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MONETARY POLICY AND THE 1979 SUPPLY SHOCK

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ABSTRACT

The most striking aspects of recent U.S. wage and price behavior are the small year-to-year variations in the rate of change of wages, the modest 1977-79 acceleration in the rate of change of both wages and the consumption deflator net of food and energy, and an unprecedented gap between the inflation rates recorded by the CPI and personal consumption deflator.

A small and simple econometric model is used to forecast the consequences of various policies for the future growth of the monetary base. No policy will be able to prevent an acceleration in the growth rate of the personal consumption deflator net of food and energy from its recent 7 percent track to 8 percent or above in the first half of 1980. The gross personal consumption deflator will climb even faster, with the difference depending on the behavior of oil and food prices.

Thereafter, the effect of slack labor markets will begin to allow inflation net of food and energy to decelerate substantially. A 6 percent rule for the monetary base is too conservative and causes the unemployment rate to rise to 8.5 percent in 1982. An 8 percent rule for the base is preferable, allows the unemployment rate to begin to fall after late 1981, and still achieves a deceleration of inflation net of food and energy from 8 percent in mid-1980 to 6 percent in 1983. Thereafter, the growth of the base should be slowed down to keep the economy from overshooting again.

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"Whether you like it or lump it, this is one of the most interesting things that's happened to monetary policy in years." -- Charles Schultze

"the Fed experiments in how to operate hard money" -- headline in the *Economist*

## I. INTRODUCTION

Rarely has any policy shift been greeted by such universal acclaim as the Fed's actions of October 6. Approval from journalists and businessmen and the Administration was joined by a positive reaction by economists ranging across the spectrum of opinion from Milton Friedman and Allan Meltzer to Arthur Okun.<sup>1</sup> In fact, there may be some tendency on the part of the Governors to view the present meeting of Academic Consultants as anticlimactic, like an expert's report recommending the strengthening of air defenses delivered to the War Department the day after Pearl Harbor.

Popular discussions of the current economic situation have been one-dimensional in tone; inflation is running out of control, and there is no alternative to a drastic tightening of monetary policy. This paper attempts to divert attention from the transient events of the moment and to investigate the fundamental relationships that should govern monetary policy over the next year. Given the constraints faced by the economy, what is the set of growth rates for nominal GNP, real GNP, and the GNP deflator that the Fed should attempt to achieve, and what behavior of monetary aggregates is consistent with these targets? The paper begins by reviewing the conceptual framework that should guide policymakers faced with a supply shock; then examines the relation between nominal GNP and monetary aggregates; and finally explores the factors governing the likely division of nominal GNP growth between inflation and real GNP growth and the effect of alternative policy actions on that division.

II. POLICY RESPONSES TO SUPPLY SHOCKS DEPEND ON THE NATURE  
OF WAGE-SETTING INSTITUTIONS

*Policy Accommodation and Extremes of Wage Behavior*

The acceleration of inflation in 1979 has not been purely due to excessive aggregate demand, but rather has been aggravated by increases in the relative prices of food and energy. A supply shock may be defined as any event that causes a discrete jump in the aggregate price level that firms require to be willing to produce a given quantity of real GNP; such an event can be caused not only by a crop failure or a hike in the price of imported oil, but by an autonomous "cost push" in the form of higher domestic indirect taxes, profit margins, or wage rates. A common feature of all supply shocks is that the division of any given level of nominal GNP is shifted toward a higher price level and a lower level of real GNP. An expansive or "accommodating" demand policy can moderate the impact on real GNP only at the cost of raising the price level and aggravating inflation. Restrictive or "extinguishing" demand policy can moderate the price increase only at the cost of further aggravating the shortfall of real GNP. The choice between an accommodative, extinguishing, or neutral demand policy depends primarily on the nature of wage-setting institutions and on the relative welfare costs of inflation and unemployment.<sup>2</sup>

The initial impact of an adverse supply shock, e.g., an OPEC price hike, is to raise the share of total spending on the product in question (oil), if its demand is price inelastic. The automatic consequence is that a fixed level of nominal GNP will be devoted more to spending on oil and less to spending on nonoil goods and services. The reduced amount of nonoil spending in nominal

terms could be reflected in lower real nonoil output, lower nonoil prices, or both. Imagine first that the domestic wage rate is fixed, and nonoil prices are "marked up" over that wage rate by a constant fraction. Then all of the impact of the supply shock will fall on nonoil real output. Because the wage rate is unresponsive to aggregate demand, stabilization policy can boost nominal income and thus real nonoil output without raising nonoil prices. Policy cannot prevent the overall price level (of oil and nonoil products together) from rising, but it can prevent the wasteful loss of nonoil output. The crucial feature allowing this beneficent impact of stabilization policy is the willingness of workers to accept a loss in real wages, that is, in the ratio of their fixed nominal wage to the higher overall price level.

At the opposite extreme assume that domestic wages are fully and instantly indexed to the overall price level and the change in the real wage depends only on the pressure of real nonoil demand in the economy. Then the decline in the real wage required to balance the adverse impact of the supply shock on labor productivity is inhibited by the indexing formula and can be achieved only if stabilization policy allows real nonoil demand to decline. Complete cost-of-living escalation of the wage rate (or *de facto* real wage rigidity in wage bargaining) thus makes a potentially serious recession and climb in the unemployment rate inevitable in the wake of a supply shock, a feature that several authors have pointed to as explaining the failure of European economies to recover after 1975 as rapidly as in the U. S. In such an economy with real-wage rigidity, the economy's aggregate supply schedule is steep, and stimulative aggregate demand policy will cause extra inflation with little benefit in the form of extra real output.<sup>3</sup> It has been suggested, in fact, that the slower

post-1975 recovery that occurred in most OECD countries resulted not from a different "taste for avoiding inflation" but rather from a different set of wage-setting institutions that cripple the output-creating impact of stimulative aggregate demand policy.

*Application to the U. S. Case*

One of the most important phenomena in the U. S. economy is the inertia displayed by year-to-year changes in the nominal wage rate, resulting from the institutions of long-term overlapping wage contracts with decentralized bargaining. While only part of the economy is unionized, the three-year contracts set in the unionized sector tend to set a pattern for important parts of the nonunionized sector. Because the aggregate nominal wage index depends mainly on its own past values, and responds only partially to consumer price inflation and real demand pressure, the aggregate real wage tends to be quite flexible.

This and other features of U. S. wage and price behavior are illustrated in Table 1. The first two columns display two indexes of aggregate nominal wage change that I have developed in my research; both indicate the same rough tendencies, but the compensation index (column 1) is more erratic than the wage index, both because it includes some types of non-wage compensation (fringe benefits and social security contributions are included in both indexes), and also because it is more subject to measurement error. The wage index in column (2) displays a remarkable stability, with an increase between 6.5 and 7.7 percent in eight of the ten years between 1968 and 1977.

TABLE 1

## Behavior of Wages and Prices, 1967 - 79

|  | Rates of Change                    |                                      |                    |                  |   |                  |                                      |                         |                       |
|--|------------------------------------|--------------------------------------|--------------------|------------------|---|------------------|--------------------------------------|-------------------------|-----------------------|
|  | Adjusted Compensation per Hour (1) | Adjusted Wage Index with Fringes (2) | CPI (3)            | PCE Deflator (4) | PCE Deflator Net of Food and Energy (5) | GNP Deflator (6) | Con-tribution of Food and Energy (7) | Real Wage (2) - (4) (8) | Level of GNP Gapa (9) |
| Four-Quarter Rates of Change ending in:              |                                    |                                      |                    |                  |   |                  |                                      |                         |                       |
| 1967:4   | 5.83                               | 5.33                                 | 2.81               | 2.59             | 2.98                                    | 3.08             | -0.39                                | 2.74                    | -2.65                 |
| 1968:4   | 7.60                               | 6.88                                 | 4.65               | 4.30             | 4.53                                    | 4.77             | -0.23                                | 2.57                    | -3.91                 |
| 1969:4   | 5.89                               | 6.76                                 | 5.63               | 4.80             | 4.71                                    | 5.18             | 0.08                                 | 1.96                    | -1.89                 |
| 1970:4   | 7.29                               | 7.07                                 | 5.59               | 4.37             | 4.46                                    | 5.00             | -0.94                                | 2.70                    | 2.45                  |
| 1971:4   | 5.91                               | 6.78                                 | 3.41               | 3.88             | 4.08                                    | 4.64             | -0.20                                | 2.91                    | 0.80                  |
| 1972:4   | 6.54                               | 7.11                                 | 3.38               | 3.43             | 2.96                                    | 4.07             | 0.47                                 | 3.67                    | -2.12                 |
| 1973:4   | 7.54                               | 7.52                                 | 8.18               | 7.31             | 4.52                                    | 7.39             | 2.79                                 | 0.21                    | -1.96                 |
| 1974:4   | 11.17                              | 9.55                                 | 11.55              | 11.36            | 9.81                                    | 10.57            | 1.55                                 | -1.80                   | 4.46                  |
| 1975:4   | 9.68                               | 9.03                                 | 7.14               | 5.95             | 5.71                                    | 7.24             | 0.24                                 | 3.10                    | 5.32                  |
| 1976:4   | 7.57                               | 7.03                                 | 4.92               | 4.72             | 5.60                                    | 4.68             | -0.88                                | 2.31                    | 3.95                  |
| 1977:4   | 6.39                               | 7.68                                 | 6.46               | 5.57             | 5.71                                    | 6.10             | -0.14                                | 2.11                    | 1.59                  |
| 1978:4   | 9.01                               | 8.41                                 | 8.62               | 7.35             | 6.47                                    | 7.98             | 0.87                                 | 1.06                    | 0.01                  |
| Two-Quarter Rate of Change at annual rate ending in: |                                    |                                      |                    |                  |   |                  |                                      |                         |                       |
| 1979:2   | 9.18                               | 8.72                                 | 12.01              | 9.76             | 7.34                                    | 9.21             | 2.42                                 | -1.04                   | 2.00                  |
| One-Quarter Rate of Change at annual rate ending in: |                                    |                                      |                    |                  |   |                  |                                      |                         |                       |
| 1979:3   | --                                 | 7.26 <sup>e</sup>                    | 13.46 <sup>e</sup> | 9.99             | 6.67                                    | 8.17             | 3.32                                 | -2.73                   | 2.13                  |

Notes: a. GNP gap is the value for the quarter indicated.

e. Estimated on basis of July and August data.

The accelerations in the wage index that occurred in 1974-75 and in 1978-79 demonstrate that the U. S. nominal wage rate is not completely dominated by inertia and does respond to consumer price inflation. Nevertheless, the response is only partial, as we can see by subtracting from the wage index in column (2) the change in the PCE deflator in column (4). This real wage concept is displayed in column (8), and its changes are compared with the contribution to inflation of changes in food and energy prices (column 7). There is a strong negative correlation; in both 1973-74 and in 1978-79, an acceleration in the *relative* prices of food and energy was accompanied by a decline in the growth rate of the real wage, and an absolute drop in the level of the real wage in both 1974 and in the first half of 1979. *It is this flexibility in the U. S. real wage that gives policymakers some room for maneuver, and economists ample room for debate, about the best policy to pursue in late 1979 and 1980.*

An important feature of Table 1 is the divergent rates of growth displayed by the CPI and the PCE deflator, especially in 1979. Because of its well-known deficiencies, the CPI tends to exaggerate inflation, and to do so particularly in years like 1969 and 1978-79 when interest rates are rising. The "double-digit" inflation in the CPI decried by politicians and journalists has not occurred in the PCE deflator thus far during 1979. And the acceleration in the PCE deflator *net of food and energy* between 1976 and the third quarter of 1979 was only 1.1 percent, far less than the 8.5 percent acceleration in the CPI over the same interval. This comparison indicates how much of our inflation problem



III. ESTABLISHING THE CASE FOR THE MONETARY BASE  
AS A POLICY INSTRUMENT

No matter whether it decides to accommodate or extinguish a supply shock, the Fed has to choose an operating instrument that it can use to carry out its chosen policy. The erratic and unpredictable recent behavior of the velocity of M1 and M2 has been widely noted, and various new monetary aggregates have been proposed to incorporate money-market mutual funds, NOW accounts, RP's, and other relatively new institutions. Table 2 illustrates the behavior of four monetary aggregates, including the traditional M1, M2, and monetary base, as well as a new "augmented M2" that adds to the official M2 aggregate the value of several new types of monetary institutions (see note a to Table 2 for details).

The explosion in all the aggregates in the third quarter of 1979, and particularly augmented M2, is evident in Table 2. The remarkable annual growth rate of nominal final sales in the third quarter is also recorded, although much of the latter represents a "rebound" from the artificially depressed level of economic activity in the second quarter (the average growth rate in the first three quarters of 1979 has been 9.3 percent, with less growth in quarters two and three combined than in the first quarter). Another important feature of Table 2 is the much more stable growth rate of the monetary base since 1967 than any of the other aggregates, and this historical tendency is reinforced by the 1979 experience.

Which monetary aggregate should the Fed attempt to control, once it has decided on its target growth rate of nominal final sales?<sup>4</sup> There is no clear tendency in Table 2 that would allow a choice among the aggregates, other than an apparent increase in the growth rates of the velocity of M1

TABLE 2

## Growth Rates of Nominal Magnitudes, 1967-79

|  | Rates of Change |           |  |                         |                                  |
|--|-----------------|-----------|--|-------------------------|----------------------------------|
|  | M1<br>(1)       | M2<br>(2) | Aug-<br>mented<br>M2 <sup>a</sup><br>(3) | Monetary<br>Base<br>(4) | Nominal<br>Final<br>Sales<br>(5) |
| Four-Quarter Rates of Change ending in:              |                 |           |  |                         |                                  |
| 1967:4   | 6.1             | 10.0      | --                                       | 6.3                     | 6.8                              |
| 1968:4   | 7.3             | 8.1       | --                                       | 6.6                     | 9.6                              |
| 1969:4   | 4.1             | 3.3       | 4.0                                      | 4.4                     | 6.5                              |
| 1970:4   | 4.8             | 7.1       | 7.1                                      | 6.4                     | 4.8                              |
| 1971:4   | 6.5             | 10.9      | 11.7                                     | 7.4                     | 9.2                              |
| 1972:4   | 8.1             | 10.8      | 11.0                                     | 8.1                     | 10.7                             |
| 1973:4   | 6.1             | 8.6       | 9.4                                      | 7.9                     | 9.4                              |
| 1974:4   | 4.9             | 7.5       | 8.3                                      | 8.7                     | 8.8                              |
| 1975:4   | 4.3             | 8.1       | 7.9                                      | 7.4                     | 10.5                             |
| 1976:4   | 5.5             | 10.5      | 11.5                                     | 8.2                     | 9.1                              |
| 1977:4   | 7.2             | 9.2       | 9.9                                      | 8.5                     | 10.9                             |
| 1978:4   | 7.8             | 8.5       | 9.4                                      | 9.3                     | 12.8                             |
| Two-Quarter Rate of Change at annual rate ending in: |                 |           |  |                         |                                  |
| 1979:2   | 2.7             | 5.2       | 10.6                                     | 6.6                     | 7.2                              |
| One-Quarter Rate of Change at annual rate ending in: |                 |           |  |                         |                                  |
| 1979:3   | 9.6             | 12.0      | 18.4                                     | 8.9                     | 13.4                             |

Notes: a. "Augmented M2" is obtained by adding to M2 the following items: NOW accounts, other checkable deposits at thrifts, money market mutual fund shares, and repurchase agreements of banks with the nonbank public. Source: "Money: Not What It Used to Be," *Business in Brief* (published by the Economics Group of the Chase Manhattan Bank), July/August 1979.

and M2 after 1974-75 that may reflect a shift in the character of the demand for those aggregates. In contrast to the marked increase in the velocity of M2 that has occurred during the last three years after 15 years of relative stability, the velocity of augmented M2 in mid-1979 was close to its 1960-75 average value.

While St. Louis-type regressions of nominal income (or final sales) change on the current and past changes in monetary aggregates have been rightly discredited because they disregard the shifting response of monetary aggregates to the behavior of income, nevertheless they can provide a useful summary statement regarding the stability of velocity that is corrected for lags in the influence of money on income. Estimates of two such equations for different sample periods (1954-77 and 1966-77) have been extrapolated for the recent seven-quarter interval 1978:1 - 1979:3, with results that are summarized in Table 3.

The top half of the table provides root-mean-squared errors for the seven-quarter extrapolations. While all the errors are roughly similar in size, those for the monetary base are smallest. The bottom half of the table indicates errors in predicting the level of nominal final sales in 1979:3, a contest won by M1 for the longer period and by the monetary base for the more recent 1966-77 sample period. Since it would appear that shifts in the demand for M1 have occurred during the last few years as a result of financial innovations, and that some of these innovations may have a smaller impact on the monetary base, the latter may be the best available aggregate for use by the Fed as an instrument. The balance of this paper investigates the effects of alternative growth rates of the monetary base on inflation and unemployment.

TABLE 3  
 Post - Sample Errors  
 in Predicting Nominal Final Sales  
 Achieved by Alternative Monetary Aggregates,  
 1978:1 - 1979:3

| Monetary Aggregate Used<br>as <b>Independent</b> Variable       | Equation<br><b>Estimated</b> for<br>1954 - 77<br>(1) | Equation<br>Estimated for<br>1966 - 77<br>(2) |
|---|--|---|
| A. Root-mean-squared Forecast Error (quarterly rate of change): |  |   |
| 1. M1   | 1.10   | 1.13  |
| 2. M2   | 1.26   | 1.26  |
| 3. Augmented M2   | 1.18   | 1.22  |
| 4. Monetary Base  | 1.08   | 1.06  |
| B. Forecast Error in 1979:3 (Percent of Actual)                 |  |   |
| 1. M1   | 2.53   | 2.53  |
| 2. M2   | 4.74   | 4.97  |
| 3. Augmented M2   | 3.30   | 3.39  |
| 4. Monetary Base  | 2.94   | 1.58  |

IV. ALTERNATIVE FUTURE PATHS  
OF INFLATION AND UNEMPLOYMENT

While forecasts from numerous large econometric models are available to guide policymakers, predictions from small and simplified models are useful as well because their operation can be more easily understood. For the purposes of this paper I have constructed a model that has only four equations, plus a few definitional relationships. The four basic equations are:

1. A price equation relates the rate of change in the personal consumption deflator net of food and energy to a weighted average of its own past values and of the rate of growth of trend unit labor cost, and to current and past values of the difference between the official unemployment rate and the "natural" unemployment rate. An attempt was made to include prices of exports, imports, or both--to capture the impact of changing exchange rates on domestic prices--but no significant effect emerged.
2. Trend unit labor cost is related to its own past values and to changes in the personal consumption deflator *including* food and energy, as well as to the current and past values of the difference between the official unemployment rate and the "natural" unemployment rate, to changes in the effective social security payroll tax rate, to changes in the effective minimum wage, and to a dummy variable to capture the impact of the 1971-74 wage and price control program (this dummy variable also appears in the price equation).
3. Changes in nominal final sales are related to current and four lagged values of changes in the monetary base.
4. The unemployment rate is calculated by adding to last period's unemployment rate a portion of the current and lagged change in the GNP gap.

The GNP gap (the difference in percent between the actual level of real GNP and "natural" real GNP) in turn is equal to its own past value plus the rate of change of the difference between "natural" and actual real GNP. Actual real GNP is simply the change in nominal final sales minus the change in the personal consumption deflator including food and energy. Finally, the impact of food and energy prices on the personal consumption deflator is set at its historical values through 1979:3 and is set at assumed values thereafter.

There are several basic features of this framework that should be noted. A supply shock has an impact on both wages and prices that persists long after the date of its direct effect, but only about one-third of the total difference made by changing relative prices of food and energy becomes permanently incorporated into the inflation rate. Both the level and the change in unemployment are allowed to influence the change in wages and prices, and the computer's verdict is that the "change" effect is much more important than the "level" effect. Finally, the procedure for calculating the unemployment rate ignores inventory change and any factors that create a difference between the behavior of the GNP deflator and the deflator for personal consumption expenditures.

Three alternative paths of the monetary base are assumed in the forecasts, and they are displayed in the top frame of Figure 1. "Path 1" assumes a constant 8.0 percent growth rate beginning in 1979:4, a rate which is below the 1978 experience but slightly above the average thus far in 1979. "Path 2" is a path similar to, but less dramatic than, the recommendation of steady deceleration long adopted by the Shadow Open Market Committee. Beginning at 8.0 percent in 1979:4, the growth rate of the monetary base slows by 0.5 percentage points each year, reaching an annual rate of 6.0

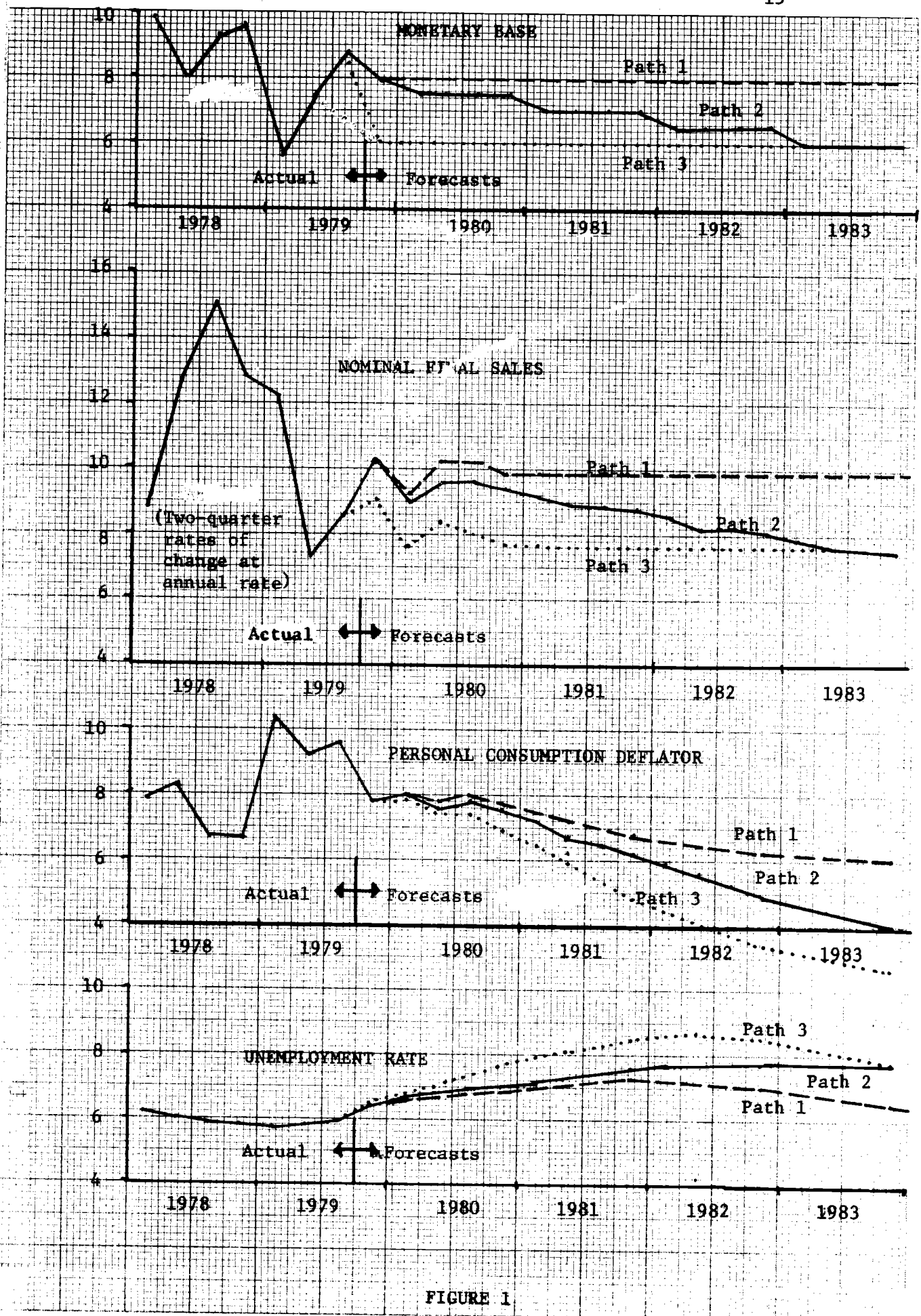


FIGURE 1

percent in 1983. "Path 3" involves a drastic slowdown in the growth of the monetary base to a 6.0 percent rate. Immediately below, the three paths of nominal final sales are traced, with an implied trend increase in the velocity of the monetary base of about two percent per year.

The bottom part of the figure illustrates the alternate inflation and unemployment rates that are predicted to accompany the various paths of the monetary base. It is important to recognize that no further supply shocks are assumed to occur after mid-1980, and this feature of the forecasts both accounts for the optimistic inflation predictions and may make all three forecast paths err in the direction of predicting too little inflation and too low a rate of unemployment. As for the period between now and mid-1980, the impact of food and energy prices on the personal consumption deflator is assumed to shrink gradually from the actual annual rate of 3.3 percent in 1979:3 to zero in 1980:3. Scheduled increases in the minimum wage and payroll taxes are assumed to occur in 1980:1, but not thereafter.

Some readers may be surprised at the rapid response of inflation to the differences between the future paths of the monetary base. By early 1982 the two-percentage-point difference between Paths 1 and 3 has been fully translated into a two-percentage-point difference in the inflation rate, and by 1983 the difference is even larger (this is a temporary overshooting effect due to the impact of changing unemployment on wages and prices and does not represent a lack of long-run "neutrality" in the model). Corresponding to an assumed 2-to-1 "Okun's law" relation between the GNP gap and unemployment, the difference between the unemployment rate in 1982-83 between Path 1 and Path 3 is half the difference between the two inflation paths, or about one percentage point.



A disappointing feature of the forecasts is the long duration of the period of high unemployment, particularly along Paths 2 and 3. The arithmetic behind this phenomenon is quite simple. Since the growth rate of "natural" (or "potential") real GNP is assumed to be three percent a year, real GNP must grow faster than three percent a year for unemployment to begin to fall. But this can occur only if the difference between the growth rates of nominal final sales and the price level exceeds three percent. In the forecasts this occurs first--in late 1981--along Path 1, at which time the growth rate of nominal final sales is about 10 percent and of the inflation rate is slightly below 7 percent. Along Paths 2 and 3 the slowdown in the growth rate of the monetary base and in nominal final sales is fast enough, and the inertial process dominating the inflation rate is strong enough, to prevent the difference between nominal final sales growth and inflation from exceeding three percent until late 1982.

#### V. CONCLUSION

Supply shocks can cause the U. S. inflation rate to jump about erratically, but in the absence of supply shocks the U. S. inflation process is dominated by inertia that is both the blessing and the curse of policymakers. Inertia can be a blessing when it prevents an energy price shock from becoming fully and instantly incorporated into wages and nonenergy prices. But inertia can be a curse when it interferes with the desire of policymakers to cause a deceleration in the inflation process. Figure 1 illustrates quite clearly a fundamental fact of life facing the Federal Reserve Board--an attempt to jar the economy by switching to a radically slower path for the monetary base, e.g., 6.0 percent per annum, must create a very long period of high unemployment.

A more gradualist path, as represented by Paths 1 and 2 in the Figure, is more consistent with the structure of our economy. Nevertheless, even the modest rate of deceleration of nominal money and income growth along Path 2 creates too much unemployment for my taste, and I think for the taste of most politicians.

I am thus drawn to the conclusion that the Fed should maintain steady growth of the monetary base at a rate of about 8 percent per year for the next few years. If adverse supply shocks occur after mid-1980, this will lead to a less optimistic set of inflation and unemployment rates than are depicted along Path 1 in the Figure, but several years of good harvests and/or a cessation of increases in the price of oil would lead to a more optimistic set. The 8 percent rule should not be maintained forever, but only until the inflation rate falls significantly below the growth rate of nominal final sales minus the growth rate of natural output, which occurs along Path 1 in late 1981. After that point a policy of rigidly maintaining the 8 percent rule will lead to an accelerating growth rate of real GNP and decline in unemployment and an eventual overshooting of the economy's stable-inflation long-run equilibrium level of utilization. Thus, after 1981 the Fed should gradually adjust downward the growth rate of the base by a rising fraction of the difference between sales growth and inflation to allow a "soft landing" in the mid 1980s.

It may be asked whether 8 percent growth in the monetary base represents enough restraint to fulfill market expectations of tight money kindled by the Fed's announcement of October 6. As illustrated in Table 2, the growth in the base during 1976, 1977, and 1978 was above 8 percent, and an 8.0 percent rule during those three years would have resulted in a monetary base in 1978:4 almost two percentage points below the actual figure. Base growth in the third

quarter of 1979 was about 9 percent, so that an 8.0 percent rule would represent a deceleration from that experience as well.

It is ironic that the recommended Path 1, with its 10 percent growth rate of nominal final sales, corresponds exactly to the recommendation of 10 percent growth in nominal final sales that I made in a consultants meeting two years ago. Much of our present economic grief is caused by the fact that nominal final sales was allowed to grow at the excessive rate of 13 percent between early 1978 and early 1979. We must now suffer the consequences of this failure to maintain stable nominal demand growth. Nevertheless, along Path 1 in the absence of further supply shocks the economy can emerge in 1982 and 1983 with an inflation rate similar to that of 1976-77 with an unemployment rate little above that being experienced today.

## FOOTNOTES

1. To be sure, reactions on each end of the spectrum differed in tone. Friedman and Meltzer were suspicious that the laudable pronouncement to control bank reserves rather than the Federal funds rate would not be matched by performance, while Okun reluctantly admitted that "The Fed didn't have any alternative." See *Newsweek*, October 22, 1979, pp. 37-39.

2. Two basic papers set out in more detail the analysis of policy responses to supply shocks. See Robert J. Gordon, "Alternative Responses of Policy to External Supply Shocks," *Brookings Papers on Economic Activity*, vol. 6 (1975, no. 1), pp. 183-204, and Edmund S. Phelps, "Commodity-Supply Shock and Full-Employment Monetary Policy," *Journal of Money, Credit, and Banking*, vol. 10 (May 1978), pp. 206-21. This analysis is extended with an explicit treatment of relative welfare costs in Edward M. Gramlich, "Macro Policy Responses to Price Shocks," *Brookings Papers on Economic Activity*, vol. 10 (1979, no. 1), pp. 125-66.

3. The rigid real-wage hypothesis has been analyzed in two recent papers, William Branson and Julio Rotemberg, "International Adjustment with Wage Rigidity," presented at the International Seminar on Macroeconomics, September 11, 1979, and Jeffrey Sachs, "Wages, Profits, and Macroeconomic Adjustment in the 1970s: A Comparative Study," forthcoming in *Brookings Papers on Economic Activity*, (1979, no. 2).

4. This paper takes as given the presumption that the erratic timing of inventory accumulation, together with the lag in the impact of Fed policy, make nominal final sales (GNP minus inventory change) a more sensible and stable target for Fed policy than nominal GNP.