand deposits held by the nonbank public. Nominal GNP is also specified to be affected by high-employment Federal Government spending and by the demand for exports.

The aggregate supply of goods and services is assumed to be exogenous, determined outside the model by long-run factors such as capital accumulation and population growth. It is measured by changes in high-employment real GNP, as estimated by the President's Council of Economic Advisers.

The rate of inflation, measured by the percentage change in the GNP price deflator, is assumed in the model to be directly affected by expected aggregate demand for and supply of goods and services. More precisely, the rate of inflation depends partly on current demand pressure, which is defined as the difference between the expected demand for goods and services and the supply of goods and services. Thus, the inflation rate is affected by those exogenous variables that affect nominal GNP, such as the growth rate in M1. The impact of M1 on inflation is indirect in that M1 affects the demand for goods and services, which affects demand pressure. Demand pressure in turn has a direct impact on inflation. In the model, inflation also depends directly on inflationary expectations. This reflects the view that in making decisions about wages and prices, economic units make their calculations in real rather than nominal terms.

Changes in the actual real output of goods and services, measured by changes in real GNP, are assumed in the model to be determined by estimated changes in both nominal GNP and the inflation rate. Since nominal GNP is assumed to depend solely on exogenous variables, such as the money supply, the model manifests one-way causality, or recursiveness. That is, changes in nominal GNP affect changes in real GNP and/or inflation, but there is no feedback effect on nominal GNP.

The unemployment rate is assumed to be determined by the percentage gap between high employment output and actual output. The unemployment rate is indirectly affected by the M1 growth rate. That is, M1 affects nominal GNP directly, which, in turn, can affect real GNP in the short run and, therefore, the gap between high employment output and actual output.

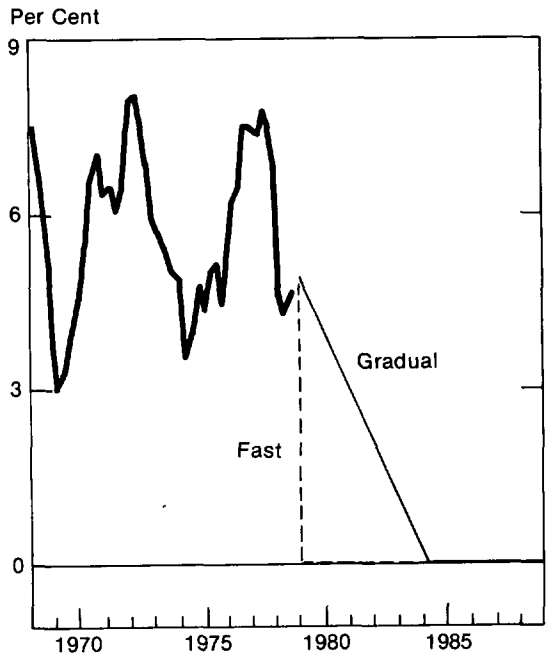
The model contains one short-term interest rate—the 4- to 6-month commercial paper rate—which is assumed to depend on demand pressure and inflationary expectations. Increases in demand pressure or in inflationary expectations are assumed to place upward pressure on short-term interest rates. The model contains a long-term interest rate—the Aaa corporate bond rate—which depends directly on inflationary expectations. Thus, the model exhibits a positive relationship between high inflation and high interest rates.

In summary, the model determines six major variables—changes in nominal GNP, the rate of inflation (per cent changes in the GNP deflator), changes in real GNP, the unemployment rate, and two interest rates. These variables are related to variables outside the model, such as the growth rate of M1 and high-employment output, and to the parameters that define and measure the relationships among the variables in the model.

ECONOMIC IMPACT OF ALTERNATIVE APPROACHES

To use the model to analyze the impact on the economy of fast and gradual approaches to reducing inflation, the first step was to estimate the values of the model's parameters.[1] The parameters were estimated by applying econometric procedures to historical data for the first quarter of 1953 through the third quarter of 1979. Given the model, the estimated parameters, and assumptions about the behavior of the model's exogenous variables, the next step in the analysis was to simulate the model under alternative assumptions about the approach adopted to reduce inflation.[2] The model was simulated for the period beginning in the fourth quarter of 1979 through the fourth quarter of 1989 under assumptions of fast and gradual approaches. Both approaches assumed a decline in the M1 growth rate, which was about 5.0 per cent during the year ended in the third quarter of 1979. The fast approach was defined as a monetary policy of reducing the M1 growth rate to zero in the fourth quarter of 1979 and maintaining it at that level throughout the simulation period. The gradual approach was defined as reducing M1's growth rate by one-quarter percentage point each quarter until zero growth is reached, and then maintaining the M1 growth rate at zero through the remainder of the simulation period. (See Chart 1.)

Chart 1
THE MONEY SUPPLY, M1
Actual 1969-79,
Model Assumptions 1980-89
(Per cent change from year earlier)



The final step in the analysis is to examine and compare the results of the simulations. The results, which show the potential impact on the economy of the two alternative monetary growth rates, support the view that a reduction in the monetary growth rate will reduce inflation. As shown in Chart 2, the rate of inflation declines under both the fast and the gradual simulations. Under the fast simulation, a zero inflation rate is achieved by mid-1984, while the gradual simulation does not completely eliminate inflation until late 1985.

It may be noted that, under both the fast and gradual simulations, the inflation rate overshoots the zero rate and then moves into the negative area.[3] In both cases, however, the inflation rate eventually moves back toward

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[1] An appendix lists all of the equations of the model. The complete empirical estimates are presented in the author's article, "Fast and Gradual Monetary Policies to Curb Inflation," *Bulletin of Business Research*, The Ohio State University, Vol. 14, No. 7 (July 1979), pp. 1-7.

[2] The assumed values of the exogenous variables for the simulation beginning with 1979: IV are the following annual growth rates: High-employment real GNP, 3 per cent; high-employment Federal Government spending, 4 per cent; exports, 4 per cent; imports deflator, 10 per cent; M1, 0 per cent. The high-employment unemployment rate is 5.1 per cent.

Chart 2
THE RATE OF INFLATION
Actual 1969-79, Model Simulation 1980-89
(Change from year earlier in GNP price deflator)

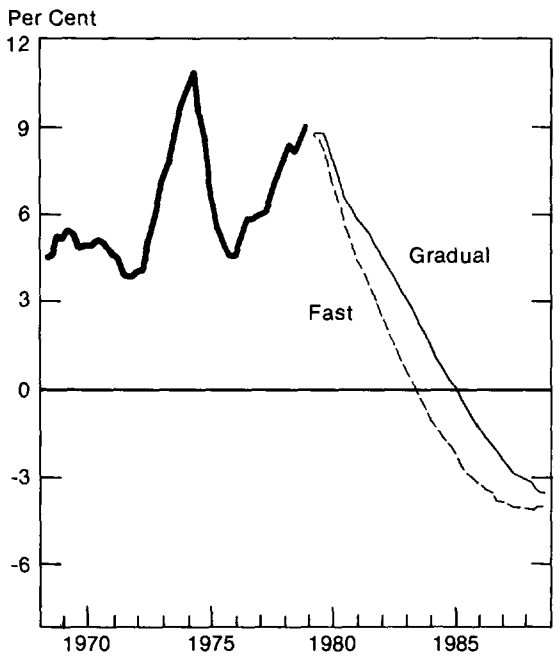
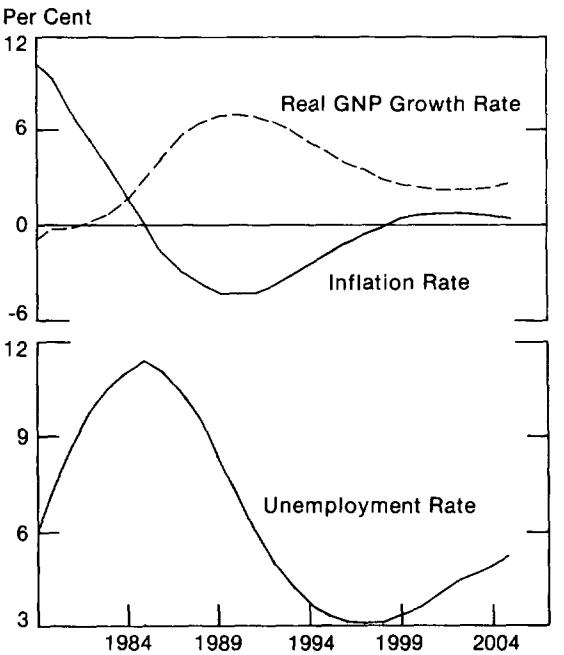


Chart 3
INFLATION RATE, REAL GNP GROWTH RATE AND UNEMPLOYMENT RATE 1980-2005
(Model Simulation of Gradual Approach)



zero, and in long-run equilibrium, remains at zero—the rate of growth of the money stock, M1. The long-run convergence of the inflation rate toward the zero point is shown for the gradual simulation in Chart 3. A similar result holds for the fast simulation. It may also be noted that, as with the inflation rate, the short- and long-run interest rates converge in the long run toward equilibrium levels significantly lower than prevailed in 1979. The long-run values are 3.4 and 4.5 per cent, respectively, for the short- and long-term rates.

The simulation results also support the view that reducing the monetary growth rate to reduce inflation will give rise to a period of economic slack. Both the fast and gradual simulations produce a period of slack during which the economic growth rate is negative and the unemployment rate increases. Under the fast simulation, the economy experiences a deep recession, with real GNP declining for several quarters at year-over-year rates of around 5 per cent. (See Chart 4.) Also, the

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[3] Though the model is stable in the sense that highly restrictive monetary policies will eventually be fully reflected in inflation and not in real output or unemployment, the model exhibits considerable instability in the sense that large disturbances have long-lasting effects on real variables as well as on inflation. This is due both to the estimated small contemporaneous effect of demand pressure on inflation and to the estimated long lag in the effect of past inflation on inflationary expectations. Though the model is specified so that there is no long-run tradeoff between inflation and unemployment, there is a short-run tradeoff.

unemployment rate increases to over 10 per cent by mid-1981 and remains over 10 per cent for a period of six years until mid-1987. (See Chart 5.) The gradual simulation, on the other hand, shows a less pronounced recession, with real GNP declining at rates of only around 1 per cent, and with the unemployment rate remaining below 10 per cent until mid-1985 and remaining above 10 per cent for a period of five years until mid-1988.

Under both the fast and gradual simulations, the economy recovers from recession at about the same time, in late 1982, when, in both cases, the real GNP growth rate moves from the negative into the positive area. During the recovery period, though, the economy grows more rapidly under the fast than under the gradual approach. Moreover, during the recovery period, the unemployment rate begins to decline earlier, declines more rapidly, and, after a time, is lower under the fast compared to the gradual simulation. In other words, while during the slack period the performance of the economy, as measured by economic growth and unemployment, is worse in the fast than in the gradual simulation, the economy's performance is better in the fast simulation during the recovery period. Thus, when taking account of performance during both the slack and the recovery period, neither the fast nor the gradual approach can be said to result in better economic performance than the other.

The simulation results show also that both the growth rate of real GNP and the unemployment rate, as is the case for the inflation rate, overshoot their long-run

Chart 4
THE ECONOMIC GROWTH RATE
Actual 1969-79, Model Simulation 1980-89
(Per cent change from year earlier in real GNP)

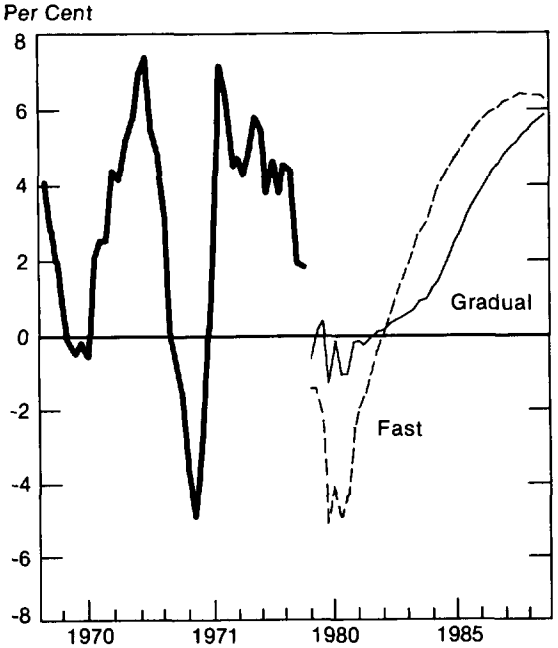
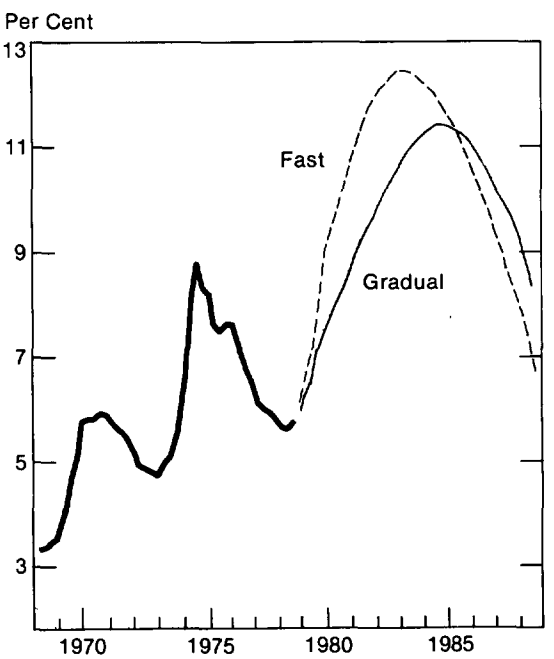


Chart 5
UNEMPLOYMENT RATE
Actual 1969-79,
Model Simulation 1980-89



equilibrium values. However, the results show that, as is the case with the rate of inflation, the economic growth rate and the unemployment rate converge in the long run to their equilibrium values. (See Chart 3.) The long-run equilibrium value of the economic growth rate is around 3.0 per cent, the assumed growth rate of the economy's capacity to produce goods and services. The long-run value of the unemployment rate is 5.1 per cent, the assumed "full employment" unemployment rate.

SUMMARY AND CONCLUSIONS

This article argues that inflation is caused mainly by excess economic demand and that rapid monetary growth is the major factor giving rise to excess demand. Thus, it is held that the inflation rate can be reduced by reducing the rate of growth in the money stock. A reduction in the monetary growth rate, however, would be accompanied by a period of economic slack and rising unemployment. The nature of this period of economic slack would depend in part on the approach that monetary authorities might adopt to reducing the monetary growth rate. The article uses a small econometric model to analyze the potential results of two alternative approaches—a fast and a gradual approach. The fast approach is defined as a monetary policy of immediately reducing the monetary growth rate to zero. The gradual approach is defined as gradually reducing the monetary growth rate to zero.

The econometric analysis supports the view that a reduction in the monetary growth rate would reduce inflation. It indicates that inflation would be eliminated more quickly under the fast than under the gradual approach. The analysis also supports the view that reducing the monetary growth rate would give rise to a period of economic slack. Under the fast approach, the economy would experience a deep recession, with the economic growth rate declining sharply and the unemployment rate increasing sharply and remaining high for an extended period of about six years. The gradual approach would produce a somewhat less pronounced recession. In both cases, the economy recovers from recession at about the same time. During the recovery period, though, the economy grows more rapidly under the fast than under the gradual approach, and the unemployment rate declines earlier and more rapidly. Thus, while during the slack period the performance of the economy, as measured by economic growth and unemployment, is worse under the fast than under the gradual approach, the economy's performance is better under the fast approach during the recovery period. Therefore, when taking account of performance during both the slack and the recovery period, neither approach can be said to result in consistently better economic performance than the other.

The findings of this article are not optimistic. They indicate that even a gradual approach to eliminating inflation would result in an extended period of economic slack and high unemployment. These results arise from the assumptions, supported by the article's econometric analysis, that on-going inflation reflects, to a large extent, inflationary expectations, which in turn reflect past experience with inflation. Because the U.S. economy has experienced high and rising inflation for an extended period, people expect inflation to continue. Countering the impact of these expectations on on-going inflation requires a high degree of economic slack for an extended period of time.

Some economists have argued that inflationary expectations would be sharply and quickly reduced if the monetary authorities were to publicly announce a policy of gradually reducing the monetary growth rate. If such an

announcement were made, and if the public believed it, inflation could in fact be eliminated faster and with less cost in terms of economic slack and unemployment than is implied by this article's findings. Based on past experience, however, it is unlikely that the public would believe the announcements of policymakers in the absence of firm evidence that monetary growth and inflation were actually being reduced.

APPENDIX
The Model
1953:I-1979:III

Equations:

1. $\dot{Y}_t = \underset{(3.28)}{2.38} + \sum_{i=0}^{4} m_i \dot{M}_{t-i} + \sum_{i=0}^{6} e_i \dot{EF}_{t-i} + \underset{(2.34)}{.04\dot{EX}_t}$

   $\sum m_i = \underset{(6.19)}{1.03} \quad \sum e_i = \underset{(.22)}{.02}$

   $R^2 = .52$, SE = 3.28, DW = 1.90

2. $D \equiv \ln(Y/P^a) - \ln(XF)$

3. $\dot{P}^a_t = \sum_{i=1}^{2} d_i D_{t-i} + \sum_{i=1}^{12} p_i \dot{P}_{t-i} + \sum_{i=1}^{7} w_i \dot{W}_{t-i}$

   $\sum d_i = \underset{(.20)}{.01} \quad \sum p_i = 1.00 \quad \sum w_i = .00$

   $R^2 = .81$, SE = 1.33, DW = 2.06

4. $\dot{P}_t = \dot{P}^a_t + \underset{(1.28)}{.04D_t}$

   $R^2 = .81$, SE = 1.20, DW = 2.03

5. $\dot{X} \equiv \dot{Y} - \dot{P}$

6. $U_t = UF_t - \underset{(-7.82)}{.20}\, D_t - \underset{(-6.38)}{.16}\, D_{t-1}$

   $R^2 = .72$, SE = .28, DW = 2.05, $\rho = .73$

7. $R_t = \underset{(.04)}{4.28} + \sum_{i=0}^{11} b_i \dot{P}_{t-i}$

   $\sum b_i = \underset{(5.18)}{.37}$

   $R^2 = .26$, SE = .18, DW = 1.42, $\rho = 1.00$

Definitions of Symbols:

Y = GNP.
M = money stock (M1).
EF = high employment Federal Government spending.
EX = exports.
D = demand pressure.
P = GNP deflator.
XF = high employment real GNP.
W = imports deflator.
X = Y/P = real GNP.
U = unemployment rate.
UF = high employment unemployment rate.
R = Moody's Corporate Aaa Bond Rate.
t = quarter.
ln = natural logarithm.
$\cdot$ = annual rate of change.
a = anticipated.

Lower case letters = coefficients.
Upper case letters = variables.

R^2 = coefficient of determination.
SE = standard error of estimate.
DW = Durbin-Watson statistic.
ρ = serial correlation coefficient.

t-values are in parentheses.

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