FOREWORD

On October 29 and 30, 1979, the Federal Reserve Bank of St. Louis and the Center for the Study of American Business at Washington University co-sponsored their fourth annual conference. This volume presents the papers and comments delivered at the conference, entitled "Stabilization Policies: Lessons from the '70s and Implications for the '80s."

The conference was divided into three sessions. The first of these considered recent developments in the theory of stabilization policy and empirical evidence on the effects of stabilization policies. The second session focused on evaluations of the monetary and fiscal policies pursued in the 1970s. The third and final session discussed international aspects of stabilization policies. This foreword presents summaries of the three sessions.

Stabilization Policies: Theoretical and Empirical Issues

In his paper "Recent Developments in the Theory of Stabilization Policy," John Taylor focuses on current theoretical work on the response of output and employment to changes in aggregate demand. He distinguishes between two approaches: information-based theories in which uncertainties about economy-wide disturbances are emphasized, and contract-based theories in which temporary rigidities in wages and prices are emphasized. The former set of theories, combined with rational expectations, are the foundation of the "new classical microeconomics." In these models only unanticipated disturbances affect real variables, and systematic policy has no effect on real variables. The contract models, on the other hand, allow for temporary rigidities in wages and prices and therefore yield more traditional conclusions about the short-run response of output and employment to demand disturbances and policy actions.

Taylor contrasts the implications of these two approaches for two important issues of stabilization policy: the possibility of improving economic performance of output and employment through systematic variation in policy instruments, and the cumulative output loss associated with anti-inflationary monetary restraint. The information-based models suggest an absence of any gains associated with policy activism and an ability to decelerate inflation without a prolonged or serious rise in unemployment. The contract-based models suggest that there may be gains to policy activism and that there may be sizable costs in terms of foregone output associated with policies aimed at reducing inflation.

In his comments on the Taylor paper, Hyman P. Minsky rejects both the new classical microeconomics and other theories based on "neo-classical" economics as meaningful frameworks for understanding the role and effects of stabilization policies. Minsky believes that these models: (1) lack the potential for economic instability that makes policy actions potentially useful; (2) ignore important developments, beginning in the mid-60s, that radically changed the environment in which stabilization policy must operate; (3) abstract from essential aspects of economic institutions, particularly the evolution of the financial system and of financial practices which have made the economy increasingly susceptible to financial instability with the accompanying threat of a serious debt-deflation process.

The second paper in the first session, "Empirical Evidence on the Effects of Stabilization Policies" by Laurence H. Meyer and Robert H. Rasche, begins with a survey of monetary and fiscal multipliers. These are examined both across various large scale macroeconometric models and simple reduced-forms, and over time, to assess the degree of consensus and the nature of the evolution in policy multipliers as the various macroeconometric models have been refined. The authors give special attention to the difference in estimated fiscal policy multipliers between the large scale income-expenditure econometric models, on the one hand, and the St. Louis reduced-form equation on the other hand.

Meyer and Rasche then develop the implications of both the large-scale income-expenditure models and smaller monetarist models for the two issues highlighted in Taylor's presentation: the cumulative output loss associated with anti-inflation policies and the gains from policy activism. They contrast the large cumulative output losses implicit in both conventional estimated Phillips curve equations and monetarist models with the implications of rational expectation macro models. Meyer and Rasche note, however, the importance of balancing the gains from reducing inflation against the transitional costs associated with reducing inflation. They conclude with a survey of empirical evidence on the gains to policy activism, based on model simulations which compare the simulated performance of the economy under fixed rules, ad hoc rules with feedback, and optimal control.

In his comments on the Meyer and Rasche paper, Neil Wallace rejects as useless any results based on the current generation of large-scale econometric models and reduced forms. According to Wallace, these models are not "coherent" in the sense that their conclusions are not derived from a mutually consistent and defensible set of assumptions. However, he admits that the same criticism can also be applied to almost all the recent rational expectation macro models. The important contribution of these models, according to Wallace, is not so much the policy ineffectiveness conclusion which has attracted so much attention, but the demonstration that the assumptions made about how economic agents forecast future values of variables have great influence on the response of real variables to macroeconomic policies.

Stabilization Policies: Critique of the '70s and Preview of the '80s

The second session focused on evaluations of the monetary and fiscal policies pursued in the '70s. In "The Case for Gradualism in Policies to Reduce Inflation," Allan H. Meltzer rejects as myth the view that the current inflation has its roots in the Vietnam War era deficits. Instead, Meltzer states that the proximate source of the current inflation is the monetary policy of the early 1960s, and that inflation persists because monetary policy continues to sustain anticipations of future inflation.

Meltzer then develops the rationale for a policy of "gradualism"-- pre-announced, gradual, sustained declines in the rate of growth of money. Meltzer emphasizes the importance of conducting monetary policy in a way that permits individuals to quickly recognize permanent shifts in the rate of monetary growth. If monetary growth is volatile, individuals have difficulty in inferring from observed money supply figures what direction the Federal Reserve is likely to take in the future. This situation results in a slow adjustment of expectations about future monetary growth and inflation to a permanent decline in the rate of monetary growth -- and, as a consequence, a serious cumulative output loss. By announcing its target and reducing the variance of actual monetary growth around its target, the Fed promotes more rapid revision in inflation expectations and minimizes the cumulative output loss associated with anti-inflation policy.

In "Federal Budget Policies of the 1970s: Some Lessons for the 1980s," Michael E. Levy is critical of monetarist explanations of the persistent inflation of the last decade and a half. While recognizing the important role of monetary change in the inflation process, Levy argues that monetarist explanations, such as that provided in the previous papers by Allan Meltzer, fail to take the analysis far enough. Although they identify the Federal Reserve as the ultimate source of inflation, monetarists do not give the Fed's inflationary behavior adequate explanation.

The fundamental source of the inflation of the last decade and a half, according to Levy, lies in the drastic changes in social attitudes and in economic policies that got underway in the mid-60s and persisted throughout the '70s. This new social activism resulted in large and rapidly growing federal programs designed to transfer real after-tax income from the productive sectors to nonproducers, a dramatic increase in both the size and scope of civilian programs, increased reliance on deficit spending, and a new wave of socially-oriented regulation. The dominant forces behind the persistent inflation were the following: the increased expansionary thrust of the budget; the acceleration in monetary growth in order to accommodate the deficit financing; the acceleration in wage demands as workers attempted to reverse the decline in after-tax real income associated with tax-transfer programs; the increased reliance on "inflationary" social security taxes; the increased business costs associated with regulation; and the slowdown in productivity and real growth resulting from disincentives, both to work and invest.

In his comments on the Levy paper, William Poole suggests that the slowdown in productivity could have raised the inflation rate associated with a given rate of monetary growth by only one or two percentage points. The remainder of the rise would have to be associated with increases in monetary growth to accommodate the inflation initiated by the other factors cited by Levy. Poole states, however, that Levy does not provide any evidence that the factors he cited were quantitatively important sources of inflation pressure. Moreover, Albert Burger, in his discussion paper, notes that Levy gives relatively little attention to the behavior of the Fed and hence leaves unanswered the question that motivates Levy's objection to the monetarist explanation of inflation: "Why did the Fed accommodate these inflationary forces?"

In his luncheon address, Lawrence K. Roos, president of the Federal Reserve Bank of St. Louis, described what he termed the "shortcomings" of the past monetary policy actions and announced his enthusiastic support for the Fed's recently announced change in the method by which future monetary policy will be conducted. Although the new policy approach, which places primary emphasis on the growth of reserves and monetary aggregates, holds the promise of avoiding the policy errors of the past, Mr. Roos cautioned that there are several steps which must be taken if the policy change is to fully achieve its desired results. Among the necessary steps are increased focus on the growth in the monetary base, the avoidance of monetary policy surprises, and a commitment to a long-run policy viewpoint so that neither political pressures nor false expectations force abandonment of the new policy. He emphasized that the new policy must be given at least a year to prove its value and should not be expected to dissipate inflation in a matter of months.

Stabilization Policies: International Aspects

Jacob Frenkel began the third session of the conference with a thorough analysis of the experience with flexible exchange rates in the 1970s. His paper, "Flexible Exchange Rates in the 1970s," sets forth the way in which the asset market or monetary approach to exchange rate determination helps to explain this experience, particularly the observed volatility in exchange rates and the relation between exchange rates and both domestic and foreign interest rates and price levels.

Within this framework Dr. Frenkel highlights the central role of expectations, particularly expectations about future inflation, in determining exchange rates. An explanation of the volatility of exchange rates is aided by the view that these rates are a financial variable whose value is sensitive to expectations about future developments and is capable of quickly incorporating new information about these developments. The central role of inflation expectations suggests, according to Frenkel, an "intimate connection between monetary policy and exchange rate policy" and imposes a "unique responsibility on the monetary authorities in affecting the rate of exchange."

H. Robert Heller outlines in his paper, "International Stabilization Policy Under Flexible Exchange Rates" the adverse effects that the move to flexible exchange rates has had on international trade, international capital movements, and foreign investment. Heller takes the position that the increased uncertainty about exchange rate fluctuations has resulted in a significant increase in costs to the business sector and that the adverse effect of this uncertainty has been particularly evident in the decreased willingness of investors to undertake direct investment and long-term construction activity abroad. He also suggests that speculative capital flows may have accentuated rather than reduced the fluctuation in exchange rates. These increased costs, moreover, were not offset by any benefits associated with flexible exchange rates, such as greater freedom for domestic stabilization policies.

Heller notes that it will be impossible to return to fixed exchange rates as long as national inflation rates differ so widely. He concludes his paper with a series of recommendations for improving the functioning of the international monetary system under flexible exchange rates. To preserve the dollar standard, the United States must act to maintain the real purchasing power of the dollar. This, in turn, will require better control of monetary aggregates and will be facilitated by adoption of longer-term monetary aggregate targets.

In his comments on the Frenkel and Heller papers, David Laidler emphasized the implications of flexible exchange rates for the response of inflation and output to deceleration in monetary growth by a single country. Flexible exchange rates, according to Laidler, impart an added degree of price flexibility; hence they permit both a more rapid deceleration in inflation and a reduction in the cumulative output loss associated with anti-inflationary policies. This fact suggests that empirical approaches which do not explicitly allow for the effect of an open economy under flexible exchange rates may seriously overestimate the cumulative output loss.

In his comments on the Heller paper, Geoffrey Wood remarks upon the lack of evidence to support Heller's contention that flexible exchange rates have had a harmful effect on international trade. Wood also objects to Heller's contention that destabilization of capital movements has been an important source of volatility of exchange rates. In Wood's view, the volatility of exchange rates simply reflects the underlying volatility of national monetary policies.

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RECENT DEVELOPMENTS IN THE THEORY OF STABILIZATION POLICY

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During the past decade the theoretical framework underlying macroeconomic stabilization analysis has undergone a number of significant developments. Theories designed to explain the crucial linkage between aggregate demand policy and real economic variables have been revised following the research on the "new microfoundations" of employment and inflation. Critical expectations effects of stabilization policy have been incorporated into the theoretical framework through the use of rational expectations. Optimal control techniques have become sophisticated enough to be used on large nonlinear econometric models, and more recently have been adapted for use in models with endogenous expectations. Supply considerations have been recognized as having important policy implications and, when necessary, have been incorporated into policy analyses. Theories underlying the choice between rules and discretionary policy have been altered and refined. These developments are likely to play an important role in the practical evaluation of economic policy in the years ahead.

This paper reviews these developments in the theory of stabilization policy and outlines some of their implications for macroeconomic policy evaluation. The first section reviews the theories which have

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been developed to explain the effect of policy variables on the real economy. As there is still little consensus here, a number of alternative representative models are presented and compared. The second section examines the implications of these different theories for the problem of reducing the rate of inflation, which is likely to be one of the more important policy issues in the years ahead. The third section discusses a number of issues which have arisen in recent policy analyses and which are closely related to the changes in the theoretical framework: The Lucas critique of traditional policy evaluation procedures, the applicability of optimal control, the choice of rules versus discretion, and the applicability of the new equilibrium approach to stabilization policy.

With few exceptions this review focuses on theoretical research on domestic stabilization policies. International considerations and empirical results are reviewed in other papers prepared for this conference. Some of the topics reviewed here have recently been the subject of a large number of survey and expositional works. The variety of survey papers by Barro (1979), Buiter (1979), Fishcer (1979), McCallum (1979), Phelps (1979), Prescott (1977), Santomero and Seater (1978), and Shiller (1978) and the books by the Ball committee (1978), and Sargent (1979) provide further detail and alternative perspectives on the topics reviewed here.

Expectations play a predominant role in any discussion of stabilization analysis. For the discussion that follows, the benchmark assumption will be that expectations are formed rationally. Variations from this benchmark -- due perhaps to the necessity of people gradually learning about whether the economy has undergone a structural change -- are considered in the course of the discussion along with variations in the model underlying the policy analysis.

THEORIES OF AGGREGATE DEMAND EFFECTS ON REAL OUTPUT AND EMPLOYMENT

In the idealized world of complete markets with perfect information about opportunities in all markets, changes in the money supply -- or more generally, changes in aggregate demand -- do not affect real economic variables such as real GNP and employment. Apart from distribution effects, aggregate demand fluctuations are translated point-for-point into price fluctuations. Money is neutral. Many of the theoretical developments in macroeconomics in the 1970s have been concerned with explaining, in more detail and with more rigor than earlier theories, why this neutrality is not observed in the real world. A reasonably firm understanding of the mechanism generating this non-neutrality is certainly necessary for evaluating stabilization policy because aggregate demand management tools, such as money growth and government expenditure plans, are the primary instruments of stabilization policy.[1]

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[1] The effects of government policies which impact directly on relative prices can be evaluated in principle using the standard allocative theories of microeconomics. Some examples: a relative lowering of tax rates on capital would be expected to stimulate investment by raising the desired capital-labor ratio; a higher steady rate of inflation has allocation effects by acting as a tax on real money balances; and unemployment insurance can raise the equilibrium unemployment rate by driving a wedge into the work-leisure tradeoff. Apart from disagreement over the magnitude of the relevant elasticities for measuring these effects, there has been a general consensus among economists that such policies have real effects. However, because these policies are used for allocative or distributional purposes, they are not generally flexible enough to be considered seriously in stabilization analysis. Nevertheless, their importance cannot be overlooked in analyzing macroeconomic trends. See Feldstein (1978) for a summary of such effects on unemployment.

Recent theories of the observed link between aggregate demand and real variables can be grouped into two types -- information-based theories in which the uncertainties about economy-wide disturbances are emphasized, and contract-based theories in which temporary rigidities in prices and wages are emphasized. At the risk of becoming too taxonomic, it will be useful to further classify each of these theories. Among the information-based theories it is important to distinguish between those in which the uncertainty is whether an observed economic change is local or economy-wide, and those in which the uncertainty is whether an economic change is temporary or permanent. Similarly, among the contract-based theories it is important to distinguish between those that emphasize relative price shifts due to asymmetrical rigidities (for example, wages are rigid while prices are flexible), and those that emphasize the general persistence of all prices due to nonsynchronous price (or wage) setting relative to a prevailing trend in prices (or wages).

Uncertainty about Local Versus Aggregate Economic Conditions

Perhaps the most significant finding of the research[2] on the "new microeconomics" is that imperfect information about economic conditions outside an individual's own market or industry can have profound implications for the behavior of inflation and employment. Suppose aggregate demand increases because of a higher rate of money growth. Then individual firms will find an increased demand for their products, and will respond by increasing their production (and perhaps running down

[2]See Phelps et al (1970).

their inventories of finished goods). But much of this higher real production may be due to the misperception on the part of each firm that the increased demand is a relative shift toward the product it sells. Because there is always imperfect information about whether an increase in sales is a local phenomenon, this misperception and the consequent real output response is unavoidable. If, on the contrary, each firm knew that the increase in demand was common to all firms in the economy, and was due to the purely nominal increase in the money supply, then its production response would be much smaller. If prices and wages were generally flexible, then firms would know that prices and wages should quickly rise to offset the increase in the money supply, and therefore that an increase in output would not be warranted. In the limiting case of perfectly flexible prices, good information about what is going on elsewhere in the economy enables firms to respond just as they would be predicted to do in the money-neutral world of general equilibrium theory. But even with perfectly flexible prices, imperfect information creates a non-neutrality in which firms respond to aggregate demand stimulus by increasing real output. The link between aggregate demand and real variables, according to this theory, depends in no essential way on price or wage rigidities. As long as there is imperfect information about the source of aggregate demand shifts, the correlation between aggregate demand and real output will exist. Of course, the possibility of a coincidence of perfectly flexible prices and wages with these well-known empirical correlations means that policy implications will be much different.

Simple descriptions of this theory are found in Phelps et al. (1970) and Lucas (1973). The algebra of the Lucas presentation is convenient for our purposes and can be represented in terms of a simple quantity theory of aggregate demand.

(1) $$y + p = m + v$$

combined with an "aggregate supply" equation

(2) $$y = \alpha(p - \hat{p}).$$

All variables are measured in logarithms and should be thought of as deviations from secular trends: y is real GNP, p is the aggregate price index, m is the money supply, and v is velocity. The $\hat{p}$ term represents a forecast of the price level before the information about m and v becomes available. The difference between p and $\hat{p}$ represents the average difference between each firm's observation of demand conditions during the period and its guess about economy-wide demand conditions. This difference represents the misperception or mistake discussed above which causes firms to increase their production. The sum of all firms' production responses is y. (It turns out that it is convenient algebraically to use prices to index demand conditions.)

Substituting from (1) into (2) and noting that from (2) that $\hat{y}=0$, we find[3]

(3) $$y = \alpha(m - \hat{m} + v - \hat{v}).$$

[3] We take $\hat{p}$ to be a rational (unbiased) forecast of p; hence $E(p-\hat{p}) = 0$. "Biased" forecasts are treated in Section 1.2 below and arise because of information confusion about what is the actual model underlying policy or the structure of the economy. These "biased" forecasts have forms which resemble adaptive expectations, but unlike adaptive expectations are closely related to the structure of the model.

Hence real output responds positively to <u>unanticipated money</u> $m-\hat{m}$ and <u>unanticipated velocity</u> $v-\hat{v}$. This is the critical link between real variables and aggregate demand which the theory explains.

However, because only unanticipated changes in aggregate demand affect real output, the policy implications of this linkage theory are striking: if the monetary authorities change their policy instrument m in a way which can be predicted by individuals in the economy, then in our notation $m=\hat{m}$ and the change in m does not affect real output at all. And from equation (1) the change in m is translated entirely into a point-for-point change in p, apart from any unanticipated shifts in velocity. This famous "policy-ineffectiveness" result, emphasized by Lucas (1973), Sargent and Wallace (1975) and Barro (1976), has understandably stimulated a large volume of research.

The significance of this theory for practical stabilization analysis is not simply the neutrality result -- the idealized general equilibrium model has long been known to yield neutrality as discussed above. Rather the significance is due to the appearance of neutrality in a model which explains the empirically observed correlation between aggregate demand policy and real output. The theory would be of little practical importance if it did not generate this important empirical result. The econometric work of Sargent (1976) and Barro (1977, 1978), has been aimed at making this empirical connection more formal and rigorous.

I think it is fair to say that this empirical work has demonstrated that the theory is consistent with these correlations. Other facts have been more difficult to reconcile with the theory. The persistence of unemployment is one regularity which does not emerge from the simple theory, and was used as a critique of the theory by Hall (1975) and Modigliani (1977). A number of modifications of the theory to account for this persistence have been suggested. Lucas (1975) emphasized that unanticipated shocks could cause firms' capital stock to get out of line, and this would have repercussions on production in later periods as the capital stock is adjusted. Sargent (1979) emphasized adjustment costs in changing employment. Blinder and Fischer (1978) have placed more emphasis on finished-goods inventory being drawn down or accumulated. Optimal inventory adjustments in later periods will then require production changes and thereby cause a correlation between output changes at different dates. All these theoretical modifications of the basic information-based model with perfectly flexible prices can in principle explain persistence, but it has yet to be demonstrated whether <u>actual</u> inventory behavior or costs of employment adjustment are sufficient to explain the persistence.

There is, of course, much other evidence which the theory can be tested against. Two pieces of evidence which seemingly run counter to the theory are procyclical productivity changes, and a slight tendency for real wages to vary procyclically, though the latter is much less pronounced. Sargent (1979), extending the work of Lucas (1970), has shown, however, that these observations are consistent with the limited-information flexible price models. His proof involves disaggregating employment into straight-time and over-time, and assuming that straight-time employment is more costly to adjust, but that over-time workers must be paid more on average. Under these conditions firms will find it optimal to employ more straight-time workers than over-time workers <u>on average</u>, but to make larger <u>changes</u> in employment among over-time workers than straight-time workers, when demand conditions change across the business cycle. This behavior implies that real average hourly earning will tend to increase during booms, because of the shift of the mix of workers toward higher paid overtime employment, even though real wages may fall for both groups of workers. Moreover, since fewer over-time workers are employed on average than straight-time workers, their marginal productivity is higher. Hence, the shift toward more over-time employment causes average productivity in the economy to increase. Sargent (1978) has attempted to see if this intricate theory is sufficient to explain the phenomena quantitatively, and finds that, although there are some discrepancies, the theory generally conforms to the facts. Another explanation for the procyclical behavior of real wages is given in Phelps (1969) using a model of inventory behavior. New data now becoming available on real inventories may permit a check of this explanation.

From the point of view of stabilization theory a number of extensions of the basic information-based model represented in equation (2) should be mentioned. Cukierman (1979) has shown that the limited-information assumptions can be generalized to permit firms to change their expenditures in order to better determine the source of economy-wide events. This makes the information structure endogenous to the rest of the economy, including policy, and thereby removes the criticism that the theory unrealistically places an exogenous information structure on economic agents. He finds that the general results of the theory are robust with respect to this modification.

McCallum and Whitaker (1979) have shown that the policy neutrality result does not apply to such aggregate demand tools as automatic stabilizers because these react simultaneously to changes in economic conditions, rather than with a lag as in the feedback monetary policy discussed above. For example, with progressive taxes, after-tax income immediately changes as a fraction of total income when nominal income fluctuates. This can have direct real stabilizing effects. It should be emphasized, however, that in principle monetary policy could be made to operate just as simultaneously as the automatic stabilizers. This has not been the case in practice, however, except for extreme interest rate pegging where the central banks' supply of reserves responds instantaneously to changes in demand.

Uncertainty about Temporary Versus Permanent Changes in Economic Conditions

The theory discussed above emphasizes lack of information about whether demand changes are local or economy-wide. From the viewpoint of stabilization policy, an equally important type of uncertainty is the lack of information about whether an observed economic change is temporary or permanent. Theories which emphasize temporary versus permanent effects are, of course, not new to macroeconomics, as exemplified by Friedman's (1956) original permanent income theory of consumption. Muth (1960, 1961) also emphasized the distinction in his original work on rational expectations. Here we are concerned with the importance of this uncertainty for the link between aggregate demand and real output. The general point is that a shift in nominal aggregate demand, which is expected to be permanent will have a much smaller effect on real output and a correspondingly larger effect on prices, than a shift which is expected to be temporary.

Suppose, for example, that in an attempt to reduce the rate of inflation the central bank reduces the growth rate of the money supply. The information problem which economic agents face is whether this change is a permanent one, or whether the central bank will soon give up on its resolve to lower the growth rate of the money supply. In reality, this information problem is not trivial, and cannot be eliminated simply by announcing that today's start at monetary restraint is the beginning of a permanent shift in policy. Lack of credibility about whether the shift is indeed permanent may be cured only by the public observing the results of the new policy.

During the transition period when people learn whether the shift is temporary or permanent, the policy of restraint can have real output effects, even if prices are perfectly flexible. This can be illustrated using the algebra introduced above.[4] Equation (2) can be written in terms of inflation rates rather than price levels by subtracting the lagged price from p and $\hat{p}$. This gives

$$y_t = \alpha(\pi_t - \hat{\pi}_t) \tag{4}$$

when $\hat{\pi}_t$ is the expected rate of inflation. Suppose that $\pi_t = \hat{\pi}_t$ so that there is initially no uncertainty, but that starting in period t+1 the central bank reduces the rate of growth of the money supply to a level that will generate an inflation rate of $\pi_s < \hat{\pi}_t$ for $s > t$. If the new policy is not fully credible, then people will not immediately adjust their expectations to π_s. A reasonable assumption would be that they expect a level of inflation which incorporates the new information

[4]The following discussion is based on Taylor (1975).

about π as well as the previously expected rate of inflation. In simple terms:

$$(5) \qquad \hat{\pi}_s = \lambda\pi_s + (1-\lambda)\hat{\pi}_{s-1} \qquad s = t+1, t+2, \ldots$$

Formula (5) can be derived more formally using Bayesian techiques which incorporate the uncertainty about whether the new inflation rate is permanent or whether the observed change is a temporary occurrence. The parameter λ will be time dependent in general, however, and this should be taken into account if one is interested in quantitative policy evaluation.

To see the effects of the new monetary policy on real output assume for simplicity that π_s is equal to a constant π^* for $s > t + 1$. Then from (5) we have

$$(6) \qquad \hat{\pi}_s = \lambda \sum_{i=0}^{s-1} (1-\lambda)^i \pi^* + (1-\lambda)^s \hat{\pi}_t$$

for $s \geq t + 1$. Hence, $\hat{\pi}_s$ converges to π^*, but will be greater than π^*, if π^* is less than $\hat{\pi}_t$ (if the new monetary policy is to aim for a lower rate of inflation). The gap between the expected rate of inflation $\hat{\pi}_s$ and the actual rate of inflation π^* will be larger, the smaller is λ. Hence, the less credibility there is about the new policy, the larger the inflation gap and the larger the reduction in real output. There will be no reduction in real output if $\lambda=1$. In this way the uncertainty about permanent versus temporary effects has an important influence on the way policy is linked to real economic variables.

The type of model represented here in very simple terms has been emphasized in stabilization policy analyses by Fellner (1976),

B. Friedman (1979), and Taylor (1975). A full macroeconomic model developed by Brunner, Cukierman, and Meltzer (1979) uses the distinction between permanent and temporary effects to examine the influence of supply shocks as well as demand shocks on production. Flood and Garber (1979) have provided estimates of similar credibility parameters in the case of monetary reform in the German hyper-inflation.

These types of models have been criticized, especially when used for policy analyses of the type discussed here, because they appear to depend on policy deception (see Barro (1978)). While the potential for deception is clearly present in these models they are equally applicable to situations where all parties disclose their intentions. Unfortunately, disclosure does not generate immediate credibility. It is the problem associated with this lack of credibility which these models emphasize.

Contracts and Relative Price Effects

Imperfect information is not the only reason that aggregate demand would be expected to influence real output. Temporary rigidities in prices or wages might force some of the change in nominal demand into changes in real production. Since casual observation suggests that such rigidities are pervasive either in the form of explicit contracts or less formal implicit contracts, economists have been willing to take these rigidities as given. The main theoretical development in this area during the past several years has been to recognize that the form which these rigidities takes is important for stabilization analysis. Attempts have been made to model these rigidities with more detail than was previously available, and to trace out the implications for policy. Two different forms of this type of analysis can be usefully distinguished.

The most common form of this type of model assumes that wages are at least temporarily rigid, but that prices are perfectly flexible in the sense that firms cannot directly influence profit margins by marking up their prices relative to wage costs. Firms simply adjust their demand for labor when the real wage shifts against them. Recent examples of this type of model are found in Fischer (1977), Phelps (1978), and Calvo (1980). Letting w_t represent the nominal wage and keeping the notation introduced earlier, the most rudimentary form of this model is

$$(7) \qquad y_t = \alpha(p_t - w_t).$$

When the real wage rises firms reduce output and employment, until the marginal productivity of labor is increased. If w_t is partially predetermined, perhaps because of multiperiod contracts which were set in previous periods, then the link between aggregate demand and real output follows directly. If aggregate demand is determined according to equation (1) then

$$(8) \qquad y_t = \frac{\alpha}{1+\alpha} m_t + \frac{\alpha(v_t - w_t)}{1+\alpha}$$

and clearly changes in nominal m_t get translated into real output. The mechanism is simply that a higher money supply raises prices which lowers the real wage and stimulates employment and production.

The major advance in using this type of model has been to develop the mechanism determining the nominal wage. Fischer assumes, for

:xample, that there are overlapping contracts with a fraction of the :ontracts set in each period so as to keep the expected real wage :onstant. A consequence of this assumption is that aggregate demand :ffects do not persist for longer than the length of the longest con- :ract. Another consequence is that wage or price trends have no :endency to persist. In these two respects this type of model has many 'eatures which are similar to the results of the information-based models. 'his has led Gramlich (1979), for example, to conclude that wage-rigidities lo not add much in the way of policy implications to a rational expecta- :ions models. In principle, of course, announced monetary policy affects 'eal variables in such models, even with rational expectations. This has)een emphasized by Fischer (1977). The question is whether they describe :he wage and price dynamics in an empirically accurate way that is rele- /ant for policy analysis.

The main feature of these models is their dependence on real wage :hanges for all employment effects. As discussed above, it has been lifficult to find much variation in the real wage over the business :ycle. Empirical checks of this model along the lines of Sargent (1978) ısing the distinction between straight-time and over-time workers would :herefore be very useful.

On the other hand, there are important policy problems where :hanges in real wages are the central issue. For example, a supply ;hock could shift the marginal productivity downward requiring a reduc- :ion in the real wage. With sticky wages, this reduction might be lifficult without monetary intervention. In effect the monetary ıuthorities can use monetary policy to shift the price level to a)osition such that the real wage is equal to the level which workers would have aimed for, if they had known about the shock when they signed the contract. This is the conclusion of Phelps (1978) who bases his analysis on such a model. Gordon's (1975) analysis of agricultural supply shocks reaches a similar conclusion if farm prices shift up while industrial prices are assumed to be relatively rigid. Blinder (1979) also emphasizes these relative price rigidities in examining the appropriate response of policy to an oil price shock. One difficulty with all these analyses is the possibility that the assumed rigid wage (or price) eventually adjusts to offset the policy-induced shift in relative prices. In the Phelps analysis, this is not much of a difficulty in principle because the real wage is pushed toward what workers and firms would have negotiated otherwise. Another difficulty, already alluded to, is that the models do not capture much of the persistence effects of inflation and unemployment which now seem to present important policy problems. In this respect they are similar to the information-based models reviewed above.

Staggered Contracts and Inflation Persistence

By most measures the variability of the general price level in recent years has been larger than the variability of all but a small number of relative prices. For example, the real wage has been relatively stable compared with the sharp rise in nominal wages and prices. Moreover, changes in both nominal wages and prices are more highly correlated with business cycle fluctuation than changes in the relative wage. For these reasons, one might suspect that analyses which focus on real wage changes as the sole cause of employment shifts might be omitting other factors.

Another class of models which are based on rigidities in wages nd prices deemphasize the aggregate effects of relative price shifts nd focus on the problems of general price movements. These models mphasize the fact that all prices and wages are not set in unison cross the economy but are generally staggered, and that a primary eterminant of the price decision is the prevailing price outstanding n the market. Hall (1979) has recently developed a microeconomic odel which gives an explanation for the importance of setting prices elative to the prevailing price.

An example of this type of model is given in Taylor (1979). irms and workers decide on a wage x_t in period t which is to last for wo periods. The contract wage x_t is set according to the expected revailing wage during the contract period with suitable adjustments to eflect demand conditions. Hence

$$9) \qquad x_t = \frac{\hat{w}_t + \hat{w}_{t+1}}{2} + \frac{\alpha}{2}(\hat{y}_t + \hat{y}_{t+1})$$

here $w_t = 1/2(x_t + x_{t-1})$ is the average wage at time t. The expecta- ions of y_t represent demand pressure on wage decisions. If we make he additional assumption that profit margins are relatively stable hen $p_t = w_t + \gamma$ where γ is a constant parameter which we can set to ero without loss of generality. By holding the relative wage constant, he model purposely abstracts from relative price changes and focuses n general price movements.

In this model, as with the previous model based on price rigid- ties, aggregate demand policy has a direct effect on real output. If quation (1) is the aggregate-demand relationship, then the mechanism works as follows: the price level is predetermined since the wage is predetermined and profit margins do not adjust. Hence, an increase in the money supply increases real balances, which tends to increase the real demand for goods. This results in an increase in production and hence an increase in employment. Eventually wages and prices will adjust because the favorable demand conditions will give firms the incentive to pay increased wage demands. This in turn tends to raise prices and reduce real money balances. Eventually a new equilibrium is reached at a higher price level but with the same level of production. Money is neutral in the long run.

What is different about this model compared with those discussed in the previous section is that convergence to the new equilibrium takes time, and there is never any important shift in relative wages (there is a period during which the workers who had settled their contracts when the money supply was changed tend to fall behind other workers but this is not necessarily integral to the workings of the model). The inertia in wage movements following the shift in money supply can be demonstrated by solving the model to obtain[5]

$$(10) \qquad x_t = \beta x_{t-1} + \delta m_t$$

where β and δ depend on the parameter α. Hence, a change in the money supply sets off a series of changes in the contract wage x_t and hence in the average wage w_t. This series of changes in w_t is matched by the price level p_t and, if the money supply is held fixed at the new level,

[5]The derivation requires the use of rational expectations to solve out for the expectation variables.

is reflected in a similar pattern of changes in real output. Because of these persistence effects this type of model would seem to be more useful for examining stabilization problems associated with reducing inflation, or more generally achieving price stability, than the models discussed in the previous section. If changes in real wages are also thought to be important, then they can easily be incorporated into the analysis. Theoretical frameworks of this kind have been used for policy analysis by Phelps (1978a), Gertler (1977), Modigliani and Papademos (1978), Papademos (1979), and Taylor (1980).

These models have some similarities to the "disequilibrium" models developed by Clower (1965) and Barro and Grossman (1976). Important differences not generally found in "disequilibrium" models are the use of rational expectations, a reasonably explicit description of the contract mechanism, and a reliance on the more traditional aggregate demand framework without the development of market spillover effects or of binding supply constraints. These differences largely reflect empirical considerations or modelling strategies. It is not yet clear what is to be gained empirically or theoretically from incorporating disequilibrium spillover effects. A recent paper by Green and Honkapohja (1979) has attempted to bring rational expectations into a framework which corresponds more closely with the disequilibrium models. However, their approach is designed to avoid explicit treatment of the nonlinearities caused by setting market transactions equal to the minimum of supply and demand. Rational expectations are much easier to deal with in linear models, and this is one reason the "demand is determining" assumption is used. Another reason is that the assumption seems to be empirically realistic in many situations.

Comparison of the Alternative Theories

What sets the contracting models off from the information-based models is of course the use of "sticky" prices, and the corresponding disuse of the market-clearing assumptions. In the contract models, markets "clear" in the short run in the sense that supply adjusts to meet the demand; in the long run, prices eventually adjust to clear markets. In the information models, on the other hand, prices instantaneously adjust to clear markets in the short run. Which approach is better? I have used the contracting approach because it corresponds more closely with my interpretation of the market mechanisms in the real world. It is not just the widely discussed long-term labor contracts which suggest this interpretation, but also the much more common (at least in the U.S.) implicit contracts, which are much shorter and are usually not called contracts. In fact, long-term labor contracts have so many indexing provisions that they probably correspond more closely with shorter contracts. Research in this area has shown that "contracts" do not have to be very long to generate a very lengthy persistence of wage and price inflation. (See Taylor (1980), for example.) But in using these contracting models, one has to be aware that without an explicit utility maximization framework, there is a possibility that the models are not robust to changes in policy. Again my preference has been to make the most of these models in situations where the contracting mechanisms are relatively robust.

At the same time, it is difficult not to appreciate the theoretical elegance of the information models, and the potential to use the traditional tools of microeconomics to conduct policy analysis with these models. But even the information-based models have some *ad hoc* assumptions, especially when they need to be modified for empirical work. One of the major recent developments in the literature on market-clearing rational expectations has been to pursue a more theoretically rigorous approach with the aim of omitting the remaining ad hoc features, in particular the money demand equation or quantity theory equations (such as equation (1) in this paper). See Wallace (1977) and Cass and Shell (1979).[6]

The work by Azariadis (1975), Baily (1974), and D. F. Gordon (1976) does not provide as much of a foundation for contract models as one might have originally thought. These theories do not suggest why contracts are set in nominal terms without contingencies. In fact, Barro (1979) has suggested that these microeconomic theories are more useful in showing that the market-clearing models are useful "as if" devices. Calvo and Phelps (1978) and Hall and Lilien (1979) have provided alternative theories of contracts which emphasize the practical and theoretical difficulties of making contracts contingent on everything.

Most of the policy discussions associated with the theories reviewed above have been about the effectiveness of policy or whether policy activism is useful or not. In the market-clearing setting, only

[6] A useful appraisal of the overlapping generations model approach advocated by Wallace is contained in Cass and Shell (1979). The major appeal of this approach is the enormous theoretical mileage one gets from the disaggregation of generations. At an abstract level this disaggregation is very similar to the disaggregation of contracts according to when they are negotiated -- a feature of the contracting models discussed in Section 1.4. More generally one suspects that different types of disaggregation are likely to yield additional theoretical insights. Another example is the two-sector model explored by Sargent and Wallace (1971), Henderson and Sargent (1973), and Foley and Sidrauski (1970).

unanticipated changes in aggregate-demand policy matter, so announced policies do affect output. In contracting models aggregate-demand policy has effect whether it is anticipated or not. Hence, in these models, policy is effective and, in certain cases, policy activism is desirable. Some examples of the optimal reaction to supply shocks were discussed above.

McCallum (1977) has argued that price rigidities are not really the source of the policy effectiveness in the contracting models. In criticizing the contract model used by Phelps and Taylor (1977) he shows that monetary policy is ineffective if one removes inventory effects on production, but uses the supply equation in the form of equation (2). However, inventory effects on production are an important part of models where prices do not adjust to clear markets. Firms will want to increase production, for example, if inventories are drawn down below optimal levels because price adjustments are not quick enough. This is the rationale behind the inventory effects on production in the Phelps-Taylor model. Omitting the term attributes suboptimal inventory management to rational firms. This point has been demonstrated by Frydman (1979) in a critique of McCallum's results.

The main outcome of the policy-effectiveness debate is a general consensus that rational expectations *per se* does not rule out effective aggregate-demand management. It is the flexible-price market-clearing assumption that makes policy ineffective for short run stabilization policy.[7]

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[7] Fischer (1978) and Lucas (1975) mention the nonneutrality that comes even in market-clearing models from the substitution out of money into real capital when the expected rate of inflation rises. However, this mechanism is not seriously considered as a tool of aggregate demand-management. Moreover it is likely to be offset by tax effects. A useful discussion of the relationship between rational expectations and policy effectiveness is found in Lucas (1980).

POLICIES TO STABILIZE PRICES

The practical policy implications of these models can be alternatively stated from the viewpoint of price stabilization rather than from the viewpoint of policy intervention to affect output. Suppose, for example, that the rate of inflation is generally agreed to have become too high, either because of past policy mistakes or unavoidable velocity shifts, and that the monetary authorities want to reduce the rate of inflation. The important question is whether the monetary restraint necessary to achieve this goal of price stabilization will cause a recession and how large that recession will be. The answer to that question will obviously influence the policymakers' choice of how much restraint to apply.

If we take literally the information-based models, which emphasize the uncertainty between aggregate and local shocks, then if this policy of restraint is announced it will not have any effect on real output. There will be no recession since inflation will match the reduction in monetary growth point for point. This striking conclusion is, of course, contrary to the views of many economists and policymakers, and I think for this reason the model is still rejected by many economists as a practical guide to policy.

On the other hand, if there is uncertainty about whether the changes in policy are permanent or temporary (as discussed above), then the real effects of policy will exist, and a recession would be expected to occur. The size and duration of the recession would depend on the speed with which people begin to believe that the central bank is firm in its resolve to restrain money growth. If the credibility is high or increases quickly, then the recession could be very mild.

Fellner (1979) indicates why he thinks that credibility is likely to increase quickly, if a clear announced policy of restraint is undertaken, and that people's expectations of inflation would be swiftly revised downwards.

The contract-based models yield different conclusions. The models which emphasize real wage shifts because of asymmetric rigidities do not suggest any reason for a recession to last longer than the length of the average contract. The inflation rate could be put on its new target path in the first period; in the second period wages would adjust. In fact, if the restraining policy was announced and believed one period (year?) in advance, there would be no decline in output. In this case, this type of contract model does not give results that are much different from the market clearing models.

The general staggered contract models suggest, on the other hand, that the recession would be somewhat longer because the adjustment process is passed on gradually from one contract to the next. However, because there are some forward-looking features to these models (see equation (9), the recession would not be expected to be as severe as would be implied by the simple reduced forms (see equation (10)). The policy of restraint (if it is believed) would change the parameters of (10), so as to reduce the size of the recession. Accurate quantitative estimates of how much the parameters would be expected to change have yet to be obtained, though simulation results in Taylor (1980) suggest that it is likely to be significant.

In sum, each of the models reviewed here has implications about the real effects of a policy of price stabilization. (These models ignore, of course, any direct positive real effects that a more certain ɿrice level might bring; see Fischer and Modigliani (1979) for a dis-:ussion of these direct effects.) In the cases where the real effect 's likely to be significant, it would be interesting and useful to :ompare empirically its magnitude with the estimates provided by con-ʼentional econometric techniques as summarized by Okun (1978). This is ı feasible and well-defined estimation problem as the discussion above ıakes clear.

ALTERNATIVE TECHNIQUES FOR THE ANALYSIS OF STABILIZATION POLICY

This section gives an overview of several recent developments :oncerning the choice of alternative techniques to analyze stabili-:ation policy. Some of these issues are intimately connected with the :heoretical developments summarized in the first section.

Ƭhe Lucas Critique of Econometric Policymaking

Econometric models have played a large role in policy formulation in recent years. It is rare that the staff members of policymaking ɜgencies do not run alternative policies through the major large scale ɜconometric models before meeting with their "principals," even if they ɟo not have formal models of their own. Whether this heavy use of ɜconometric models actually influences the decisions of policymakers is ɜnother question. Political or other noneconomic considerations are frequently a factor. But when "pure" economic advice is sought, the results of the econometric models are certainly taken into account. For ɜxample, the property of almost all econometric models that nonaccom-ɲodative monetary policy has small effects on prices and large effects ɔn output, undoubtedly influences policymakers to choose more accom-ɲodative policies than they otherwise would.

Lucas (1976) has criticized this type of econometric policymaking. He argues convincingly that the parameters of these models are not invariant to changes in policy, so that the policy experiments performed on these models (which treat the parameters as fixed) give misleading results. R. J. Gordon (1976) suggests that suitable modifications of econometric policy evaluation procedures could deal with the Lucas criticism. The parameters could, in principle, be made endogenous.

The parameters of econometric models can shift for many reasons, but the one Lucas emphasized was that rational economic agents would forecast the future effects of policy, and accordingly, modify their behavior in a way not described in the econometric models. To deal with this problem it is necessary at least to reestimate the econometric models taking these expectation effects into account. The most practical way to do this with existing econometric techniques is to use the rational expectations assumption. Having specified and estimated an econometric model with rational expectations it is then possible to perform a policy analysis to take account of the expectations effects. This is the approach taken by Taylor (1979a). A simple quarterly econometric model of the U. S. economy was estimated during the 1954-1976 period, imposing rational expectations on economic agents. Using the estimated parameters of this model, alternative policies were compared, and for a given set of policy preferences, optimal policies were calculated. Because the model incorporated contracts of the kind discussed above, a policy tradeoff between inflation and unemployment was implied by the model and this was calculated using the estimated parameters. The tradeoff was characterized by a "best" relationship between output stability and price stability.[8] This optimal relationship apparently dominated actual policy during the period as well as the policy of a constant growth rate for the money supply. Constant money growth would have given better results than actual policy, however, according to these estimates.

Anderson (1979) and Fair (1979) have tried to estimate the quantitative significance of the Lucas critique by simulating conventionally estimated econometric models, with rational expectations inserted. They both find the effects to be quantitatively significant, but their results are difficult to interpret because the conventional models were not formulated as rational expectations models. For example, Anderson (1979) finds that the Phillips curve is much steeper when he imposes rational expectations on the model. But clearly the specifiers of his model would have altered its specifications if they knew rational expectations would be imposed. It is likely that the adaptive expectations distributed lags used in such models are designed to capture other dynamic properties than pure extrapolative forecasting.

Quantitative work of this kind with rational expectations is only just beginning. More experience with these techniques will be necessary before they can be accurately appraised as significant improvements over conventional econometric policy evaluation procedures. The results available thus far are promising, are already giving rough

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[8] Flemming (1976) p. 73 suggests that a tradeoff between output stability and price stability might be a good way to characterize the policy problem. Phelps and Taylor (1977), Taylor (1980), and Green and Honkapohja (1979) have calculated theoretical tradeoffs of this kind. An international comparison of such tradeoffs is given in Taylor (1980a).

empirical estimates of the effect of policy, and indicate that further research is fruitful.

Two objections can be raised against these attempts to account for the Lucas critique. One is that the rational expectations assumption is not accurate because it does not incorporate learning on the part of individuals about the economy. If this learning problem is significant, then these techniques will have to be modified. Learning effects are likely to be a serious empirical problem immediately following a major economic reform. This was illustrated above for the case where the monetary authorities change their policy and people do not know whether it is a permanent or temporary change. However, even if learning problems are significant, these techniques will be useful for evaluating alternative policy procedures over a long period of time. For example, it is useful to know if a less accommodative monetary policy during the 1960s and 1970s would have increased the amplitude of business cycle fluctuations as much as conventional econometric models would imply. If the use of rational expectations gave results much different from other models over long enough periods for the rational expectations assumption to be realistic, then the results would be taken into consideration in recommending how accommodative policy should be in the 1980s.

Another objection to the quantitative use of rational expectations as described here is that there are other reasons that parameters of a model could change. For example, even if rational expectations were used, behavioral relations for contract-wage determination might shift with policy as workers and firms change contract lengths. While expectations are probably a significant source of parameter drift, this does not mean that models can ignore other behavioral shifts. Successful policy evaluation requires careful modelling of all behavioral relations.

The New Equilibrium Approach to Policy Evaluation

Lucas and Sargent (1978) have suggested that the pervasiveness of these other sources of parameter shifts means that minor modifications of econometric models are not sufficient. They recommend a "new equilibrium" approach to modelling in which all economic relations are based on explicit utility maximization analysis. If tastes and technology remain relatively constant -- or can be modelled as exogenous factors -- then this approach, in principle, will avoid these other types of parameter shifts. The approach is attractive because once one has developed a model based on sound utility maximization principles, macroeconomic policy analysis is conducted like any other welfare analysis in microeconomics. Explicit externalities can be located and offset by optimal policies, and no approximate aggregate welfare criteria such as output and price stability are necessary. One would design policy to maximize the welfare of the representative individual. Attempts to design business cycle or econometric models along these lines include the work by Barro (1976), Lucas (1975), Hansen and Sargent (1980) and Kydland and Prescott (1980).

This approach represents a fundamental change in macroeconomic policy evaluation and its full practical implementation will take a long time as emphasized by Lucas and Sargent (1978). As an alternative to the approach outlined in the previous section, several reservations about this new equilibrium approach might be mentioned. Does utility maximization provide any additional constraints on an economic model which do not already come from a set of explicit decision rules and rational expectations? If it does not, then the gains from beginning each analysis with explicit utility maximization are not clear. For example, one of the major *ad hoc* features of decision rules designed for empirical work is that they include lags to capture the gradual adjustment of firms to new economic conditions. With utility maximization, these lags are "explained" by adjustment costs which tend to make it optimal for firms to adjust slowly. But one has almost as much freedom to choose adjustment costs in a utility framework as one does to choose lag length when writing down decision rules. Unless good micro-economic or technological information is available to measure these adjustment costs, the utility maximization approach does not seem to provide additional information in this case.

Another reservation concerns the *practical* use of the welfare of the representative individual as the criterion for stabilization policy. In principle this approach is better than the alternative approach of postulating an aggregate measure of welfare, which might include measures of inflation or aggregate employment stability. But the aggregate welfare approach has advantages in practice. It is very difficult to incorporate some of the welfare gains of price stability into individual utility functions. The gains from a relatively stable aggregate price level involve such considerations as providing a more certain framework for private decision making. Until one finds a way to incorporate these complex effects into individual utility functions, the use of aggregate criteria may serve as satisfactory and workable alternatives.

Rules Versus Discretion

The debate between those favoring rules versus discretion has not diminished in recent years but the arguments have been modified. A definitional change is that rules are now rarely taken to mean holding policy instruments constant. Feedback rules, in which the money supply responds in a systematic way to economic developments, are rules as much as constant money growth.

Kydland and Prescott (1977) have suggested that the problem of time inconsistency (see also Calvo (1979)), implies that rules should be used rather than discretion. Time inconsistency can arise because of taste change or because people forecast future behavior of policymakers. In both cases policymakers may be tempted to change plans after they have announced the optimal path. Time inconsistency does not imply that optimization techniques cannot be used (see Fischer (1980) for a discussion of this issue), but it does raise questions of how policy should be implemented. Kydland and Prescott (1977) argued that rules would be a way to reduce the incentive for policymakers to change plans. Rules do not generally exploit the initial conditions of a maximization problem as much as fully optimal policies. If policymakers do not exploit initial conditions today, then people might expect that they will not exploit initial conditions in the future. But of course there is no logical guarantee. This preference for rules over discretion is a practical, rather than a logical, implication of time inconsistency problems.[9]

Another practical reason to prefer rules over discretion is that, especially with rational expectations, it is difficult to estimate the impact of alternative discretionary paths with great accuracy. The rational-expectations assumption is not accurate unless one can assume people are familiar with how policy works; this might require that they have experience with one type of rule for a long period of time.[10]

Fischer (1979) has suggested a compromise resolution to the rules versus discretion debate: rules should be used in normal times, but in the case of an unanticipated disaster (such as a financial panic) discretion should come into play. It is difficult to disagree with this eclectic solution to the problem, but practical implementation might prove difficult. Objective measures of what is normal and what is abnormal are difficult to obtain in economics.

A less constructive, but perhaps more realistic resolution to the rules versus discretion debate comes from deemphasizing the distinction between the two. If policymakers make the same policy decision whenever their staffs' econometric forecasts are the same, then in effect

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[9] Monetarists who advocate the use of a fixed money growth rule, suggest that, because of initial conditions (a high inflation rate inherited from the past), the growth rate be diminished to the target path <u>slowly</u> when starting out on such a plan. There is a time inconsistency argument here. If higher rates of money growth are advocated because of initial condition, then what is to keep people from expecting a return to high money growth when similar conditions arise again in the future?

[10] Another practical reason is that statistical estimates of policy effects are considerably less complex if one can focus on rules.

they are using rules. The rules might be difficult to describe and even more difficult to estimate, but they are rules nonetheless. If this is a good description of the way policy works, then research which focuses on alternative rules rather than discretionary paths might turn out to be the more practically useful type of policy research. Such research might suggest ways in which the policymaking process (rule) should be modified in order to improve the performance of the economic system.

CONCLUDING REMARKS

This overview has been aimed at recent theoretical research in stabilization theory. Earlier research on such issues as the choice of intermediate targets, problems of lags in the effect of policy, and the effect of parameter uncertainty on the choice of policy instrument has been omitted largely because theoretical developments in these areas have been relatively minor in recent years. It should be emphasized that these older problems continue to be of practical importance. The continuing efforts to persuade the Fed to switch to a reserve targeting procedure in their short-run operating strategy is a case in point.

The practical interpretation of these earlier stabilization issues has been changed in some cases, however, by the theoretical developments reviewed in this paper. For example, Poole's (1970) analysis of the choice of policy instrument loses most of its practical relevance in the market-clearing models where monetary policy is ineffective. But in the contracting models, where monetary policy effects on real output are significant, Poole's analysis needs only slight modifications to account for the rational expectations effects. Interest rate pegging frequently leads to instability in rational expectations models, whether prices are flexible or temporarily rigid. This policy implication, which was emphasized by Sargent and Wallace (1975), appears to be robust to change in the theory which is used.[11] That many other important policy implications are not robust to changes in alternative theories -- as was emphasized here for the policy objective of price stabilization -- suggests that additional theoretical and empirical work to sort out and test these theories should be high on any agenda for future research on stabilization policy.

[11]Such instability can occur in the model used by Phelps and Taylor (1977) for example. Because prices are set at levels which clear markets on average, market-clearing conditions are used to determine expected future prices which in turn are used to determine the current price setting. Extreme interest rate pegging can make future prices and hence the current price level undetermined.

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EMPIRICAL EVIDENCE ON THE EFFECTS OF STABILIZATION POLICY

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Macroeconometric research in the 1970s has been dominated by the refinement of large-scale income-expenditure macroeconometric models, the attempt to reconcile the policy multipliers derived from these models with those yielded by simple reduced-forms, the refinement and estimation of the relation between inflation and unemployment, and the application of optimal control techniques to macroeconometric models. These four themes provide the focus for this paper.

The first section reviews the implications of various macroeconometric models for monetary and fiscal multipliers. We are particularly concerned here with the degree of consensus across models and the evolution of estimated models over time. The second section discusses attempts to reconcile the divergent implications of income-expenditure structural models and the St. Louis reduced-form for fiscal policy multipliers. In the third section we develop the implications of estimated Phillips curve equations and monetarist models for the response of unemployment, output, and inflation to traditional demand management policies. And in the fourth section we consider the accumulated evidence on the gains from policy activism, drawing on the results of optimal control simulations with a variety of macroeconometric models.

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During the last half of the '70s increased attention has been focused on the way in which economic agents form expectations, particularly inflation expectations, and on "equilibrium" macroeconomic models embodying "rational expectations." These models yield dramatic conclusions about both the costs of eradicating inflation and the gains from activism. We therefore consider the implications of rational expectation models in both the third and fourth sections, although there is as yet only a small literature on empirical applications of these models to draw upon.

A COMPARISON OF POLICY MULTIPLIERS ACROSS MODELS AND TIME

In this section we review the evidence from structural models and reduced-forms about the size and time pattern of policy multipliers. We are interested in the average size of multipliers, the consensus across models, and the evolution over time in the estimated multipliers.

A Comparison of Multipliers Across Models

Christ (1975) has summarized the consensus across models rather pessimistically: "... though models forecast reasonably well over horizons of four to six quarters, they disagree so strongly about the effects of important monetary and fiscal policies that they cannot be considered reliable guides to such policy effects, until it can be determined which of them are wrong in this respect and which (if any) are right." (p. 54)

Tables 1, 2, and 3 present policy multipliers from seven econometric models (Bureau of Economic Analysis (BEA), Brookings (B), University of Michigan (MQEM), Data Resources, Inc. (DRI), Federal Reserve Bank of St. Louis (St.L), MIT-Pennsylvania-SSRC (MPS), and Wharton (W)) as reported in Fromm and Klein (1976). The multipliers are reported for the first quarter and fourth, eighth, twelfth, sixteenth, and twentieth quarters and for three policy changes -- an increase in real government expenditures on goods and services, a decline in personal taxes, and an increase in either the money supply or nonborrowed reserves. The mean and coefficients of variation for the various multipliers are also reported.[1]

TABLE 1

Fiscal Policy - Increase in Government Expenditures

Model	IC*	RMSE(4Q)*	Multiplier					
			1Q	4Q	8Q	12Q	16Q	20Q
BEA	62	6.94	1.1	2.2	2.2	1.8	1.6	1.3
B	56I	5.13	1.8	2.8	2.7	2.4	2.0	1.5
MQEM	62I	6.20	1.4	1.7	1.4	1.0	1.0	1.1
DRI 74	61I	4.60	1.3	2.1	2.2	2.0	1.7	1.7
St.L	62I	4.98	0.5	0.5	-0.2	-0.2	-0.2	-0.2
MPS		4.23	1.2	2.2	2.2	0.7	-0.5	
W	65I	4.64	1.3	2.0	2.4	2.6	2.4	1.9
Mean (w/o St.L)			1.35	2.17	2.18	1.75	1.37	1.17
St. dev. (w/o St.L)			0.24	0.36	0.43	0.76	1.03	0.86
s.d./mean			0.18	0.17	0.20	0.43	0.75	0.74
Mean (w/St.L)			1.23	1.93	1.84	1.47	1.14	.97
St. dev. (w/St.L)			.39	.71	.98	1.01	1.11	.94
s.d./mean			0.32	0.37	0.53	0.69	0.97	0.97

* IC = initial conditions for policy simulation; RMSE = root mean square error for four quarter forecast of real GNP (billions of dollars at 1958 prices) over 1961-1967 period.

[1]The multipliers are reported with and without the St. Louis model multipliers. The latter are based on a reduced-form income equation rather than on a structural model and, particularly in the case of the fiscal multipliers, differ substantially from the multipliers based on the structural models.

The mean fiscal expenditure multiplier is just over 1-1/4 in the first quarter and builds to 2-1/4 by the end of year two; however, the cumulative multiplier is still over one after five years. While there is considerable consensus about the multipliers through the first three years, the agreement deteriorates sharply. Note that in all cases the multiplier peaks within three years, generally within four to eight quarters; and cumulative fiscal multipliers fall to zero or below by the fifth quarter for the St. Louis model, by the 12th to 16th quarter for the MPS model and by the 24th quarter for the BEA model. But it

TABLE 2

Fiscal Policy - Tax Cut

Model	Multiplier				
	1Q	4Q	8Q	12Q	16Q
BEA	0.4	1.2	1.4	1.1	0.8
B	1.0	1.6	1.6	1.6	1.5
MQEM	0.6	1.2	1.1	1.1	1.2
DRI 74	0.9	1.3	1.2	0.9	0.6
St.L*	0	0	0	0	
MPS	0.4	1.3	2.1	2.2	1.8
W	0.5	1.2	1.7	1.9	1.6
Mean (w/o St.L)	0.63	1.30	1.52	1.47	1.25
St. dev. (w/o St.L)	0.26	0.16	0.37	0.52	0.47
s.d./mean	0.41	0.12	0.24	0.35	0.38
Mean (w/St.L)	0.54	1.11	1.30	1.26	1.07
St. dev. (w/St.L)	0.34	0.51	0.66	0.73	0.64
s.d./mean	0.63	0.46	0.51	0.58	0.60

* Multipliers reported for St. Louis model are based on absence of a tax variable in the model's reduced-form equation for income.

takes eight to ten years for the cumulative multiplier to reach zero in the Wharton and Michigan models and still longer in the Brookings and DRI models.[2]

The tax multipliers are smaller than the expenditure multipliers; they build from an initial mean value of 0.63 to a peak of 1.5 at the end of the second year. In the case of a tax change, there is less consensus in the first quarter, but no deterioration in later quarters. The tax multipliers tend to peak a bit later than the expenditure multipliers, generally between the 8th and 12th quarters, and then decline.

TABLE 3

Monetary Policy

Model	MV*	Multiplier				
		1Q	4Q	8Q	12Q	16Q
BEA	RU	0	0.2	0.4	0.7	0.7
DRI	RU	0.3	4.1	8.3	6.5	2.8
St.L	M1	1.1	4.4	2.8	1.2	-0.4
MPS	RU	0.3	3.2	8.4	12.4	14.5
W	RU	1.4	4.5	7.2	8.6	8.0
Mean (w/o St.L)		0.5	3.0	6.08	7.05	6.50
St. dev. (w/o)		1.24	0.65	0.63	0.69	0.95

* MV = monetary variable (M1 = narrow money supply; RU = nonborrowed reserves; initial conditions same as in Table 1.

[2] Note also that the fact that the cumulative multiplier turns negative does not guarantee a negative long-run multiplier since these models are subject to oscillatory convergence to their long-run values.

There are only four comparable multipliers for monetary policy (those using nonborrowed reserves). The initial quarter mean multiplier is small and the mean multiplier peaks at the end of the third year at a value of 7. There is less consensus about monetary compared to fiscal policy; the coefficient of variation is larger in all but one quarter for monetary policy multipliers. While the St. Louis cumulative multiplier peaks in the fourth quarter and goes to zero by the 16th quarter, large scale model multipliers generally peak after 8 to 12 quarters and the MPS multiplier reported by Fromm and Klein is still rising from the 12th to 16th quarters. The large scale models thus suggest that monetary policy has a more persistent effect on output than is the case in the St. Louis model. The exception is the DRI model in which the cumulative monetary policy multiplier falls to zero by the 20th quarter.

While the multiplier results do differ across models there is clearly considerable consensus particularly over the first two years in the case of fiscal policy when we exclude the St. Louis results. The problem is evaluating how much divergence in the multipliers is consistent with using the models for policy recommendations. Later we will discuss the use of stochastic simulations which allow for multiplier uncertainty within a particular model. Here we want to note the valuable approach suggested by Chow (1977). Chow notes that while policy recommendations derived from alternative structural models differ from each other, they may nevertheless be closer to each other than to a passive policy of constant growth rates in the policy instruments. The comparison Chow suggests and implements is the improvement in economic performance in one model using optimal policy derived from a second model relative to the economic performance under passive policy. Chow uses the multiplier properties of the Wharton and Michigan models to construct reduced-form equations for real and nominal GNP including government expenditures and nonborrowed reserves as the policy instruments and employs a conventional quadratic loss function involving deviations in real and nominal GNP from their targets (in each case average historical values over the period in question).

The results of this experiment are mixed. If the Michigan model were the true structure and the policy recommendations were derived from the Wharton model, active policy would improve performance relative to a passive policy; costs under the active policy would be under 25 percent of those under a passive policy although they would be 70 percent greater than if the policy were derived using the true structure. On the other hand, if the Wharton model were the true structure and the policy recommendations were derived from the Michigan model, the cost under an active policy would be three times the cost of a passive policy and about 17 times the cost when the true model was used. And, of course, the Michigan and Wharton multipliers are quite close at least for fiscal policies, compared to say the Brookings and the St. Louis models. Thus there are other comparisons that would lead to even less favorable results for activism.

A Comparison of Policy Multipliers Over Time

We expected to find a secular decline in the value of fiscal multipliers and a secular rise in monetary policy multipliers for large scale econometric models from the late '60s versions to the versions of the mid- to late '70s. However, published information on such multipliers is relatively scarce and what is available is frequently not constructed on a comparable basis. This, of course, increases the value of the NBER/NSF model comparison studies but makes multiplier comparisons pieced together from the literature hazardous. Perhaps the most serious problems for comparing multipliers across models or over time are differences in initial conditions and differences in the specification of policy instruments, particularly for monetary policy. The large scale models are invariably nonlinear, implying that their multipliers are sensitive to initial conditions, particularly the degree of economic slack. But there is painfully little reported evidence of the degree of this sensitivity. There are a bewildering number of possibilities for a change in tax rates and even differences in multipliers for different government expenditure components. The most serious problem, however, may be differences in assumptions about the monetary policy instrument. Monetary policy, particularly in the late 60s versions, has been identified with changes in short-term interest rates. In other cases, monetary policy is identified with either the money supply or some reserve aggregate, most often nonborrowed reserves. The choice affects both monetary and fiscal multipliers since fiscal multipliers assume unchanged monetary policy; fiscal multipliers will, of course, be much larger under fixed short-term interest rates than under fixed values of the money supply or nonborrowed reserves.

In Tables 4 and 5 we have pieced together some policy multipliers for alternative versions of Michigan, Wharton, and MPS models. The Michigan '70 and Wharton '68 models assume constant short-term interest rates while the others assume constant unborrowed reserves. It is surprising (to us at least) that the fiscal multipliers in the late '60s

TABLE 4

Real Non Defense Government Expenditure Multipliers - Real GNP

Q	Michigan 70[a]	Michigan 75[b]	Wharton 68[c]	Wharton 75[b]	Wharton 79[d]	MPS 69[e]	MPS 75[b]
1	1.5	1.4	2.0	1.3	1.1	1.3	1.2
4	2.1	1.7	2.0	2.0	1.7	1.8	2.2
8	1.9	1.4	2.0	2.3	1.8	1.6	2.2
12	n.a.	1.0	2.1	2.6	1.7	1.1	0.7

a S. H. Hymans and H. T. Shapiro, "The DHL-III Quarterly Model of the U.S. Economy," Research Seminar in Quantitative Economics, University of Michigan, 1970, Table 4, p. 22.

b C. Fromm and L. R. Klein, "The NBER/NSF Model Comparison Seminar: An Analysis of Results," in L. R. Klein and E. Burmeister (ex), Econometric Model Performance, Pennsylvania, 1975, Table 6, p. 402.

c M. K. Evans and L. R. Klein, The Wharton Econometric Forecasting Model, Economics Research Unit, University of Pennsylvania, 2nd ed., 1968, Table 5, p. 58.

d Unpublished Wharton multiplier simulations kindly provided by R. M. Young, Wharton Econometrics Forecasting Associates.

e F. DeLeeuw and E. M. Gramlich, "The Channels of Monetary Policy," Federal Reserve Bulletin, June 1969, Table 4, p. 489. Shock applied fully to federal real wage payments.

versions of the three models (including the two with constant short-term rates) are so small; they peak at 2.0 or less. One important difference in the later versions of Michigan and MPS models is the sharp decline in the cumulative multiplier from its peak value by the 12th quarter. There was a tendency in earlier versions for multipliers to stabilize at about 1.5-2.0 for a longer period. This continues to be the case in the Wharton model; in both the '75 and '79 versions the fiscal multipliers are stable or rising during the first three years.

We have been able to find comparable unborrowed reserves multipliers at different points in time for only two models: the Wharton model and the MPS model. These are reported in Table 5. In these models there is a fairly dramatic evolution of the monetary policy multiplier. In the 1968 Wharton model the unborrowed reserves multiplier for real GNP reached a fairly constant level in the 1.5 to 2.0 range after about one year. In the MPS model the multiplier is stable in the 10.0 range during the second and third years. In the later

TABLE 5

Unborrowed Reserve Multipliers
(Real GNP/Nominal Reserves)

	Wharton 68[c]	Wharton 75[b]	Wharton 79[d]	MPS 69[e]	MPS 75[b]
1	0.0	1.4	1.2	0.7	0.3
4	1.5	4.5	4.8	5.4	3.2
8	2.1	7.2	9.1	10.0	8.4
12	1.7	8.6	13.3	12.4	9.4

Notes - See Table 4.

versions of both models, the multiplier is continually growing over the first three years. Note also the substantial increase in the size of the monetary policy multipliers in the Wharton model from the '68 version to the '75 and '79 versions. We view the Wharton '68 multipliers as fairly typical of the conventional wisdom of the mid- to late '60s, prior to the development of the MPS model.

COMMENTS ON THE "ST. LOUIS" EQUATION

Since the original Andersen-Jordan article (1968) (AJ) that proposed a single equation test of the relative importance of monetary and fiscal policies on nominal GNP, numerous replications have been performed, across time, across countries, and across functional forms and a number of criticisms, mostly statistical in nature, have been levied against the equation. The purpose of this section is to review the criticisms that have been raised against the equation and to evaluate how robust the equation appears to be against these criticisms.

The conclusions of the Andersen-Jordan investigation are by now almost universally known. The conclusion that remains most controversial is the zero cumulative fiscal multiplier for nominal GNP. This conclusion did not conform well to the conventional wisdom of the late 1960s, nor was it consistent with other econometric results. Consequently, for the past decade there has been considerable skepticism of the specification that yields this conclusion.

Time Periods, Functional Forms, and Distributed Lags

The AJ equation was estimated over the period 52/I-68/II and subsequently reestimated by Andersen and Carlson (1970) (AC) over the 53/I-69/IV period as part of the St. Louis model. In each case monetary policy had a powerful and significant effect while the tax variable (change in high employment receipts) was insignificant and excluded from their preferred regression and the government expenditure variable had only a small and transitory effect. Silber (1971) subsequently split the period into Republican (53/I-60/IV) and Democratic (61/I-69/IV) administrations and found that fiscal variables were significant in the latter but not in the former. Silber argued that these results are consistent with the more systematic use of fiscal policy in the latter period. At a minimum, these results suggest that the time period used in the estimation can dramatically affect the conclusions and that the estimates may reflect the particular policies pursued over the estimation period.

More recently Friedman (1977) has extended the sample period employed by AC through 76/II and concluded that "even the St. Louis equation now believes in fiscal policy." In Table 6 we report the results of the AJ and AC equations along with estimates over alternate time periods including Silber's two subperiods (S1 and S2), Friedman's extended period (F), and the period 1960/I-1976/II (MR). The results suggest that both money and the time period matter! The size and significance of fiscal policy multipliers is not definitely settled by these results.

In response to Friedman, Carlson (1978) has pointed out that the first difference form of the estimated equation, while appropriate over the AC period, is not appropriate over the longer period because of heteroskedasticity, implying that the t values of coefficients reported by Friedman are unreliable. When all variables are defined as rates of change, Carlson finds that the results of the two periods are

TABLE 6

Time Periods

Sample	AJ 52/I-68/II	AC 53/I-69/IV	S1 53/I-60/IV	S2 61/I-69/I	F 53/I-76/II	MR 60/I-76/II
M	5.83 (7.25)	5.57 (8.06)	5.58 (.43)	9.20 (2.35)	4.94 (6.3)	5.72 (1.07)
G	0.17 (0.54)	0.05 (0.17)	-1.77 (.90)	1.75 (2.11)	1.42 (4.3)	2.44 (5.57)
T			2.36 (.67)	-3.92 (2.78)		-1.67 (2.90)
R^2	.60	.66	.652	.73	.66	.69
Se	4.01	3.84	4.23	3.30	7.54	7.84

consistent with the hypothesis that the specification is stable and, like the original AC equation, indicate that any effect of government expenditures is small and temporary. Allen and Seaks (1979), using the growth rate specification, find that the fiscal variable sums to zero in both Silber subperiods (Eisenhower and Kennedy-Johnson) but is significant in the Nixon-Ford era (69/II-77/I). Over the period 60/I-76/II we find that both expenditure and tax variables enter significantly into both first difference and rate of change specifications. In Table 7 we report the results of the AC equation in difference form over both the original period (AC) and over Friedman's extended period (F) and in rate of change form over Friedman's extended period (C) along with the Allen-Seaks results over the Nixon-Ford period (AS) and both functional forms over the 1960/I-76/II period (MR1 and MR2). From these results we can conclude that money, time period, and functional form matter.

The results of AJ type equations are estimated using polynomial distributed lags. This technique requires selection of lag length, degree of polynomial, and end point constraints. Schmidt and Waud (1973) caution that introduction of inappropriate constraints can result in biased and inconsistent estimates and demonstrate how changes in degree of polynomial and end point constraints can substantially alter the conclusions about policy multipliers. Others have found length of lag can affect conclusions also.

We can conclude, therefore, that the choice of time period, functional form, and lag constraints matters a great deal. The results for money appear very robust. The results for fiscal policy are dramatically affected by these factors.

TABLE 7

Functional Form

Sample	AC 53/I-69/IV	F 53/I-76/II	C 53/I-76/II	AS 69/II-77/I	MR1 60/I-76/II	MR2 60/I-76/II
Form*	Delta	Delta	Dot	Dot	Delta	Dot
M	5.57 (8.06)	4.94 (6.3)	1.06 (5.59)	.90 (1.93)	5.72 (5.31)	.75 (3.08)
G	0.05 (0.17)	1.42 (4.3)	.03 (.40)	.36 (2.07)	2.44 (5.57)	.37 (2.82)
T					-1.67 (2.90)	-.29 (2.25)
R^2	.66	.66	.40	.56	.69	.42
Se	3.84	7.54	3.75		7.84	3.02

* Delta: first difference specification
Dot: rate of change specification

Biases Associated With Choices of Independent Variables

The inconsistency between the AJ/AC reduced-form multipliers and the multipliers in large-scale econometric models generated a search (on both sides of the controversy) for an explanation. Monetarists criticized large-scale econometric models for failing to capture the crowding-out phenomenon through misspecification of the money demand equation (e.g. excluding a wealth effect) and failure to explicitly include a government financing constraint. The income expenditure counterattack focused on the unreliability of reduced-forms due to a variety of problems, some more easily correctable than others, associated with the choice of independent variables. The key issues have been: What are appropriate measures of the policy instruments? How can the possibility of reverse causation be avoided? What biases are introduced by omission of nonpolicy exogenous variables?

The Measurement of Policy Instruments

There are two interrelated problems with specifying the policy instruments. The first is the problem of specifying the instrument that the policy authority directly controls. For example, if the Fed sets policy by controlling the value of the monetary base, employing a monetary aggregate other than the monetary base as a proxy for the policy instrument may bias the policy multipliers if the other aggregate varies endogenously relative to the base. A second problem arises even if the instruments themselves are included if policy itself systematically responds to economic developments. In this case, the policy instruments themselves become endogenous and reverse causation again may bias the multiplier results. In this section we take up the problem of specifying the policy instruments and in the next the problem of endogeneity of policy.

The problem of reverse causation was noted in a DeLeeuw-Kalchbrenner (1969) comment on the AJ paper. Indeed it was the concern over this issue that arose out of the Friedman-Meiselman debates that motivated the choice of the high employment fiscal policy measures by Andersen and Jordan. DeLeeuw and Kalchbrenner's main concern is with the choice of the monetary base or money supply as the variable the Fed directly controls. They point out that the choice among the monetary base, the nonborrowed base, total reserves, and nonborrowed reserves depends on whether the Fed offsets the effect of movements in member bank borrowing on the base and of movements in currency holdings on reserves. They express no special preference among these alternate measures suggesting only that results which hold for some measures and not for others should be viewed with great caution. Their empirical results indicate that fiscal multipliers are affected by the choice of monetary instrument; in particular, fiscal multipliers of approximately the size produced in the MPS model result when nonborrowed reserves are substituted for the monetary base.

The treatment of fiscal instruments in the AJ/AC equations has also drawn considerable comment. In order to avoid the bias associated with the income induced movements in tax revenues and expenditures (mostly transfer payments) under preexisting schedules of tax and transfer rates, the AJ/AC equations use high employment expenditures. High employment receipts were tried but dropped from the preferred equation due to lack of significance. The high employment surplus was also employed in an alternate specification.

The latter is clearly an inappropriate measure of stimulus associated with fiscal actions because it groups components which are expected to have different multiplier responses. The same problem arises even in the case of high employment expenditures because this variable includes both expenditures on goods and services and transfers while economic theory suggests that transfers should be netted against taxes. Suggestions for improved specification of fiscal variables have been made by DeLeeuw-Kalchbrenner (DK), Gramlich (1971), and Corrigan (1970). Gramlich employs government purchases of goods and services rather than high employment expenditures, and assumes no adjustment is necessary to purge it of effects of changes in income. Government expenditures are employed in a composite variable including grants-in-aid and exports with an adjustment introduced for defense inventory accumulation.

DeLeeuw and Kalchbrenner suggest adjusting high employment receipts to purge changes in this variable of the effects of endogenous movements in prices. Gramlich uses high employment net tax revenues (taxes minus transfers) also adjusted along lines suggested by DK. The difficulty with all these series for tax revenues is that the series for changes include nonzero entries in periods during which no changes in tax rates or transfer programs occurred. Corrigan has suggested an alternate tax variable, the initial stimulus measure, that indicates the tax revenues released or absorbed by tax rate changes. This series has plenty of zeros! For each tax, the initial stimulus measure is the change in tax rates times the lagged tax base. An unweighted sum for all taxes is the variable Corrigan used and it continues to be used in the New York Fed version of the St. Louis equation.

The discussion above suggests that the simple specification of both monetary and fiscal instruments employed in the AJ and AC equations may be improved upon and that such improvements might alter the relative importance of monetary and fiscal multipliers. However, the modifications suggested above have not generally resulted in dramatic changes in the estimated multipliers in simple reduced-form equations. While many of these suggestions seem valid, they have not helped to resolve the differences between the St. Louis equation and econometric models.

Endogeneity of Policy

Even if we obtain measures of direct policy actions, our estimates of their effects will be biased if these actions themselves are systematically related to economic developments. This problem has widely been noted in comments on the AJ equation, but most critics including DeLeeuw and Kalchbrenner considered the problems in measuring the instruments the more likely source of bias. The biases associated with endogenous policy are easy to illustrate. If a policy instrument varies in response to disturbances so as to eliminate completely the instability in income, the regression of the change in the policy variable on changes in income (zero by assumption) will yield a zero coefficient on the policy instrument. Thus, endogeneity of policy may result in a downward bias in the policy multiplier, with the downward bias a function of the effectiveness of policy. We can, therefore, interpret the zero multiplier on fiscal instruments as evidence of their effectiveness rather than of their insignificance! While the endogeneity of policy may introduce biases into the estimates of policy multipliers from both reduced-form equations and structural models, Goldfeld and Blinder (1972) suggest on the bases of simulation results that the bias is much more serious for reduced-forms. If policy responds to economic developments with a lag, the bias is reduced but not eliminated.

Omitted Exogenous Variables

The third major source of bias in the choice of independent variables in the AJ/AC equation is alleged to be the omission of non-policy exogenous variables. Andersen and Jordan explained in an appendix to their original paper why they believed that the omission of other exogenous variables did not bias their measured impact of the monetary and fiscal policy variables: these variables are presumed to be independent of monetary and fiscal policies and their average effect is registered in the constant term. Modigliani (1971) made the first detailed critique of the St. Louis reduced-form model on the grounds of omitted variables and Modigliani and Ando (1976) reported a more extensive set of simulation results supporting their view that omission of exogenous variables may severely bias the results of reduced forms.

The ingenious simulation experiments involved estimation of an AJ type equation on data generated by non-stochastic simulations of a model. The model represents the known structure of a hypothetical economy. The simulated values of nominal income from the model are the "actual" values of income in the hypothetical economy. A reduced-form is estimated using these simulated values for income, and the resulting estimated multipliers are compared with their "true" values (the values implied by the structural model). The comparison of the reduced-form multipliers with their "true" (structural model) values tests the ability of simple reduced-forms, including only a couple of policy instruments, to replicate the true value of the policy multipliers.

In the 1971 paper, Modigliani emphasized the finding that the estimate of the St. Louis equation on MPS simulated values yielded a money multiplier in excess of the "true" MPS multiplier and reached the "unequivocal conclusion" that reduced-form money multipliers are upward biased. This bias was attributed to positive correlation between the money supply and omitted exogenous variables. For example, if the Fed attempts to stabilize interest rates (as monetarists assert they often do), then the money supply will be positively correlated with real sector exogenous demand variables and the monetary policy multiplier can be expected to be biased upward.

Modigliani and Ando (1976) turned their attention to biases in the estimates of fiscal effects and suggested that correlation between omitted exogenous variables and fiscal instruments in this case might account for the small size and transitory effects of fiscal instruments in the St. Louis equation. Estimates of the AJ type equation on values of the change in nominal income based on simulations with the MPS model yield fiscal multipliers like the original AJ equation and contrary to the structure of the MPS model. They concluded that the St. Louis approach is "a severely biased and quite unreliable method of estimating the response of a complex economy to fiscal and monetary policy actions" (p. 42).

To demonstrate the role of omitted variables in the bias in the AJ equation, they remove any correlation between policy instruments and nonpolicy exogenous variables in the structural models by assuming all nontrended exogenous variables are constant at their means and all trended exogenous variables grow along a constant trend. The predicted value of nominal income for this adjusted structure is computed and used to reestimate the AJ equation. Fiscal multipliers now of appropriate size and magnitude confirm the crucial role of omitted exogenous variables in biasing the estimates of the policy multipliers in the initial AJ equation.

In both papers, Modigliani and Modigliani and Ando (MA) are careful to note that the evidence they present does not permit them either to accept the MPS multipliers or reject the St. Louis ones. But their results should make those who use St. Louis type reduced-form equations uneasy about the validity of the multiplier results, particularly those for fiscal instruments.

While the analysis demonstrates that omitted variable bias <u>may</u> be a source of serious inferential error in the impact of policy actions, the conclusion appears to be nonconstructive in the sense that it does not provide any evidence on the particular source of the bias in the experiments that were conducted and it suggests abandoning the entire approach without attempting to investigate the issue of biases in the St. Louis results directly. It would be useful to identify the sources of bias in the estimated multipliers by introducing the most important exogenous variables directly into the reduced-form equation.

A number of studies have attempted to address the alleged biases in the St. Louis approach directly by including nonpolicy exogenous variables. Gordon (1976), for example, added a "shock proxy," consisting of the sum of net exports, consumer expenditures on automobiles and non-residential fixed investment to the St. Louis specification.

Although monetary multipliers decline and fiscal multipliers increase over his longer sample period, the multiplier results with and without the shock proxy remain qualitatively alike; monetary multipliers are significantly positive while the sum of the lag coefficients on the government expenditure variable is not significantly different from zero.

Recently, Dewald and Marchon (1978) have estimated expanded St. Louis equations for six different countries, including the United States. They included exports as a separate independent variable, dismissing the conglomerate variable constructed by Gordon as including too many endogenous influences. For the United States, the Gordon result is replicated; the impact of monetary policy is reduced, the impact of fiscal policy is left essentially unchanged, and the exports variable has a significant contemporaneous impact. A major monetarist contention is that the influence of a maintained change in the monetary growth rate should be a proportional change in the growth rate of nominal income. This hypothesis is alleged to be a universal phenomenon. However, while Dewald and Marchon cannot reject this hypothesis for the U.S. data, the monetary response for the U.S. is the strongest of any of the six countries investigated. The long-run elasticities of nominal GNP with respect to the money stock in the other five countries never exceed .5. In France they found this elasticity to be only .07 and in two countries (France and the U.K.) this estimated elasticity is not significantly different from zero.

Resolving the Puzzle: Reduced-Form Versus Structural Model Multipliers

Two further tests by Modigliani (1977) attempt to resolve the puzzle of conflicting multiplier results. First of all, he suggests that despite the apparent large differences in the AC and MPS multipliers, the two sets of multipliers may not be significantly different! To test for significance of the difference in multipliers, Modigliani presumes that the MPS multipliers are the true ones and tests whether the AC multipliers differ significantly from the MPS multipliers. The result is that they are not significantly different at the 5.0 percent level. Modigliani concludes, "This test resolves the puzzle by showing that there is really no puzzle: the two alternative estimates of the expenditure multipliers are not inconsistent, given the margin of error of the estimates. It implies that one should accept whichever of two estimates is produced by a more reliable and stable method, and is generally more sensible. To me, these criteria call, without question, for adopting the econometric model estimates." (p. 10)

For those who would still opt for the reduced-form multipliers, Modigliani compares the post-sample prediction performance of the AC equation with one in which the coefficients of government expenditures plus exports were constrained to equal those based on multipliers derived from simulations with the MPS models. The post sample simulation begins in 1970II. For the first four years, the MPS based equation dominates: the AC equation yields "distinctly larger" errors in eight quarters, smaller errors in only three quarters, and results in a squared error 1/3 larger than for the MPS based equation. Over the next two years, both equations perform "miserably" but the MPS based equation is still "a bit better."

Conclusion

The income expenditure counterattack on reduced-forms, particularly the Modigliani-Ando results on the implications of omitted exogenous variables, and the ability to dramatically alter the fiscal policy multipliers by choice of time period and functional form, have substantially weakened the case based on reduced-form equations for small and transitory fiscal effects on nominal income. The implied monetary policy multipliers, on the other hand, have proven robust, at least for the United States.

ASSESSING THE CUMULATIVE OUTPUT LOSS OF ERADICATING INFLATION

A prominent policy issue of the '70s and one that seems certain to dominate at least the early '80s is the appropriate policy response to a prevailing high rate of inflation. The view that there is a long-run trade-off between inflation and unemployment, widely held at the end of the '60s, is now held by only a small minority. The key issues are the nature of the short-run relation between inflation and unemployment and the process by which economic agents form inflation expectations. Macroeconomic models, both income expenditure and monetarist versions, suggest that while the traditional demand management techniques remain quite capable of reducing the rate of inflation, the cost of such a policy in terms of cumulative output loss would be great. Despite the importance of the issues, there is substantial disagreement about the cost of eradicating inflation and little evidence on the benefits derived as a consequence.

In this section we present evidence on the cumulative output loss associated with reducing inflation based on both estimated Phillips curves and monetarist models. Then we discuss the most serious limitation of these results -- the failure to allow the results to be influenced by the degree to which the public believes policy authorities are committed to a consistent anti-inflation policy. In the final analysis, the cost of anti-inflation policies in the form of output loss must be balanced against the benefits associated with a reduced rate of inflation. Empirical evidence on the cost of inflation and hence the benefits of reducing inflation is quite limited. Our discussion of the benefits of anti-inflation policies is therefore confined to determining how large the per period gains would have to be in order to justify incurring the cumulative output loss which we calculated from the Phillips curves and monetarist models.

Econometric Evidence on the Size of the Cumulative Output Loss

Three alternative sources of evidence on the cumulative output loss associated with the use of demand management policies to moderate inflation are discussed below. The first is evidence directly from estimated Phillips curves. Here we calculate how long unemployment must be increased by either 1 percentage point or 3 percentage points above the rate consistent with steady inflation to reduce inflation by 7.5 percentage points. The second and third sources use monetarist models which include either a Phillips curve or a reduced-form equation relating inflation to monetary change. Here we simulate the effects on inflation and output of a phased deceleration in monetary growth.

Results Based on Estimated Phillips Curves

Three recent studies have considered the cost of reducing inflation in the context of traditional Phillips curve regressions (Perry

(1978), Okun (1978), and Cagan (1978)). Perry's results are based on a wage change equation using the inverse of his weighted unemployment rate and lagged wage change estimated using annual observations over the 1954-77 period. His preferred equation yielded a "nonaccelerating inflation rate of employment" (NAIRU) of 4.0 in terms of his weighted unemployment rate (corresponding to about 5.5 percent in the official unemployment rate in '77):

$$(1) \quad \Delta \ln W = \underset{(-2.2)}{-1.88} + \underset{(3.5)}{7.44} \, (1/Uw) + \underset{(4.6)}{0.79} \, \Delta \ln W_{-1} + \underset{(1.1)}{0.21} \, \Delta \ln W_{-2} + \underset{(2.9)}{1.07} \, DNIX$$

$$S.E. = 0.70$$

where W = adjusted hourly earnings in the private nonfarm sector and DNIX is a dummy for the controls equal to -1 in 1972 and 1973 and +1 in 1974 and 1975.

Any unemployment rate in excess of the critical unemployment rate, if maintained long enough, will permit a cycling down of inflation. To compute the cumulative output loss of eradicating inflation, we begin with $\Delta \ln W$ set equal to 10.0 in the two lagged years and at NAIRU. Our "moderate" policy consists of increasing the weighted unemployment rate 1.0 point above NAIRU in period 1 and holding it here until $\Delta \ln W$ declines to 2.5, the rate presumed equal to trend growth in labor productivity and, therefore, consistent with price stability. The wage inflation rate falls from 10.0 to 9.6 percent in the first year and declines about 0.3 percentage points per year thereafter taking 23 years to reach a 2.5 percent rate. An alternative "radical" policy is modeled as a 3 percent point increase in unemployment beginning in period one and again sustained until wage change declines to

2.5 percent. This takes <u>only</u> 11 years! Note that the nonlinearity in Perry's wage equation ensures that the cumulative excess of person years of unemployment and, hence, cumulative output loss will be greater in the more radical policy case.

Using Okun's estimate of 3.2 as the impact on output of a 1 percent point increase in unemployment, we can convert the excess unemployment into output loss.[3] One percentage point increase in unemployment reduces output 3.2 percent or $45.6 billion dollars (calculated at 1978 value for real potential GNP). The 3 percent point increase in unemployment involves an initial year output loss of $136.7 billion. To find the cumulative, but undiscounted output loss we assume potential output will rise at a 3.3 percent rate. This yields a cumulative loss of $1532.6 billion for the moderate policy and $1778.0 billion for the radical policy.[4] The discounted output loss is essentially the product of the initial year loss and the number of years required to complete the program (not accounting for the 3.3 percent rate of growth in potential output is the same as discounting by a 3.3 percent rate); the discounted losses are $1047.9 billion and $1503.6 billion in the modest and radical cases, respectively. The results are depicted in Charts 1 and 2. (Perry 1 refers to the moderate case and Perry 2 to the radical case.)

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[3]Estimation of the Okun law relation over more recent data suggests that 3.2 may be an overestimate of the output loss associated with a one percentage point increase in unemployment; the recent estimates are about 2.5.

[4]If the Okun's law coefficient is 2.5 instead of 3.2, these output losses should be reduced by about 20 percent.

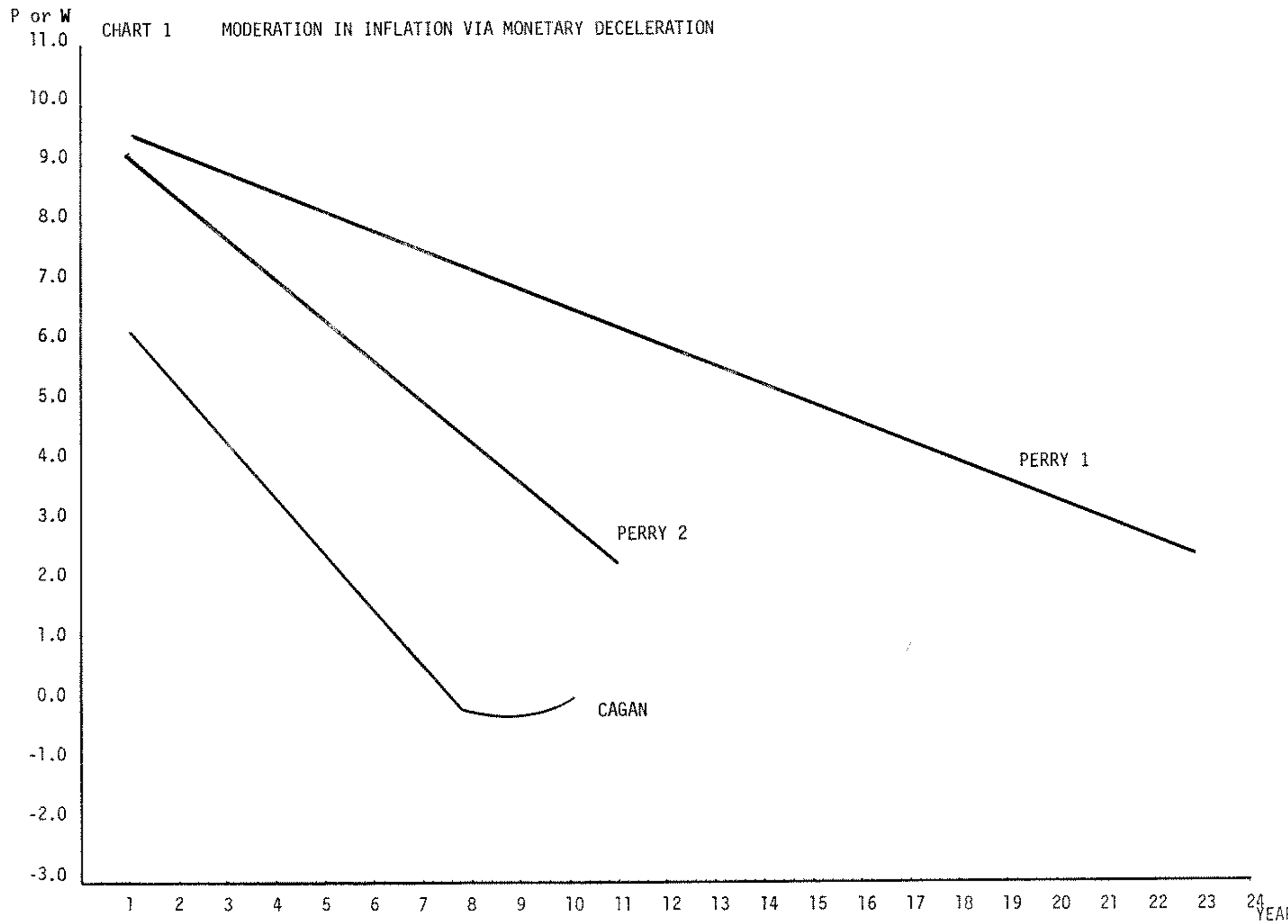

CHART 1 MODERATION IN INFLATION VIA MONETARY DECELERATION

Okun finds that a variety of estimated Phillips curves (PCs) in the literature yield quantitatively similar conclusions. The six equations considered by Okun yield a first year reduction in inflation of from 1/6 to 1/2 percentage point and an average of 0.3 percentage points for a 1 percentage point increase in unemployment. Gramlich (1979) reached a similar conclusion.

There are two aspects of the Perry specification which deserve further discussion: expectations are formed adaptively and the unemployment rate enters nonlinearly. The Phillips curve is uniformly drawn as a nonlinear relation and there have been a number of theoretical explanations (including Lipsey and Tobin) and some empirical support (Perry's influential 1966 study, for example). However, nonlinear and linear specifications seem to do about as well over sample through the mid-1970s.[5] The existence of nonlinearity would provide a rationale for the gradual as opposed to radical policy approach; the greater the nonlinearity, the greater the cumulative output loss under the radical as opposed gradual policy.

The inflation inertia implicit in the Perry equation derives from two sources: actual inflation is built into expected inflation with a lag and actual inflation responds gradually to unemployment in excess of the critical rate. To the extent that the lag in incorporating actual inflation into future wage negotiations is long, indexation might substantially reduce the inflationary inertia. Even with indexation, there would be a lag. Assuming that the full effect occurs

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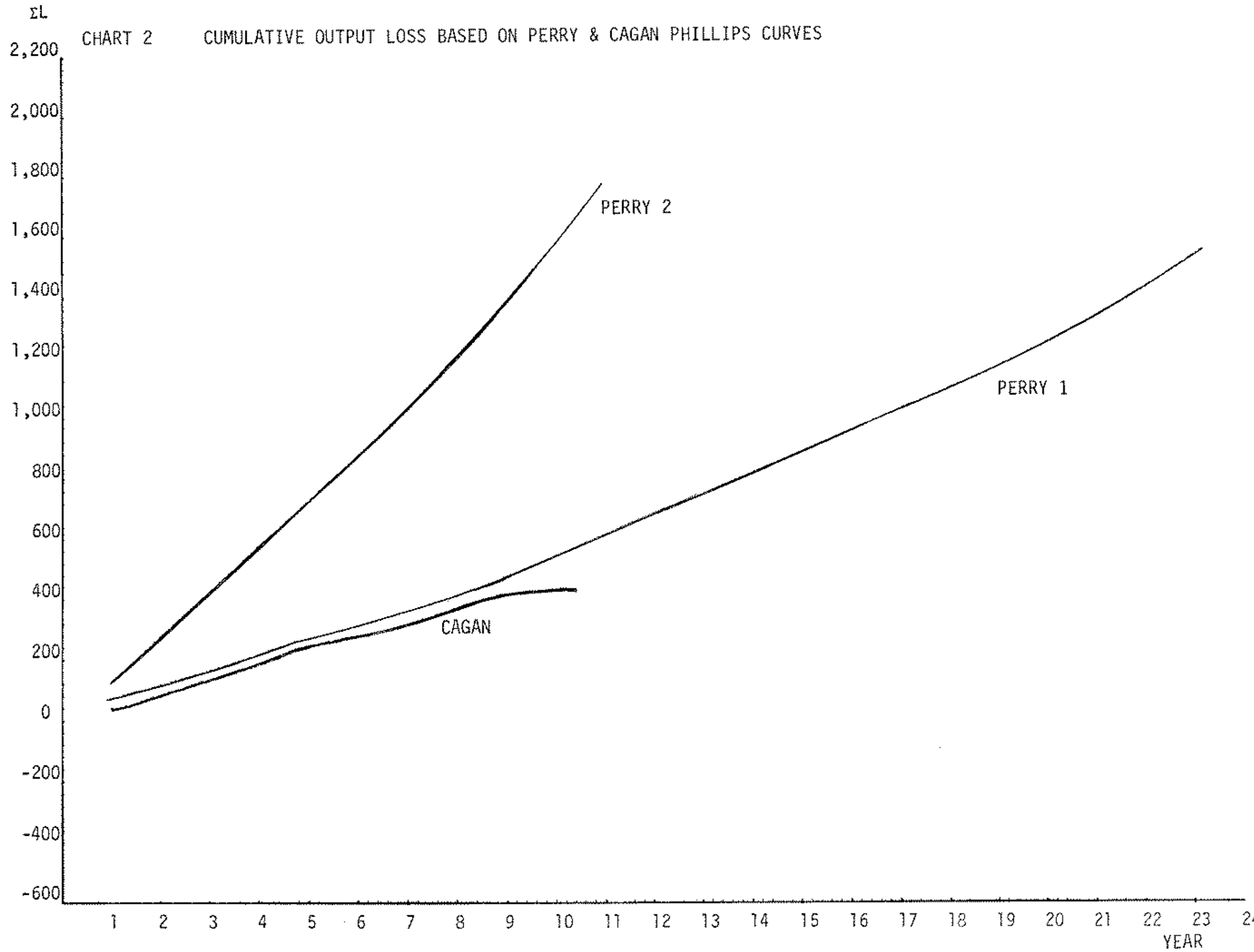
[5]Cagan (1977) has recently noted the surprising lack of evidence of nonlinearity and this has been confirmed in a careful examination by Papademos (1977).

CHART 2 CUMULATIVE OUTPUT LOSS BASED ON PERRY & CAGAN PHILLIPS CURVES



within the first year would not dramatically reduce the cumulative output costs. The cumulative output loss would decline about 20 percent in each case. Thus, the critical determinant of the gradual decline in inflation is the extremely small per period deceleration in inflation associated with labor market disequilibrium (excess unemployment) in the conventional Phillips curve, not with the slow response of inflation expectations to changes in the actual inflation rate.

Cagan develops a PC equation beginning with the natural rate specification and assuming adaptive expectations Cagan's estimated PC is:

$$(2) \quad \dot{P}_t = \dot{P}_{t-1} - 0.95 \left(\frac{u_t - u_{t-2}}{2}\right) - 0.23 \left(\frac{u_t + u_{t-1} + u_{t-2}}{3} - \bar{u}\right)$$

where $\dot{P}$ is the quarterly rate of change in the CPI, u is the unemployment rate for prime age males and $\bar{u}$ is estimated from the constant of the regression (3.7, for this regression) and the equation is estimated using quarterly observations over the period 1953-1977.

As is clear in Charts 1 and 2, the Cagan equation generates a dramatically more rapid decline in inflation and smaller cumulative output loss. Beginning in period 0 at a 7.5 percent inflation rate (in the current and last period) and at NAIRU, a one percentage point increase in the unemployment rate reduces inflation by the full 7.5 percentage points by the eighth year with cumulative output loss of $4.2.9 billion, about a quarter of that associated with the Perry and Okun results.

Evidence Based on the St. Louis Model

To provide additional evidence on the output effects of using stabilization policy to reduce inflation, we ran simulation experiments with the St. Louis model.[6] We begin with a base run in which the rate of monetary growth is at a steady 7.5 percent rate beginning in 1968/III through 1978/IV. This builds in inflation inertia and provides the base against which we can evaluate the effects of gradual monetary deceleration. Beginning in 1973/I we gradually decelerate monetary growth by 1 percentage point in the first quarter of each year. We then compare the policy runs with base run and compute the cumulative output loss associated with the policy.

The first set of simulations with the St. Louis model employ the version of the model estimated over the sample period 1953/I-78/IV. The general practice at the Bank is to employ the estimates of the model using all available data for forecasting and policy simulations. The version estimated through 78/IV, however, has a very large coefficient on the demand slack variable in the model's Phillips curve, almost three times the size of the coefficient estimated with data through 71/II or 75/I, for example. The results are reported in Charts 3 and 4 by the lines labeled StL1. There is a rapid deceleration in inflation and a low cumulative output loss. The inflation rate begins to decline very slowly; it takes two years to reduce the inflation rate by 1 percentage point. Thereafter the deceleration speeds up so that after

[6]For a description of the St. Louis model, see Andersen and Carlson (1970). The model includes a reduced-form equation for nominal income and a Phillips curve equation for price change; output is then solved for via an identity.

5-1/2 years, inflation has declined by 7.5 percentage points. The unemployment rate rises slowly at first and the maximum increase is only 1.8 percentage points, during the sixth year. The cumulative output loss is only about $200 billion.

The output loss is, of course, sensitive to the coefficient on the demand variable in the Phillips curve. Using a version of the model estimated through 71/III, where the coefficient on the demand variable is substantially smaller than in the first version discussed, inflation decelerates much more gradually; after six years the inflation rate in the policy run is only four percentage points below that in the base run. At this point unemployment is four percentage points higher than in the base run. The cumulative output loss is $350 billion at this point and escalating rapidly. These results are depicted in Charts 3 and 4 by the lines labeled StL2.

Evidence Based on Reduced-Form Equations

Given reasonable doubt about the validity of the Phillips curve,[7] it is useful to consider the implications of reduced-form models that are not tied directly to an explicit Phillips curve. We consider two examples: Stein's (1978) two equation model of inflation and unemployment and AJ type equations for nominal income and inflation. The results are depicted in Charts 3 and 4 by the lines labeled Stein (Stein 1 for the moderate case and Stein 2 for the radical case) and StL3.

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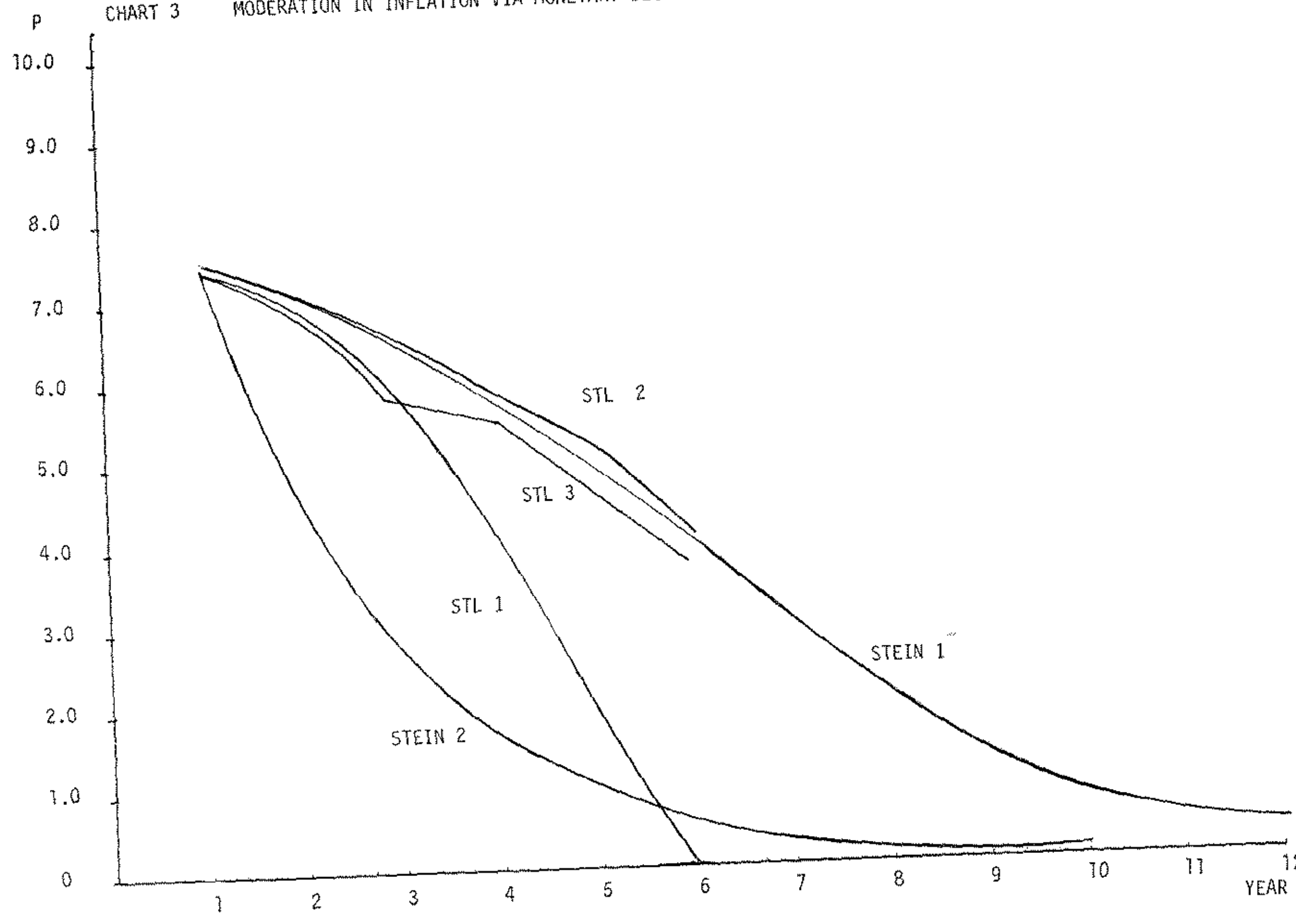
[7]See, for example, Stein (1978).

CHART 3 MODERATION IN INFLATION VIA MONETARY DECELERATION



The Stein model -- In the Stein model, both unemployment and inflation are driven by the rate of monetary growth. Stein's two equation model is:

(3) $\Delta u(t) = 3 - 0.6\, u(t-1) + 0.4\, \pi\,(t-1) - 0.4\, \mu_1\,(t-1)$

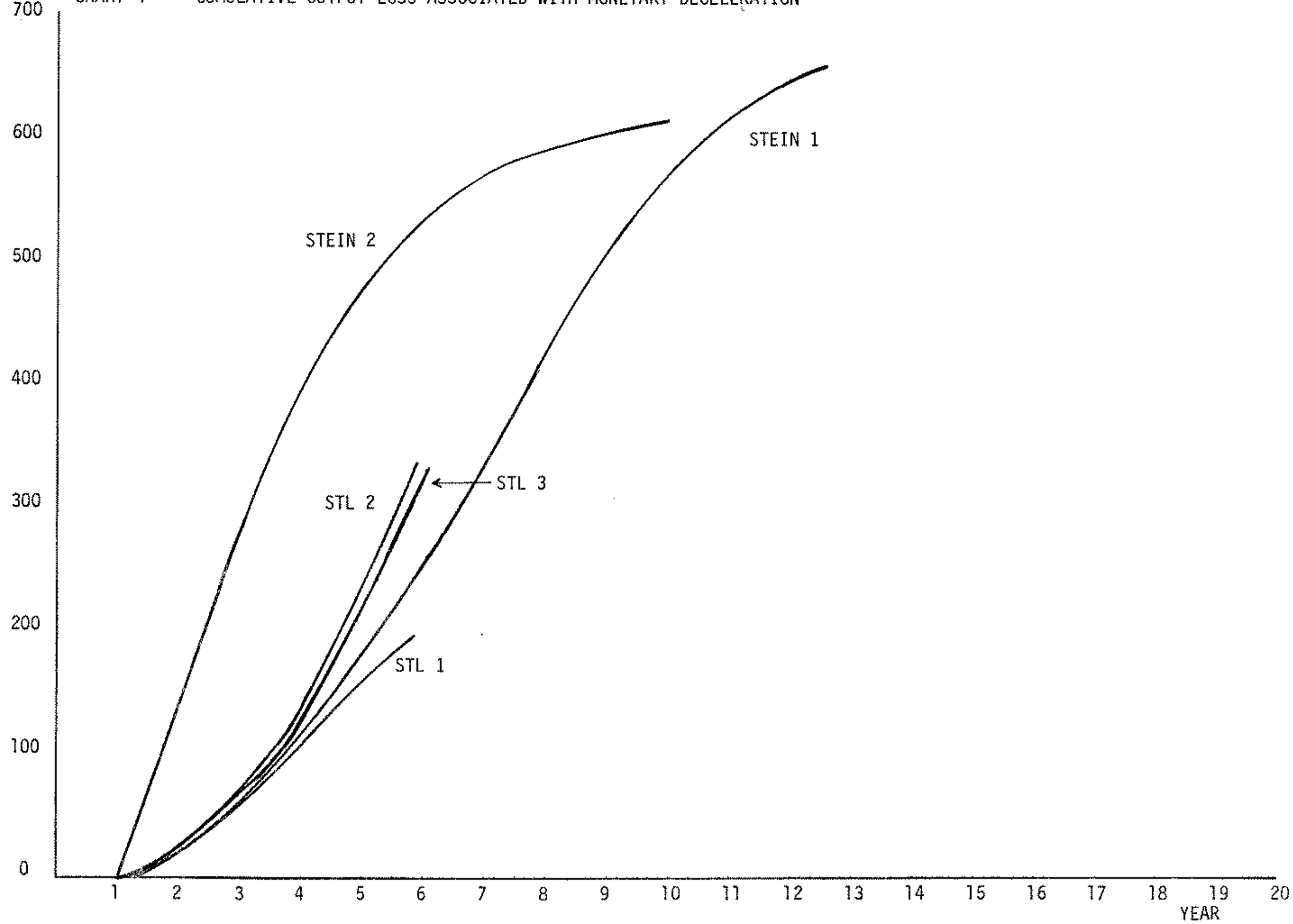
(4) $\Delta \pi(t) = -0.4\, \pi\,(t-1) + 0.4\, \mu_1\,(t-1)$

where u is the unemployment rate, π is the inflation rate and μ_1 is the rate of monetary growth. The critical unemployment rate is 5.0 and the equilibrium rate of inflation is the rate of monetary growth. Beginning at $u = 5.0$ and $\pi(t) = \pi(t-1) = 7.5 = \mu_1(t) = \mu_1(t-1)$, we decelerate the rate of monetary growth either (a) gradually by 1 percentage point per year until $\mu_1 = 0$ or (b) immediately to 0. In the gradual policy, unemployment rises beginning in year 2 and peaks in year 8 at 6.6 percent returning to almost 5 percent by year 16. The inflation rate begins to decelerate in year 2 initially at a 0.4 percent point a year rate but ultimately reaches 1.0 point per year by year 7. The inflation rate is down to 2 percent by year 8 and thereafter declines gradually to about zero by year 16. The cumulative output loss is \$687.5 billion. Interestingly, the gradual policy incurs a smaller cumulative output loss, \$613 billion.

The St. Louis reduced-form equation for income with a reduced-form for inflation -- A second simulation based on reduced-form equations combined the reduced-form for nominal income in the St. Louis model with a reduced-form equation for inflation.[8] The inflation

[8] The reduced-form equation for inflation used in this section was developed by Jack Tatom of the Federal Reserve Bank of St. Louis. An earlier version of this equation was used by Tatom in "Does the Stage of the Business Cycle Affect the Inflation Rate?" Federal Reserve Bank of St. Louis Review, September 1978, pp. 7-15.

CHART 4 CUMULATIVE OUTPUT LOSS ASSOCIATED WITH MONETARY DECELERATION



reduced-form includes a twenty period distributed lag on the rate of change in the money supply and a four quarter distributed lag on the differential in the rate of change in producer prices for energy and the price index for the nonfarm business sector, and two dummies for the effects of the freeze and Phase II and for the subsequent catch up effects. The St. Louis equation yields values for nominal income; the inflation reduced form is employed to generate price level predictions; and the price level is used to deflate nominal income to yield real output predictions. The results in Charts 3 and 4 depicted by the line labeled StL3, reflect the response to the same phased monetary deceleration employed with the other St. Louis model simulations described above.

Note the similarity with the St. Louis results with a Phillips curve (based on the sample period through 71/II), StL2, in Charts 3 and 4. With the reduced-form equation inflation declines more rapidly, by about .20 - .30 percentage points per year over most of the period; correspondingly, the output loss is somewhat smaller. But the time pattern and magnitude of both the deceleration in inflation and the cumulative output loss are remarkably similar. Again note that the output loss per quarter has not peaked after six years of the phased deceleration so that the cumulative output loss is still rising rapidly at the end of six years.

Qualifications of the Empirical Analysis

The results reported above are derived both from explicit Phillips curves, and from monetarist reduced-forms. The existence of a cumulative output loss associated with eradicating inflation is therefore generally consistent with both income-expenditure structural models and monetarist reduced-forms. The major deficiency of the empirical analyses on which the results described above are based is the failure to allow the public's perception of current and future policy to affect expectations about future inflation.

The Credibility Effect

The results reported above based on Phillips curves all related inflation in the current period to a distributed lag on past inflation rates where the latter are intended to reflect the rate of inflation expectations (and/or direct the influence of past inflation as for example via catch-up effects). This specification does not allow the degree of credibility associated with announced anti-inflation policies or even the expected influence of recent policy actions to influence inflation expectations. The estimates of cumulative output loss generated by such models are, therefore, almost certain to be overestimates. Fellner (1979), for example, maintains that "... the standard model coefficients... would change significantly for the better -- in the direction of a much more rapid rate of reduction of inflation for any given slack -- if a demand management policy... changed to a credible policy of consistent demand disinflation." But by how much does the standard model overestimate inflationary inertia? By 10 percent, 50 percent?

We do not have any reliable quantitative estimate of the degree to which policymakers can speed the deceleration of inflation by clearly defining their anti-inflation policies and convincing the public that they intend to follow through. Nevertheless, there would be nearly universal agreement that anti-inflation policies ought to be set out clearly and supported by both the Treasury and the Federal Reserve in such a manner as to maximize the credibility effect.

Rational Expectations and the Cumulative Output Loss

In the extreme form of rational expectations models advocated, for example, by Sargent and Wallace (1976), the cumulative output loss associated with a credible policy of monetary deceleration should be zero. These models have two essential features: 1) they are equilibrium models in which prices respond immediately and fully to monetary change and real variables such as unemployment and output respond only to unanticipated inflation; and 2) inflation expectations are formed rationally, taking into account knowledge both about the structure of the economy and the systematic features of policy.

In such a model, inflation should moderate immediately in response to the monetary deceleration, provided, of course, that the policy was announced in advance and believed (or otherwise expected). We had thought of running simulations with an RE version of the St. Louis model along lines suggested by Andersen (1979). On a moment's reflection, the implications were sufficiently obvious that computer simulations could be dispensed with. The St. Louis model has a Phillips curve in which inflation depends on a demand variable (x) and expected inflation ($\dot{P}^e$) where the latter is determined from an adaptive expectations model with weights taken from a regression of the nominal interest rate on past inflation rates:

(5) $\dot{P} = \alpha + \beta x + \varepsilon \dot{P}^e$

Andersen's RE version imposes the condition that $\dot{P}^e = E(\dot{P})$; i.e., that subjective inflation expectations equal the model's forecast for inflation. In this case:

$$(6) \quad E(\dot{P}) = \alpha + \beta x + \varepsilon E(\dot{P})$$

$$(6') \quad E(\dot{P}) = \frac{1}{1-\varepsilon} (\alpha + \beta x)$$

and Andersen substitutes

$$(7) \quad \dot{P} = \frac{1}{1-\varepsilon} (\alpha + \beta x)$$

for the St. Louis Phillips curve.

Andersen sets $\varepsilon = .86$, its value in the St. Louis model. However, if ε is meaningfully viewed in this case as the coefficient on expected inflation, the value of .86 estimated in the St. Louis model should not be accepted as the magnitude of that parameter in the RE version of the St. Louis model because the value of ε was estimated under the assumption that expectations were formed adaptively. Taking $\varepsilon = 1$, as seems essential to the RE model, equation 7 no longer is a meaningful equation for $\dot{P}$. Instead we obtain from (6) where $\varepsilon = 1$

$$(6') \quad 0 = \alpha + \beta x$$

so that there is a unique value of $x^* = -\alpha/\beta$ corresponding, of course, to the natural rate of unemployment. x can differ from x^* only on account of random disturbances (with zero mean). In this case any effect of monetary deceleration on the rate of growth of nominal income is transformed immediately and fully into a decline in inflation without any cumulative output loss. This seems to us a more meaningful RE version of the St. Louis model than that employed by Andersen.[9]

Balancing the Gains from Reducing Inflation Against the Transitional Costs[10]

The cumulative output loss is a measure of the cost of anti-inflation policies. To evaluate the desirability of such policies we also need to assess the gains from reducing inflation. Unfortunately, the costs of inflation (and hence the benefits of reducing inflation) are not as clearcut or easily quantifiable as the cost of unemployment. Fischer and Modigliani (1978) provide a careful outline of the costs of inflation. The costs include the welfare loss associated with the incentive to economize on cash balances, the reduction in capital accumulation due to disincentives for saving and investment that reflect the way in which the tax system permits inflation to affect after-tax

[9] There is a second and related objection to Andersen's approach. In the St. Louis model ε is not the sum of the coefficients on lagged inflation rates. Indeed the sum of the coefficients is generally about 1.0. The reason for this is that the St. Louis Phillips curve does not estimate the weights on lagged inflation directly within the estimation of the Phillips curve itself. First, an equation for a short-term interest rate is estimated as a function of the rate of monetary growth and distributed lags on both the rate of change in output and on past inflation rates divided by the ratio of unemployment to the full-employment rate. The sum of the coefficients on lagged prices from the interest rate equation in the original Andersen/Carlson article was 1.27 so the sum of weights on lagged inflation rates in the Phillips curve is .86 $(1.27/(u/u_f))$, approximately 1.0. The sum of the inflation coefficients from the interest rate equation vary considerably over different sample periods and the estimate of ε always compensates to yield a sum on past inflation rates of about 1.0. This reinforces our view that the value of ε in equation (6) should be taken as 1.0.

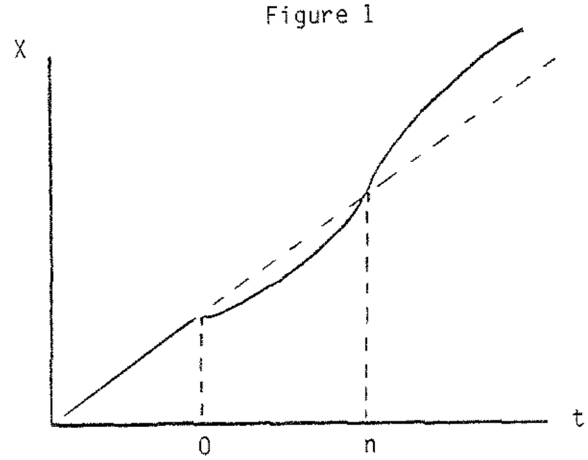
[10] This section was added to the original paper and was motivated by comments by Jerry Jordan and Allan Meltzer at the conference.

rates of return and the cost of capital, and the arbitrary redistribution of income and wealth due to unanticipated inflation.

While Fischer and Modigliani do provide estimates of some components of the costs of inflation, neither their study nor others permit us to compute a meaningful estimate of the benefits that would accrue from reducing inflation which could in turn be compared with the cost in terms of cumulative output loss. What we can compute is the minimum size of the permanent gain in output per year due to eradicating inflation which would just justify incurring the cumulative output loss associated with the transition to price stability. We will refer to the benefits as a gain in real output per year. Some components of the gain may, however, be welfare or utility gains that would not necessarily show up in computed measures of real output. While such welfare gains are even more difficult to evaluate than output gains, they are no less important in developing a measure of the benefits of reducing inflation.

Figure 1 depicts the comparison we wish to make. The dashed X line is the rate of growth of (potential) output if inflation remains

Figure 1



indefinitely at 7.5 percent. If anti-inflation policies are pursued, output is assumed to follow the solid line. The transitional costs occur between t = 0 and t = n as unemployment rises above the rate associated with potential output. However, if there are costs of inflation, output will rise above the level that would have prevailed if the initial steady inflation rate had continued. We define G as the present value of the permanent per period output gain, evaluated from period n to ∞.

(8) $$G = \sum_{i=n}^{\infty} \frac{g_i}{(1+r)^i}$$

This can be compared to the present value of the cumulative output loss (L)

(9) $$L = \sum_{i=0}^{n-1} \frac{L_i}{(1+r)^i}$$

where L_i is the output loss in the ith period (i=0, ... n-1).

Assuming that the unemployment rate is maintained above the rate consistent with potential output by a fixed amount for n periods, the loss in period i can be expressed as

(10) $$L_i = \bar{L}\,(1+\rho)^i$$

where $\bar{L}$ is the loss in the first period and ρ is the rate of growth in potential output. If $r=\rho$, the expression for L simplifies to

(10') $$L = n\bar{L}$$

This is precisely the way we calculated the discounted value of the cumulative output loss above for the Perry and Cagan equations.

To simplify further, we assume g_i is a constant $\bar{g}$ for all $i \geq n$. We then solve for the value of $\bar{g}$ which first equates the cost of unemployment and the gain from eradicating inflation -- the minimum value of the permanent per period gain from eradicating inflation that would justify incurring the transitional costs. The value of $\bar{g}$ for the Perry, Stein, and Cagan results are presented in Table 8; we calculated them under the assumption of a 3.3 percent discount rate and for two

TABLE 8

The Minimum Value of the Per Period Gain
that Justifies Eradicating a 7.5 Percent Inflation Rate

Equation/ Model	Value of $\bar{g}$ (billions of 72 $) 3.2	2.5
Perry 1	73.0	57.0
Perry 2	70.9	55.4
Cagan	16.6	13.0
Stein 1	31.0	24.2
Stein 2	25.4	19.8

alternative values of the Okun's Law coefficient (3.2 and 2.5, respectively). The minimum value of $\bar{g}$ varies from $13 billion per year based on Cagan's Phillips curve to $73 billion based on the Perry's Phillips curve under a moderate policy.

Note that this analysis provides an alternative perspective on the case for gradualism. Under gradualism, the costs may be reduced if the Phillips curve is nonlinear. But the benefits are also more gradual (in our analysis, postponed until inflation is eradicated). Thus, we find that although the costs are smaller under the gradual policy using the Perry equation (Perry 1), the size of the per period gain required to justify eradicating inflation is smaller under the more radical policy (Perry 2). The radical policy also yields a smaller minimum per period gain using the Stein model, although this result was expected in this case because the cost turned out to be lower in the radical case using Stein's model.

The calculations reported above presumed that the gains from reducing inflation could be meaningfully represented as a fixed real sum per period. What if the gains are more meaningfully specified as a real sum which grows at the same rate as potential output? For example, the cost of a fully anticipated increase in inflation is generally measured by the reduction in the area under the demand curve for money balances as wealth owners reduce their demand for money in response to the associated rise in nominal interest rates. The decline in demand for real money due to a rise in the interest rate is generally viewed as proportional to the overall scale of money holdings which, in turn, is determined by the level of transactions (e.g. real income). The cost of a given rate of inflation and hence the benefits of eliminating the inflation may therefore grow at the rate of increase of potential output. In this case where $\bar{g}$ is the value of the gain in period n (the

$$(8') \quad G = \sum_{i=n}^{\infty} \frac{\bar{g}\,(1+\rho)^i}{(1+r)^i}$$

first period in which a gain is registered). For $\rho \geq r$, $G \to \infty$. This corresponds to the result recently derived by Feldstein (1979): if the cost of inflation grows at a rate equal to or greater than the discount rate, any positive initial gain (any $\bar{g} > 0$) is sufficient to justify incurring any finite transitional cost!

These results suggest that the case for anti-inflation policies should not be dismissed lightly, even when there are large transitional costs of eradicating inflation. The range of the estimates of the cumulative output loss, the uncertainty about the adjustment in those results required to allow for the credibility effect, and the lack of a quantitative estimate of the cost of inflation makes it extremely difficult to make a meaningful comparison of the costs and benefits of anti-inflation policy. It should not be surprising therefore that policymakers generally seem indecisive and often lacking in commitment to reduce inflation. Narrowing the range of estimates of output loss and developing a measure of the cost of inflation should be high on the priorities for macroeconomic research in the 1980s.

RULES VERSUS ACTIVISM

The case against activism rests on two propositions. The first proposition is that the private sector of the economy is inherently stable. This is a major tenet of monetarism and suggests the absence of a need for stabilization policy. Indeed, monetarists generally contend that the instability observed in the economy results mainly from government rather than private sector decisions. The inherent stability of the private sector results in part from the absence of large and persistent exogenous shocks and in part from the fact that the shocks that do occur have relatively small and only temporary effects on output and employment as a consequence of the economy's built-in stability.

The second proposition in the case against activism is that even if the economy were subject to cumulative movements in output, employment and inflation relative to target levels, discretionary policy might only compound the instability rather than dampen it. The danger that policy will turn out to be destabilizing follows from the long inside lag, the long and variable outside lag, and the general uncertainty about the effect of policy on the economy.

The case for activist policy involves a rejection of the two propositions developed above; the economy needs to and can be stabilized by appropriate manipulation of policy instruments. The first proposition in support of policy activism, then, is that the economy is subject to substantial and persistent disturbances arising from the private sector. In addition, nonmonetarists contend that policy can be implemented with sufficiently short inside lags and with sufficient precision given our understanding of the structure of the economy to yield an improvement in economic performance relative to a policy of a fixed rule.

Relevant empirical evidence on rules versus activism includes:

(1) the relative size of exogenous impulses arising from policy and nonpolicy sources

(2) the degree of persistence in the response to such disturbances

(3) the ability of active policy to improve economic performance in the face of the disturbances.

Stability of the Private Sector

The issue of the stability of the private sector has been categorized as a fundamental difference between monetarists and the conventional Keynesian tenets (See Andersen (1973) and Mayer (1975)). Nevertheless, it appears to be an issue on which little, if any, relevant empirical evidence is available.

The evidence that is conventionally cited in response to the allegation that the Keynesian position regards the private sector as inherently unstable is the result of simulation experiments with various econometric models. These experiments suggest that the models are stable, usually exhibiting highly damped oscillations back to equilibrium following some shock (see Klein (1973)). Such results under the postulated experimental conditions are probably a necessary condition, but not a sufficient condition to substantiate the monetarist proposition. We would need to look at the degree of damping under a policy of fixed rules relative to the damping under an endogenous policy with feedback from current economic developments. The case for rules is enhanced if endogenous policy reduces the degree to which disturbances are damped.

Evidence from Model Simulations

Discussions of the effectiveness of policies often focus on the size of policy multipliers. Such measures of the leverage of policy on goal variables are critical to setting policy, but do not provide any evidence on the usefulness of discretionary policy unless they are zero. Indeed as Cooper and Fischer demonstrate, even if the policy instrument has a zero cumulative multiplier it may be useful as a stabilization tool as long as it has a nonzero short-run multiplier. More important is the predictability of the outcome of policy actions which is more closely related to the errors in forecasting the goal variables. The case for discretion, therefore, has little or nothing to do with the size of policy multipliers, unless there is some concern about moving the policy variables too far or too fast such as when a "penalty function" is added to the "goal function." The time pattern of the response as well as the predictability of the policy multipliers, on the other hand, do matter. Evidence on rules versus discretion, therefore, generally involve model simulations and these are most useful if allowance is made for uncertainty about the multipliers.

Below we review the evidence on the comparison of economic performance under rules and discretion based on simulations with macroeconomic models. First we must define a set of alternative policies; four alternatives have been investigated.

1) Actual policy: Historical simulations in which policy instruments take on their historical values provide the benchmark of actual policy, discretion as it was implemented as opposed to what would have been optimal in the context of the model under consideration.

2) Fixed rules or rules without feedback: Simulations in which the policy instrument is constrained to grow at a constant rate provide evidence on the effect of fixed rules; for example, a constant rate of monetary growth as advocated by Friedman. In this case the policy instrument is totally independent of current economic developments.

3) Active rules or rules with feedback: An alternative to both discretion and fixed rules is an active rule or a rule which requires policy instruments to respond systematically to current economic developments. This approach introduces Phillips type ad hoc rules involving proportional and derivative controls. Some experimentation is undertaken to identify "good" rules but short of full optimization. Such simulations can be viewed as a way of modeling systematic discretionary policy without the blatant policy errors that in retrospect always mar the historical runs.

4) Optimal control: The benchmark for identifying the best that is possible under discretionary policy is an optimal control simulation in

which policymakers are viewed as selecting a time path for their instruments that minimizes the losses associated with deviations of their goal variables from their target levels. It, therefore, requires imposing an explicit loss function including the designation of relative weights on competing objectives and solving the model subject to minimization of the losses. The solution allows the selection of an instrument path to reflect knowledge of the structural parameters of the model and forecasts of future performance based on current and past values of exogenous variables and the dynamic structure of the model. A superior economic performance under such circumstances hardly provides convincing support for discretionary policy, although it provides evidence of the <u>potential</u> for discretionary policy to improve economic performance.

The various policy regimes can be simulated in a number of different ways. In a <u>deterministic</u> simulation the error terms in the various estimated equations are set to zero. This immediately removes a potentially important source of instability in the private economy and should be expected to bias results in favor of fixed rules. There are two basic types of <u>stochastic</u> simulations reflecting the two sources of random disturbances: the additive error terms in the estimated equations and the estimated coefficients. Simulations allowing for random additive error disturbances are generally labeled stochastic simulations while those that randomize both parameters and additive errors are referred to as <u>fully stochastic</u> simulations.

Actual Policy Versus Fixed Monetary Growth Rules

Modigliani reports two simulations with a fixed monetary growth rule over the period beginning in 1959 and ending in mid-1971. In each case M1 is constrained to grow at a 3 percent annual rate. In the first simulation all shocks are eliminated by substituting constant trends or means for untrended exogenous variables. In the second, historical values of exogenous variables are employed. In the first case the monetary rule stabilizes the economy, but, allowing for historical shocks the economy "was distinctly less stable than actual experience, by a factor of 50 percent [p. 12]."

Eckstein investigates the implications of smooth growth in nonborrowed reserves over the period of 1964 through 1975. (Nonborrowed reserves grow at a 4 percent rate in '64, accelerate 1/4 percent point each year until they stabilize at a 6 percent rate during and after 1972). Eckstein finds that smooth growth in reserves does result in "a more stable growth pattern" but does not dramatically alter the overall results for economic performance.

Active Rules Versus Fixed Rules

In a series of papers employing simulations with both the MPS and St. Louis models, Cooper and Fischer (1972a, 1972b, 1974) compare Phillips type feedback control rules with fixed growth rate rules. They conclude that there are active rules which dominate fixed rules for both models, under deterministic, stochastic and fully stochastic simulations. The dominant active rules generally involving strong derivative controls and some proportional control. The criterion was the average standard deviation in the unemployment and inflation rates.

For the St. Louis model, for example, the average standard deviations for each variable were reduced by about 20 percent in the deterministic simulations (over the period 56/I-68/IV), between 50 - 70 percent in the stochastic simulations (over the same period) and by about 50 percent in the fully stochastic simulations (over the period 55/I - 71/IV). The improvement was more modest, however, in the MPS model, where the standard deviation of unemployment fell by 4 - 24 percent and that of inflation by 7 - 32 percent in stochastic simulations over the period 1956/I - 68/IV.

Optimal Control Simulations

There have been numerous attempts to compare fixed rules with optimal control simulations including Chow (1972), Garbade (1975), Cooper and Fischer (1975), Crane, Havenner and Tinsley (1976), and Crane, Havenner and Berry (1978). The first four studies find that fixed rules are uniformly inferior to optimal control (and generally inferior to historical policies). These studies use stochastic simulations but actual values of exogenous variables and, with the exception of Cooper and Fischer, constant parameter values. Garbade for example finds that "discretion," in the form of optimal control, reduces the expected loss by 50 percent compared to a fixed rule, a result in close agreement with Chow. Garbade views his results as adding to the "accumulating evidence" of the gains associated with discretion "when a valid representation of the economy is available." But that, after all, is the major element in the controversy.

Cooper and Fischer find that their active rules perform quite well in relation to optimal control solutions using the St. Louis model.

Costs are reduced by about 45 percent relative to fixed rules, but fixed rules outperform historical policy in this case due in part to greater instability in instrument movements in the latter case. The Cooper-Fischer paper produces a possibly valuable insight about the relative performance of rules and discretion. Stochastic simulation requires multiple simulations for alternative realizations of the stochastic disturbances. They found that the poor overall performance of fixed rules resulted from their "spectacularly bad" performance in replications where losses turned out to be above average for all policies. Where average performance is good, on the other hand, fixed rules perform about as well as optimal control. This may imply that optimal policy is nonlinear-restrained to fixed rules within a band around target values of goal variables and active only outside those bands. Thus, "fine tuning" is rejected, but activism in the face of a major disturbance has a substantial payoff.

This conclusion is reinforced by the Crane, Havenner and Tinsley study of the 1971/I-1974/II period using a condensed version of the MPS model, MINNIE. Optimal policy is not especially volatile after an initial aggressive expansionary policy in the first two quarters to offset the recession implicit in the initial conditions. The optimal policy again dominates fixed rules, in this case by about 40 percent; and fixed rules would have increased expected losses by about 45 percent relative to historical policies.

Rational Expectations and the Limits of Activist Policy

The traditional arguments against activist policy focused on the implications of long inside lags, long and variable outside lags, and multiplier uncertainty; there was a general emphasis on the limitations of policy in an environment characterized by insufficient knowledge of the economy's structure. The Lucas-Sargent-Wallace rational expectations models suggest a dramatically different basis for fixed rules. These models suggest that policy is doomed to ineffectiveness in an environment in which economic agents have knowledge both about the structure of the economy and the way in which policy authorities respond to economic developments. In this case too much knowledge rather than too little knowledge underlies the ineffectiveness of policy. Real variables according to these models respond only to unanticipated price or inflation shocks. Systematic policy, by definition, cannot produce surprises. Therefore, although there exists a trade-off between unanticipated inflation and unemployment, it cannot be systematically exploited by policy authorities; this is generally referred to as the neutrality proposition. The theoretical structure of these models and the implications of a number of qualifications, particularly the existence of nominal contracts, have been thoroughly developed in the paper by Taylor. The role, operational specification, and implications of rational expectations in macroeconomic models is the central issue in macroeconomic theory today and empirical investigations of these models is certain to be the growth industry of the '80s. There are, however, only a handful of empirical studies to date that attempt to test the neutrality proposition.

McCallum (1979) in a recent survey of this literature notes that while "the formal evidence is not inconsistent with the neutrality proposition. . . the power of existing tests is not high and, in any event, the evidence is not entirely clearcut." The two most important empirical studies are the Barro papers (1977, 1978) on the effect of unanticipated monetary growth on unemployment and output and Sargent's paper (1976) applying Sims and Granger tests for causality to movements in the unemployment rate, the money supply, government expenditures and other macro variables.

Barro estimates a reaction function to isolate unanticipated monetary growth and then examines the role of unanticipated and anticipated monetary change on unemployment and output. His results are remarkably one sided, supporting the hypothesis that only unanticipated policy actions affect real variables. But his empirical methodology has been convincingly critiqued by Small, Fischer (1978) and Gordon (1979). Sargent is somewhat more cautious in interpreting his findings as indicating that "the causal structure imposed on the data by the classical model. . . is not obscenely at variance with the data [p. 233]." We think this means the results are mixed, which indeed they are. There is some evidence, for example, that movements in the money supply "cause" movements in the unemployment rate (using the Granger test) and some evidence that it does not (using the Sims test).

Summary

The evidence accumulated over the '70s has has at best only a modest role in increasing the consensus over the gains associated with activist policy. The experience of the '70s has clearly eroded the optimism about the potential activist policy that characterized the apparent success of the 1964 tax cut and the long expansion of the '60s. There is wider recognition today compared to the mid-1960s among proponents of active policy of the limitations of active policy and the difficulty of "fine tuning" the economy by responding to even small departures of output and employment from target levels. Active policy, however, continues to have wide support in situations where a sizable displacement has occurred, as in the 1973-75 recession. On the other hand, many proponents of rules, such as Friedman (1968), also allow for the use of discretionary policy to offset "major disturbances [p. 14]." Therefore, the gulf between proponents of rules and activism is not nearly so great as it might at first appear. The optimal control studies have helped to emphasize the potential usefulness of aggressive policy action when initial conditions are far away from targets and the limited potential usefulness of activist policy in response to smaller displacements. This lesson is perhaps one on which proponents of rules and activism can agree.

CONCLUSION

As the '70s began, the monetarist-income expenditure controversy was a dominant theme in macroeconomics. Particularly after the MPS and other large scale models began churning out large values for monetary policy multipliers, the controversy focused in on the size of fiscal multipliers, particularly the fiscal multipliers on nominal GNP. The econometric evidence of the '70s has not fully resolved this issue, i.e., there are those who continue to be persuaded by the St. Louis equation results. And while this evidence questioning the reliability of the fiscal multipliers in the St. Louis equation undoubtedly has reinforced the views of the skeptics, it has not necessarily shaken the confidence of the equation's supporters.

As the '70s began, the orthodoxy of a Phillips curve embodying a stable trade-off was under an attack it did not survive. After a transitional period, evidence mounted in support of a vertical long-run Phillips curve. Thereafter, the issues contested have been the nature and sources of any short-run trade-off and the implications for the output loss of eradicating inflation. The econometric evidence from a wide range of sources and models suggests that monetary deceleration can eradicate inflation, but not quickly and not without large costs in terms of cumulative output loss. The major unresolved issue is the significance of the credibility effect and the degree of overestimation in the cumulative output loss due to the failure to take into account the effect of recent policy actions and expected policy actions on inflation expectations.

While fine-tuning may have few advocates, the evidence from model simulations suggests there are likely to be considerable gains to activism when the economy is far away from targets and in response to very large shocks. Rules or activism remains an important issue although the case against activism has been broadened by the development of rational expectations market clearing models.

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DISCUSSION OF THE MEYER-RASCHE AND TAYLOR PAPERS

Neil Wallace

For us at this conference, the 1970s constitute ten years of additional data and some theoretical developments that suggest new ways of interpreting those and earlier data. The two papers presented this morning -- in part, because of the assignments given the authors -- contain very different views about the lessons of the 1970s. I will come to still a third view and, as it happens, one that does not represent a compromise between them.

As I understand it, Meyer-Rasche accepted the task of summarizing lessons from the data of the 1970s, while Taylor accepted the task of summarizing lessons from the theoretical developments of the 1970s. That division of labor did not turn out well; it encouraged Meyer-Rasche to proceed as if one could learn lessons from data without invoking theory.

On the basis of the preliminary draft of the Meyer-Rasche paper made available to me and on the basis of their oral remarks this morning, I am left somewhat in the dark about the point of view of the Meyer-Rasche paper. I know what they did, but I'm not sure what their message is.

Based on what they did, one might infer that for Meyer-Rasche, the 1970s represent no more than ten years of additional data. They

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use those data and earlier data in the same way that most economists ten years ago used the data available to them. In particular, both their so-called structural models and their reduced-form models consist of regression equations that in form are the same as those most economists used in the 1960s. Moreover, Meyer-Rasche extrapolate from those regression equations for the effects of different policies in the same way that many economists in the 1960s extrapolated from their estimates. That is why I say that for Meyer-Rasche, the 1970s seem to represent no more than ten years of additional data.

Even at the level of pure empiricism, a different lesson can be drawn. The Meyer-Rasche extrapolation procedure applied in the late 1960s did badly predicting the 1970s. Why, then, believe that those same procedures applied now will do well predicting the 1980s?

Happily, though, we do not have to decide on the basis of pure empiricism. The theoretical developments of the 1970s -- many of which are described in Taylor's paper -- provide convincing arguments why we should not take seriously as "multipliers" the correlation coefficients or the functions of them presented in the Meyer-Rasche paper.

Meyer-Rasche are aware of the criticism of the multiplier interpretation of their estimates. In effect, they acknowledge the criticism and say that they are unwilling to defend such an interpretation. That, though, is what leaves me confused about their message. Nor does it help to suggest, as Meyer seemed to in his oral remarks, that their estimates of Phillips curve trade-offs provide upper bounds on the unfavorableness of this trade-off. Logically, such a claim also requires a supporting argument. Moreover, upper bounds can be interesting, or not interesting. All of GNP is an upper bound on the output loss that accompanies a one percent cut in the inflation rate, but it is not an interesting upper bound. Meyer-Rasche must convince us that their estimates are interesting upper bounds if, in fact, they are upper bounds at all. Such convincing must take the form of a theoretical argument that says why it is legitimate to extrapolate in particular ways from particular correlations.

In the 1960s, many economists thought that their policy extrapolations from the kinds of models used by Meyer-Rasche were legitimized by existing theory. The theoretical developments of the 1970s have convinced many of us that that is not so. Although Taylor's paper describes some of those developments, his paper stops short of describing in full generality why we were led astray badly by the kind of theorizing that was used. Since that kind of theorizing still persists, it is worthwhile summarizing in a general way what is wrong with it.

Whether we are talking about most textbooks in macroeconomics or most macroeconometric models, the models from which policy implications are drawn consist of a set of relationships -- a consumption function, an investment function, a money demand function, and so on. Let us label these M_1, M_2, M_3,...,M_N (M for model). The style of macroeconomics textbooks is to present the complete model and its policy implications and also to present separate chapters -- one on consumption, one on investment, one on money demand, and so on -- that are meant to justify one by one the relationships of the complete model, the M_i. When builders of macroeconometric models try to justify their models, they also proceed in this way. In order to get at what is wrong with this kind of theorizing, we must describe the logical relationship between these justifying chapters and the macroeconomic or macroeconometric model consisting of M_1, $M_2,\ldots,M_N$.

Each justifying chapter consists of a set of assumptions. Let us label these sets of assumptions $S_1,S_2,\ldots, S_N$ (S for story), where for each i, S_i is said to justify M_i. The most extravagant claim made about the relationship between S_i and M_i is the following: <u>For each i</u>, <u>S_i implies M_i</u>. In particular, it is never claimed that the converse is also true. In other words, in general, S_i and M_i are not equivalent and more is implied by S_i than just M_i. This nonequivalence has two consequences.

First, it implies that consistency among the M_i does not imply consistency among the S_i. If the S_i are mutually inconsistent, then it cannot be claimed that there is an underlying theory of the M_i. Note, in this regard, that consistency among the S_i is never checked and, as I illustrate below, that inconsistency is easy to demonstrate for most macroeconomic models.

Second, if the S_i are mutually consistent, nonequivalence between S_i and M_i implies that we are missing many of the implications of the underlying theory by limiting attention to the M_i. Thus, for example, the S_i often contain at least hints of a welfare analysis of inflation. As is well known, the typical M_i provide no such analysis.

I will now briefly defend the nonequivalence claim and, at the same time, argue that inconsistencies are present in standard macro models. And, since this is St. Louis, I will begin by focusing on money demand.

The usual way to defend the money demand functions of most macroeconomic models is to appeal to a transaction cost model of the Baumol

(1952), Tobin (1956), or Miller-Orr (1966) variety. Those models explain money demand in the presence of default-free, higher-yielding securities -- Treasury bills, say -- by transactions costs, for example, trips to the bank. But the models imply more than a money demand function. They imply that if the ratio of the public's means of payments to its holdings of interest-bearing assets changes as a result, say, of open-market operations, then there is a change in the amount of resources used up in transactions. But such a change contradicts the usual resource-supply assumptions of most macro models. Those make no allowance for an altered amount of resources being used up in transactions. For this and other reasons, the implications for open-market operations of the theory of interest in the inventory models are very different from those of most macro models, particularly monetarist models (see Bryant and Wallace 1979).

It is also standard to assume that the money demand function that one derives for a closed economy holds with only minor modifications for an open economy in a world in which each of several countries issues its own money. It is this view that lies behind the attachment to (the viability of) laissez-faire floating exchange rates. But such a claim is supported neither by an acceptable theory (see Wallace 1979), nor by recent experience. That experience suggests that the demand for a particular money in a world of many monies may be very different from the demand for a single money in a closed economy.

In the 1970s, of course, inconsistencies regarding expectation formation have received the most attention. Expectation formation is important because macroeconomics is concerned primarily with aspects of behavior that depend upon views about the future -- asset acquisition versus current consumption, the composition of assets, or nominal wage determination in those contracts that Taylor discusses at length in his paper. It has been argued convincingly that the M_i of most macroeconomic models contain, either implicitly or explicitly, forecasting schemes that are good schemes in some environments and not in others. (See, for example, Lucas 1976.) Moreover, careful examination of the S_i reveals that the particular forecasting schemes imbedded in the M_i were chosen because they were good schemes in particular environments. The inconsistency arises because the environment implied by all the M_i -- including various specifications for policy -- may not correspond at all to that assumed in the various S_i. This kind of inconsistency is avoided by using a perfect foresight (rational expectations) equilibrium concept. By using that concept, the economist avoids imposing on the individuals whose behavior is being modeled any fixed way of extrapolating from the past, and ensures that he or she is not attributing to them views about the future that make no sense for the environment they are in.

Now having said that perfect foresight is an equilibrium concept, it should be evident that it is misleading to discuss its merits or its implications in terms of a particular policy conclusion like "policy (whatever that means) does not matter." The perfect foresight equilibrium concept has been around for a long time. It would be surprising, indeed, if that concept alone implied a result like "policy doesn't matter." In general, of course, by themselves equilibrium concepts imply very little. The importance of the perfect foresight equilibrium concept has nothing to do with the validity of some vague conclusion like "policy does not matter." Why, then, all the attention to "policy doesn't matter" in this morning's papers?

In 1975, there appeared a paper by Tom Sargent and me in which a result of that sort was obtained. We took a particular M_1, M_2,..., M_N, one that we argued resembled in many respects standard macro models, and replaced a fixed forecasting scheme, one of the M_i, by perfect foresight. We argued that the replacement made a great difference for the implications of the model. In particular, under perfect foresight and certain other assumptions, all policies in a certain class gave rise to the same equilibrium values for real variables. This result did not follow under the fixed forecasting scheme. Our message was, therefore, that the kind of forecasting scheme imposed matters greatly. Such a message, though, is very different from one that says that the perfect foresight version should be taken seriously as a model of this or any other economy. From the discussion above -- and from remarks in our 1975 paper -- it should be evident that the imposition of a perfect foresight equilibrium concept does not by itself turn a hodgepodge of indefensible relationships into a coherent model.

The Sargent-Wallace "policy-doesn't-matter" result is to be contrasted with a neutrality result obtained by Lucas (1972). The Lucas result was obtained from a model that is coherent in the sense that its conclusions are derived from a mutually consistent (and defensible) set of assumptions, a single S. The Lucas neutrality result, however, applies only to <u>alternative deficits consisting of money transfers that individuals know they will receive in proportion to their holdings of money</u>. This is neither monetary policy in the sense of open market operations -- there is, in fact, only one asset in the Lucas model -- nor is it the kind of fiscal policy that any country ever follows. The Lucas model is important because it is the first coherent model that implies anything like Phillips curve correlations. The model implies that it is not legitimate to extrapolate from these correlations for the effects of different policies.

What is new about the 1970s and what offers bright prospects for the 1980s is not so much the view I have set out about the illogical structure of standard macroeconomics. That view can, I think, be found in Leontief (1947) and Koopmans (1947) and, I might add, in the attitude of many nonmacroeconomists toward macroeconomics. What is new and exciting about the 1970s is the progress we have made in devising defensible assumptions that can explain a wide range of macroeconomic phenomena. Lucas (1972) is an outstanding example. In the work on search and matching models (see, in particular, Mortensen 1979), we see the beginnings of a theory of unemployed resources. And, perhaps, in new work on money (see, for example, Kareken and Wallace 1979), there are ideas about how to confront long-standing problems in monetary theory. Although I think we are making rapid progress, the profession is very far from having reached a consensus.

First, not everyone, by any means, agrees that we must completely abandon the style of macroeconomic theorizing and modeling that I have described above. For many, to do that is to abandon macroeconomics. This is right if macroeconomics is defined by a style of modeling. But if, instead, macroeconomics is defined by the phenomena it seeks to explain and by the policies it seeks to analyze, then this is not a call for abandoning macroeconomics. It is a call for abandoning a fallacious style of reasoning that has evidently gotten us nowhere. Second, even among those who agree that we must, as it were, start over in macroeconomics and monetary theory, there is little agreement about how to proceed. For example, in my very brief listing of promising developments, I did not include disequilibrium theory. In my view, disequilibrium theory is not very promising, but many economists disagree.

Given the lack of consensus on theory, it would be surprising if there were consensus on policy. And there is not. Academics, of course, thrive on controversy, which very naturally accompanies the development of substantially new theories in a field. Policymakers, in contrast, seek consensus. Since the economics profession is far from having reached consensus on macroeconomic policy, I do not envy the task of policymakers in the 1980s. The absence of professional consensus leaves policymakers in the position of having to make up their own minds.

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DISCUSSION OF THE TAYLOR PAPER

Hyman Minsky

For this conference John B. Taylor has prepared a survey paper titled "Recent Developments in the Theory of Stabilization Policy." Such a survey is useful as it develops the critical issues in the field, indicates what progress has been made, defines the questions on the research frontier and serves as guide through an important literature. Its usefulness depends upon the competence, taste and vision of the author.

John B. Taylor holds a position and has the credentials that bespeak of competence. The paper before us is an academic exercise that illustrates the author's command over a literature which is sometimes technically demanding. The paper also shows that he is able to ignore the developments in economic theory and the economy which are especially relevant for stabilization policy and the theory thereof. Hence in reading Taylor's paper I was led to question the taste and vision that guides him and the literature he surveys.

The theory of stabilization policy is important only as it serves as a guide to action in an unstable world. The topics and the literature that Taylor has chosen to cover are not useful to anyone seriously involved in stabilization policy; one cannot derive any guide for action with respect to the serious issues of stabilization policy from

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this survey or from the underlying papers. Therefore the paper serves no useful purpose aside from being a showcase for Taylor's talents. In a similar vein, the underlying literature may be best interpreted as the products of a game played for academic advancement.

In selecting what to discuss Taylor ignores the literature which quite clearly demonstrates that neo-classical aggregate economics, which focuses on price or wage rigidities and which introduces money as an exogneous variable, will not do. The literature he focuses on looks to refining and making more precise the very neo-classical formulations whose logical consistency and empirical relevance has been demolished by developments in theory in recent years. However one rule of the game Taylor and the authors of the reviewed literature play is that research is to be carried on "within" the neo-classical model; thus taste and vision conspire to rule out the relevant and the serious because it is unorthodox.

The most important developments for the theory of stabilization policy during the late 1960s and 1970s were not in the literature but in the "world." The observations that theory has to explain and the developments in the economy that stabilization policy has to contend with changed radically in the mid 1960s. In particular, stabilization policy now has to deal with threats and partial realizations of financial instability as well as with stepwise increasing unemployment and a stepwise acceleration of inflation.

For all who take "our economy" rather than the literature about economics derived from the neo-classical (monetarist and pseudo-Keynesian) research program as the subject matter of their research, the world underwent a marked change of state around 1965. The instability that policymakers have to contend with after 1965 is of a different order of magnitude and the potential consequences of mismanagement of stabilization policy are much more serious than earlier in the post-war period. The financial system and practices evolved from 1945 to 1965 so that the system, which had been virtually impervious to financial instability, became highly susceptible. Between 1945 and 1965 there were no threats of a financial crisis of the scale which could usher in a deep depression; in the years that have followed there have been at least three such threats within the United States, as well as a number of threats to the stability of the international financial system. Whenever financial instability threatens to trigger a debt-deflation process, policy interventions by both the government and the central bank can really make a difference in the path of the economy through calendar time. Nothing in the paper before us exhibits an appreciation of the change in the character of the "stabilization problem" over the years surveyed.

Once the potential consequences of the mismanagement of policy becomes so much more serious, the importance of economic theorizing about stabilization policy increases. In particular, economic theory needs to be relevant in the sense that the critical situations -- in this case financial instability and the way in which financial variables affect aggregate demand -- are well defined within the theory. If theory is based upon misspecifications of the economic process and the problems faced by policymakers, then theory cannot be relevant: garbage in -- garbage out applies to theory construction as well as to computer modeling.

The problems of the economy have been exacerbated because policy-makers have been guided by insights and conclusions drawn from neo-classical theory. Neo-classical theory is an inappropriate tool for dealing with instability, for financial or any other instability is foreign to this theory. In neo-classical theory any deviation from equilibrium must be due to exogenous developments and any sustaining of a disequilibrium must be due to "barriers." Neo-classical theory is able to explain instability only by postulating the existence of one or more devils, be they trade unions, OPEC, monopoly, the central bank, government or democracy. Because economic policy advising over the past decades has been largely monopolized by practitioners of neo-classical theorizing our current economic malaise is in good measure iatrogenic. The physicians, including our hosts, have served to make the disease worse.

A theory of stabilization policy is needed if and only if the economy is unstable. There is no sense whatsoever to the concept "stabilization policy" if the beast is stable. When Wallace, Sergent, et al. play their games by positing a system whose behavior is determined by elements that are independent of the variables that, in their specification, stabilization policy directly affects, then the proposition that policy does not matter is true not by demonstration but by assumption. As the instability that is so evident in the world cannot occur within their models, the games they play only serve to show that their models and the empirical tests that they perform are irrelevant for our economy. In my view the strong proposition that emerges from one literature surveyed by Taylor, is that this large body of work is irrelevant for the world in which we live. If economics is to be anything more than an academic nit-pick, theory and theorizing has to go in other directions than those represented in the literature Taylor surveys.

If economic theory is to be relevant for stabilization policy in our economy, the questions that must be addressed are "why and in what way is our economy unstable?" Note the phrase "our economy." The subject matter of any theory that aims to be relevant is not an abstract economy devoid of institutional detail but rather an economy that is rich in specific institutional detail and which exists at a particular time and has a special history. The problem of economic theory is to select the essential details of the institutional framework to model: the aim of the theorizing is to show causal connections that lead to the observed instability. The hope is that by showing how instability is generated the theory will indicate policy interventions which can attenuate if not eliminate instability.

Although the lines of argument examined by Taylor are largely irrelevant to the topic of this conference, "Stabilization Policy: Lessons from the 1970s and Implications from the 1980s," there were developments in theory over the past decade that are relevant to stabilization policy: Taylor either is ignorant of these developments or chose to ignore them. The developments in economic theory in recent years that are relevant to the theory of stabilization policy are:

1) Progress in general equilibrium theory

2) The two-Cambridge debate

3) The recovery of the "lost" financial elements in Keynes.

Because I am writing a comment rather than a survey article I will just devote one paragraph to each of these developments.

During recent years progress in general equilibrium theory made the conditions that need to be satisfied for the key propositions of this theory to be valid precise. One conclusion of these developments is that the coherence and coherence-seeking theorems of general equilibrium theory are not unconditionally valid for a decentralized set of markets with capital assets, money, banking and financial institutions such as we have. An implication of this conclusion is that the introduction of money as an "exogenously determined" instrument designed to facilitate trade into a general equilibrium model in which relative prices determine consumption and production decisions throws no light whatsoever on the behavior of a capitalist economy with a "money" that is created in a banking process. There is no established microeconomics that can serve as a basis for a macroeconomic or monetary theory that is relevant to stabilization policy as long as the results in microeconomics depend upon highly artificial constructions to explain the existence of and changes in money.[1]

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[1] Of the general equilibrium theorists, perhaps F. H. Hahn has been most open about the limitations of theory. See F. H. Hahn: "On Some Problems of Proving the Existence of an Equilibrium in a Monetary Economy," in R. Clower (ed.), Monetary Theory (Penguin, 1969).
"Professor Friedman's Views on Money," Economica, February 1971, 38 (149), pp. 61-80.
On the Notions of Equilibrium in Economics (Cambridge: Cambridge University Press, 1973).

Also see

K. Arrow and F. H. Hahn, General Competitive Analysis, (San Francisco Holder Day, 1971), especially Chapter 14, The Keynesian Model, pp. 347-369. In introducing their discussion they note that in their earlier proof that a temporary equilibrium always exists they "...supposed that at the moment an equilibrium was shown to exist, economic agents had no capital assets as we know capital assets. It is interesting to note that Arrow and Hahn head Chapter 14 with a quotation from W. B. Yeats, The Second Coming, "Things fall apart, the centre does not hold."

The two-Cambridge debate, ostensibly about capital theory, was really about the validity of the integration of Keynesian theory with the earlier neo-classical theory. The critical issue that the debate clarified centered around the pricing of capital assets. A capitalist economy is characterized by two price systems. One is the price system of current output, the second is the price system of capital assets. The price system of current output largely depends upon wages and mark-ups, whereas the price system of capital assets depends upon current estimates of future expected profits, current estimates of the uncertainties involved over various horizons, and current capitalization rates of profit streams. In an economy with the monetary, banking and financial systems that characterizes capitalist economies the capitalization rate is a "monetary" phenomena and the two price systems can and do vary relative to each other. Inasmuch as the ratio of the capitalized values of expected future profits to the supply price of investment output is a determinant of investment demand, aggregate demand is sensitive to the ratio of these two sets of prices. The two-Cambridge debate is of vital importance for the theory of stabilization policy because it leads to the conclusion that if the ongoing processes of an economy affect this ratio it will lead to endogenous change in the performance of the economy: i.e., variations in the ratio of employed to available resources will result. The two-Cambridge debate made it clear that the "proofs" in the literature that a growth equilibrium of an investing capitalist economy exists depend upon the assumption that the present value of future profits always equals the perpetual inventory valuation of capital assets. But the equality of the two valuations of capital assets in an attribute of equilibrium. The "proofs" of the coherence of an investing capitalist economy does not hold; the proofs depend upon first assuming that a condition of coherence exists.[2]

The third theme in economic theory in the 1970s that is relevant to stabilization policy is the recovery of the financial and monetary aspects of Keynes' revolution in economic theory. There is something very queer about the standard interpretation of Keynes as embodied in the various IS-LM models. This essentially non-monetary view of the economy is paraded as a representation of the theory of the major economic theorist whose life's work was almost entirely on money and finance. In the recovery of what lost in the Hicks-Hansen-Klein-Modigliani-Patinkin tradition it became clear that underlying Keynes' theory was the premise that to understand capitalism it is necessary to model capitalism. This means that it is necessary to model the way positions in capital assets and investment are financed, the dependence of this financing upon the banking and financial system, and the effects of financing relations first upon investment and then on income, employment and prices. In this analysis, in a capitalist economy unemployment exists when the long run expectation of profits by business men together with capitalization rates that reflect portfolio preferences in an uncertain world lead to demand prices for capital assets that are "too low" relative to the supply prices of investment output. The demand price for capital assets as well as the supply price of investment

[2]This is the outcome of the two-Cambridge debate on Capital Theory, although the standard discussion and summary of the debate, G. C. Harcourt, "Some Cambridge Controversies in the Theory of Capital," (Cambridge, England: The Cambridge University Press) does not make this clear.

output depend upon financing terms. Financing terms, which cannot fully be captured by a single interest rate, reflect whether or not recent and near term expected behavior of the economy lead to sufficient realized and expected profits that almost all of the payment commitments on outstanding obligations are expected to be fulfilled. By integrating money, finance, expected profitability and the supply price of current output into a theory of effective demand, Keynes developed the basis for a theory of the economic processes of a capitalist economy that explained why such an economy is "so given to fluctuations." Instability is an inherent characteristic of a capitalist economy in Keynes' theory. Furthermore, Keynes' theory is rich, for even though it does not lead to a set of policies which eliminate instability, it does lead to policy moves (fiscal policy) which offset the effects of instability upon employment and aggregate income.[3]

As the 1970s matured, history advanced the argument from the simple question of "why is our economy unstable?" The question that economic theory had to address if it was to be relevant to stabilization policy became "why is it that our economy is so much more unstable in the 1970s than in the 1950s?" The issues that theory had to

[3]Among the "key works" in the reintegration of money are:
Joan Robinson, Economic Heresies, (London: MacMillan, 1971). P. Davidson, Money and the Real World, (New York: John Wiley & Sons, 1972).
J. A. Kregal, The Reconstruction of Political Economy, (London: MacMillan, 1973).
S. Weintraub, A Keynesian Theory of Employment, Growth and Income Distribution, (Philadelphia, Chilton 1966).
Victoria Chick, The Theory of Monetary Policy, (London: Gray-Mills Publishing Ltd., 1973).
H. P. Minsky, John Maynard Keynes (New York: Columbia University Press, 1975).

address can be made even more precise by dividing the question into two parts: "Why is it that our financial system seemingly is more unstable, more vulnerable to threats and partial realizations of financial crises (both domestic and international) since the middle 1960s?" and "Why is it that inflation became more serious as the 1970s progressed?"

Once economic theory moves from the study of an economy to the study of our economy and once the various faces of the instability of our economy are taken as the problems theory must address then the need to model money, banking and capital-asset pricing moves to the foreground. In Taylor's survey, which presumably deals with stabilization policy, banks and banking are nowhere discussed. We all know that in our economy money is created by the actions of profit seeking banks and other financial institutions, that the assets acquired and liabilities issued by banks evolve in response to profit opportunities, and that the mix and activities of financial institutions also evolve. This implies that an economic theory applicable to our economy will integrate banking and financing markets into the determination of capital asset prices, investment decisions and the determination of the domain of stability of the economy. You cannot understand something by ignoring it. The literature discussed by Taylor's paper ignores banking and Taylor, by his selection of the literature to discuss, apparently believes you can understand and give guidance for stabilization policy for our economy by ignoring banks and banking.[4]

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[4]It would be useful if today's economists were acquainted with H. Simon's "Rules vs. Authorities in Monetary Policy," Journal of Political Economy, 1937.

It has long been argued that the instability of the economy is related to the structure of liabilities by which positions in capital assets are financed.[5] Experience during the 1970s lends substance to this argument. The relation between the debt financing of capital assets positions and the need to fulfill commitments on maturing debt by rolling over debts - by issuing new debts - is a critical determinant of the stability of an economy with sophisticated finance. As a result of the maturing of the flow of funds data (poorly designed as the set of accounts may be) it is possible to relate the evident instability of our economy to the growth of the debt structure relative to income and the increased complexity of financial relations. In order to answer questions about why our economy is unstable it is necessary to fully integrate the monetary mechanism with system behavior. The literature Taylor surveys is "vague" or "silent" on the processes by which positions in capital assets are financed.

One striking characteristic of our economy that became evident in the 1970s is the link between financial instability and accelerating inflation. Since the mid 1960s whenever the Federal Reserve follows the rules for monetary policy to constrain inflation that were developed on the basis of the experience of the 1940s and '50s, a financial crisis develops; when the Federal Reserve and the government succeed in containing the crisis so no deep and long recession follows, the financial base is laid down for inflation at a higher rate. Since the middle 1960s we have had three "cycles" of inflation, constraint,

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[5] I. Fisher, "The Debt-Deflection Theory of Great Depressions," Econometricas, 1933.

incipient financial crises, lender of last resort intervention, federal deficits, renewed expansion, financial innovation and accelerated inflation. In each cycle this "sequence" took four to five years to work its way through the system.

Any theory that is useful for stabilization policy will need to explain why the economy reacted to variations in the rate of growth of the reserve base, or in one manner in the years prior to 1965 and in another manner in the years since 1965. For an economic theory to do this it need contain a sub-theory of "financial stability and instability." Nowhere in Taylor's survey or in the literature he surveys is this aspect of the stabilization problem addressed.

Any theory of the capitalist process needs to focus in the decisions to own capital assets, the techniques used to finance control over capital-assets and the investment and investment financing processes. Obviously a theory, if it is not merely mechanistic, which explains decisions today that are based upon future revenues and costs will include a theory of expectation formation. The fundamental problem in the making of decisions today that involve revenues and costs over a significant time horizon is that the future is uncertain; the future cannot be represented by a set of nice stable probability functions over well-defined outcomes.

The need to make decisions in an uncertain world leads to one question, "how does one behave rationally in an irrational world?" An "irrational world" is one in which what happens is not explained with the requisite precision by the accepted theory. As long as theory does not explain a phenomena with the exactness required for decision, then the world of that phenomena is irrational. If, for a capitalist economy, the world conforms to expectations derived from standard theory a large part of the time, even as it behaves in a manner (instability) inconsistent with this theory a part of the time, then decision making formulas that use the accepted theory will not determine the behavior of a rational man. In a world where diverse types of behavior can occur, theory is effective as a guide to decision and policy exactly as it yields information as to which of the diverse types of behavior of the economy is likely to rule. If economic theory is to be an ingredient in the formation of expectations by a rational man, it needs to relate the expected behavior of the economy to history and the evolving institutional arrangements.

The Franklin National bankruptcy of 1974 and what followed is a concrete example of a situation in which policy actions truly affected the behavior of the economy. In May of 1974 the Federal Reserve, under Arthur Burns, opened the discount window wide to Franklin National so that all of Franklin National's overseas and money market liabilities were validated. The Federal Reserve by this action aborted a wave of withdrawals from the international banks and assured the "world of international finance" that the offshore liabilities of large, if not respectable, American banking institutions were implicit contingent liabilities of the Federal Reserve. This and related interventions by the Federal Reserve and cooperating institutions in 1974-75 together with massive government deficits made it virtually certain that the recession of 1974-75 would be contained and that the subsequent recovery would lead to serious balance of payments difficulties and inflation at an accelerated rate. Policy may not always matter, but there are junctures in the history of an economy when policy really matters: 1974-75 was one such juncture.

It is the duty of economists who parade as knowing something about stabilization policy to be aware of such issues. Neither the literature Taylor discusses nor Taylor in his paper seem to be aware of these problems. Theory that is useful for stabilization policy needs to offer guidance to central bankers and other policymakers when they are faced with the need to act in a situation such as ruled in 1974-75. By this criteria, neither Taylor's paper nor the literature he chose to report on are useful.

THE CASE FOR GRADUALISM IN POLICIES TO REDUCE INFLATION

Allan H. Meltzer

Inflation is usually defined as a sustained rate of increase in a broadly based index of prices. Whatever meaning one gives to the imprecise term "sustained," the past fifteen years seem to meet the standard. Both the all-item consumer price index and the implicit GNP deflator have increased in every quarter since late 1965, and neither seems likely to reach a zero rate of change in the near future.

Sustained inflation at the rates of recent years is rare, even if not unique, in the histories of developed economies. It seems useful, at a conference summarizing the lessons of the seventies and drawing implications for the eighties to look back on the path we have travelled and to explore the path we might take to restore price stability. I shall use the opportunity to discuss some of what has been learned about monetary policy. The list is a long one, particularly if we include propositions that once were "known" but later forgotten or rejected in the years of Keynesian orthodoxy, so I shall not attempt to be complete.

Any long-term gain from ending inflation depends on a negative relation between inflation and real output. The most common reason for suspecting that a gain will occur is the observed association between inflation and changes in relative prices. See Cukierman (1979). The

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principal problem for monetary policy at present is to achieve this gain by ending inflation at minimum transitional loss of output. Every six months, I join with my colleagues on the Shadow Open Market Committee in recommending a policy of pre-announced, gradual, sustained reductions in the growth of money as a means of restoring price stability. A clear statement of the reasons for a policy of this kind -- often called gradualism -- has not been provided. I will try to partially fill that gap and to relate the case for gradualism to some of the lessons we have learned from recent experience with sustained inflation.

The history of recent inflation is surrounded by myths that obscure the origins of the inflation and the reasons for its persistence. I begin with an account of the origin and an explanation of persistence. Much of the case for gradualism depends on the way in which individuals form anticipations of the future. I present one view of rational expectations, in the sense of Muth (1961), and use this model of expectations to show how Federal Reserve policy procedures can convert real shocks into permanent changes in the rate of price change. Then I present the case for gradualism in a world in which persistent and transitory changes in monetary policy cannot be identified quickly.

THE ORIGIN AND PERSISTENCE OF CURRENT INFLATION

The most enduring myth about the origins of the current inflation is that the inflation started during the Vietnam war. According to a standard version of history, President Johnson rejected the recommendations of his advisers by refusing to choose between "guns and butter." The President delayed asking Congress for increased taxes (or for smaller expenditures for redistribution) and allowed the budget deficit to overstimulate the economy in 1967. Since 1967, inflation has been intractable. According to some estimates, ten or more years of recession would be required to eliminate inflation by monetary and fiscal policies.[1]

The facts do not correspond to this capsule history. The rate of increase of consumer prices reached the 3 to 4% range at least a year before the Vietnam deficits. Spending by the federal government in dollars of constant purchasing power remained 3 to 5% below the 1962 level during most of 1965. Budget deficits and government spending did not start the inflation or encourage the Federal Reserve to expand in 1965 or 1966. The budget had a small surplus in 1965, and a small deficit in 1966. The Federal Reserve slowed the growth rate of the monetary base late in 1966 in a sudden burst of concern about rising inflation. The 1967 deficit of more than $13 billion comes after these first steps to slow inflation and much too late to explain the start of the inflation.

A surtax was added to the income tax in 1968, so the Vietnam deficit proved to be temporary. By late 1968, the budget again was in surplus, and the surplus persisted in 1969. The 1969 surplus of $8.5 billion is one of the largest of the past thirty years in real as well as in nominal terms.

To sustain the thesis that the Vietnam deficits started the current inflation, one must not only ignore the problem of the timing of

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[1] See Perry (1978) for a more complete statement of this view and for an extreme form of the argument that inflation is intractable. Perry's Phillips curve implies that it costs $200 billion dollars of real output for each percentage point reduction in the rate of inflation.

the start of inflation, on which I commented earlier, but must accept the improbable proposition that six quarters of wartime deficit generated anticipations that were irreversible. Credulity is strained further when the 1967 deficit is expressed in constant dollars to compare with the deficits in earlier and later years. The 1967 deficit is almost identical to the 1958 deficit when both are expressed in dollars of the same purchasing power. The 1958 deficit did not initiate years of sustained inflation. On the contrary, inflation fell from the 3 to 4% range of 1956-57 to the 1 to 2% range in 1958-59 and to less than 1% by 1961.

The 1975 nominal budget deficit of $70 billion is four times larger than the deficits of 1958 and 1967 when the three are expressed in dollars of comparable purchasing power. The 1975 deficit is not followed by a balanced budget or a surplus but by sustained deficits. Yet, most broad measures of the rate of price change declined in 1976. The GNP deflator rose by less than 4.5%, on average, for the first three quarters of the year, and the consumer price index rose by less than 5% for the year as a whole.[2]

The proximate cause of the start of the current inflation is the monetary policy of the early 1960s. Inflation persists because policy continues to sustain anticipations of future inflation by producing persistent inflation. Bursts of anti-inflation policy, and announcements of firm commitments to reduce inflation, are not followed by policies that reduce money growth.

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[2]The decline in the rate of inflation affected more than just food prices as is sometimes claimed. The wholesale price indexes of consumer finished goods rose by less than 2.5% for the year.

CHART 1

Rate of Growth of the Monetary Base
(3 Year Moving Average)

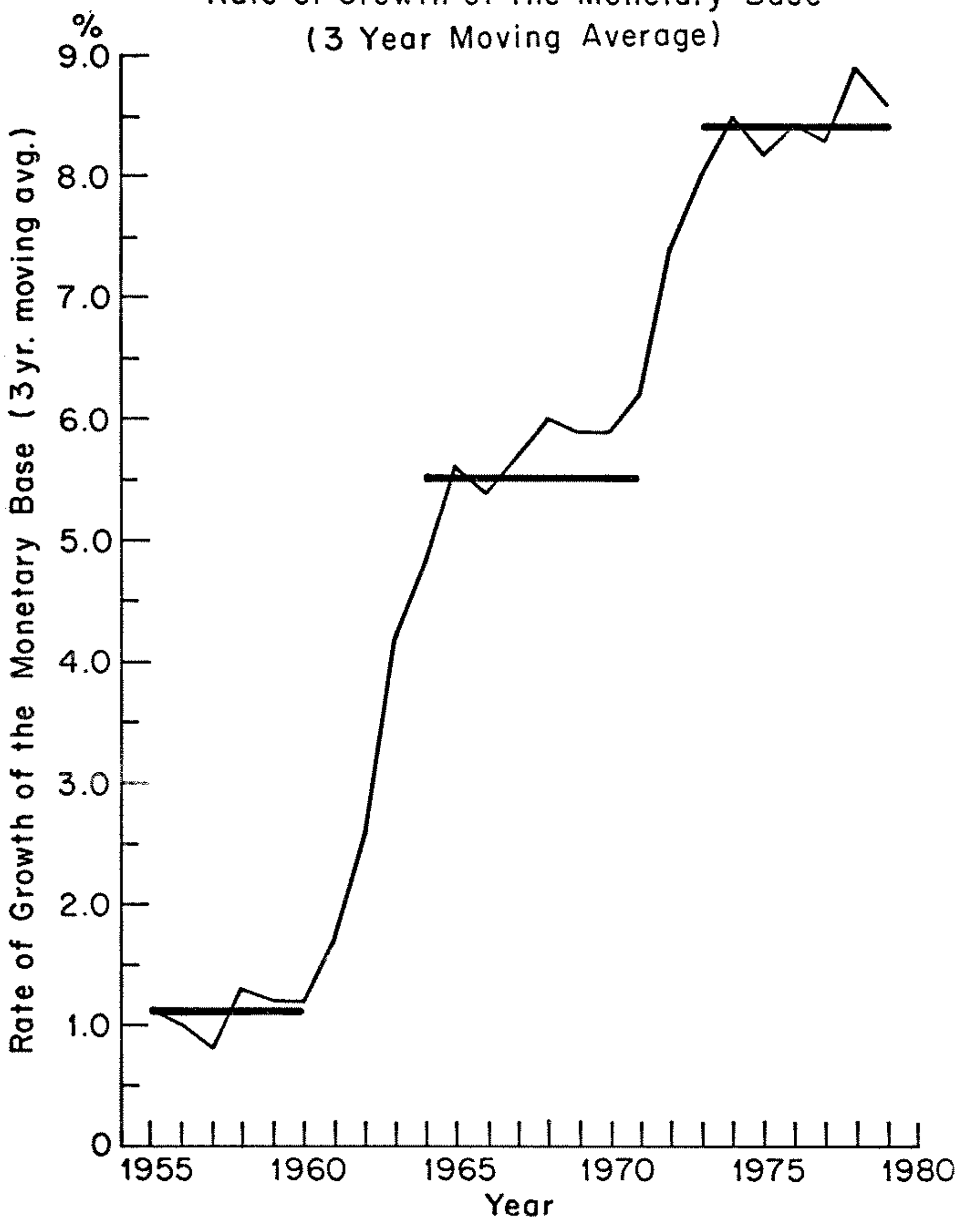

Chart 1 uses a twelve quarter moving average of the growth of the adjusted monetary base as a measure of the long-term effect of monetary policy. Using this measure as an index of the sustained thrust of monetary policy, we can divide the monetary history of the past twenty-five years into five episodes. The first, from 1955 to 1960, has a low average rate of monetary growth, 1.1%. The second is a three-year transition. The twelve quarter moving average rises steadily toward the 5.5% range. In the third period, 1964-71, the growth of the base remains in the neighborhood of 5.5%. The fourth period is a one-year transition, 1972, during which the maintained growth of the base moves from about 5.5% to 8.5%. Since 1973, the moving average of the base has grown at a maintained rate of about 8.5%.

A number of studies, including my own Meltzer (1977), suggest that inflation follows money growth with an average two-year lag. The mean of the three-year moving average ending in year t, shown in Chart 1, is an unweighted average centered in year t-1. If we impose a two-year lag, inflation in year t+1 is influenced by the twelve quarter rate of growth of the monetary base ending in year t. To measure persistence, I have computed the standard deviation of the percentage rates of change of the consumer price index and the percentage rate of change of money wages for the years 1956-61, 1965-72 and 1974-78 that correspond to the two-year lag of prices behind the maintained growth of the monetary base.[3] The data are shown in Table 1.

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[3] The rates of price and wage change are one-year averages of the all-item consumer price index for six-month spans and average hourly earnings over six-month spans from BCD. Wage data are not available before 1965.

TABLE 1

Mean (μ) and Standard Deviations (σ)

Years (t)	Growth of Adjusted Monetary Base in t		Rate of Price Change t+1		Rate of Wage Change t+1	
	μ	σ	μ	σ	μ	σ
1955-60	1.1	.18	1.9	1.00	N.A.	
1964-71	5.7	.44	4.0	1.26	5.9	1.13
1973-78	8.4	.31	7.5	2.42	8.0	.79
Omitting 1974			6.4	.85	7.7	.36

The data show a tendency for the standard deviation of the rates of change of money and wages to fall in recent years. Removing the effects of the oil shock, by omitting 1974, further reduces the standard deviations. The standard deviations of the rates of change of wages and prices are not startlingly different from the standard deviations of the maintained growth of the adjusted base. The persistence of rates of price change from year to year appears to be related to the persistence of maintained rates of money growth.

To examine further the relation between the persistence of money growth and the persistence of inflation, Table 2 compares the two quarter average rates of growth of base money to the quarterly averages of the rates of change of prices and wages used in Table 1. As before, I imposed a two-year lag of rates of price change behind rates of money growth. The data now suggest that the variability of base money growth is of approximately the same magnitude as the variability of the rate of wage change.[4] The standard deviations of the rate of price change,

[4]The time periods for the base differ from those in Table 1 because Table 1 has a three-year moving average. I have kept the periods for rates of price and wage change the same as in Table 1.

however, are not closely related to the standard deviations of rates of base money growth. Short-term variability of the rate of price change reflects more than the variability of monetary growth.

TABLE 2

Mean (μ) and Standard Deviations (σ)

Period	Two quarter moving average of growth of monetary base		Period	Standard Deviations (σ) quarterly average rate of change over six-month spans			
				Consumer prices		Money wages	
t	μ	σ	t+2	μ	σ	μ	σ
1954-59	1.1	0.87	1956-61	1.5	1.61		
1963-70	5.7	1.10	1965-72	4.00	1.34	5.9	1.19
1972-76	8.2	0.91	1974-78	8.2	2.61	8.0	0.90

The data for 1963-70 and 1972-76 include several periods in which inflation was given "highest priority" as a goal of public policy. Careful inspection of the data shows that periods of slower growth of the base coincide with these announcements in 1966, 1969-70 and 1974-75, but none of these periods of slower growth is long enough to have any marked effect on the standard deviation of the growth rate of the base. Table 2 shows that the standard deviation of the two quarter moving growth rates is independent of the rate of growth of the base and not very different in the three sample periods.

The data suggest two reasons for the persistence of inflation and the slow response of inflation to changes in the growth rate of money. First, short-term rates of price change are relatively variable, so people have difficulty separating the effects of money growth from other influences on short-term price changes. This is particularly the case for recent years, when announced changes in oil prices have had considerable influence on measured rates of price change and their variability. Second, the commitment to anti-inflation policies does not last. People are unwilling to buy long-term contracts based on the assumption that the slower rate of money growth will persist long enough to reduce the trend rate of inflation. In the next section, I offer an explanation of the relation between the variability of money growth and the persistence of inflation.

THE BASIC INFERENCE PROBLEM[5]

Each week the Federal Reserve reports the growth rates of various monetary aggregates. Market participants try to infer the future course of money growth, interest rates, prices and exchange rates from the announcement. Their problem, and ours as economists, is to separate transitory changes in money growth (or other variables) from persistent changes. I call this problem of separating permanent or persistent changes from ephemeral or transitory changes the basic inference problem because it arises for most economic variables and is a major problem for people making decisions.

To illustrate the problem, suppose that in a given week the announced change in money is large relative to past changes. Few observers will use the observation for a single week to predict the growth path, and fewer still will predict an equiproportionate change in the rate of inflation. Let the increased rate of money growth persist, for a month or two, and the balance of opinion will start to

[5]This section owes a large debt to Brunner, Cukierman and Meltzer (1979).

change. More observers will infer that there has been a persistent change in the growth rate of money.

The effect of the first week's observation on market prices, interest rates and exchange rates differs from the effects of a change that is perceived to be permanent. Although the change in money is reported, and therefore is known, the correct inference to be drawn from the information is uncertain because the content of the information is uncertain. A rational investor who uses all available information, must first decide what he knows; that is to say, he must decide how much of the changes he has observed can be expected to persist.

This view of the world in which monetary and other policies operate differs in an important way from the usual model of rational expectations developed by Lucas (1975) and others. There, people are uncertain about whether the changes they observe are the result of shocks that change relative prices or shocks that change the absolute price level; once information becomes available, there is no doubt about its meaning.

Given the speed with which information becomes available, the confusion between aggregative and relative changes cannot be the principal source of confusion. The main aggregates in our models -- money, debt and deficits or GNP, prices and output -- are observed within a month or a quarter. Once they are observed, the confusion between absolute and relative changes disappears.

The permanent-transitory confusion does not disappear when data are published. The principal uncertainty that individuals face arises, in this model, from an inability to properly interpret information, not from lack of information. People observing the price index must decide whether a reported increase or decrease in an aggregate is a one-time change that will soon be reversed or the start of a higher or lower maintained rate of change. Expectations remain rational, but the use of all available information does not solve the inference problem and does not eliminate error.

A simple model brings out the source of the permanent-transitory confusion. It is, of course, only one of many ways in which the problem can be formulated, but it is the way that has been used in an application to the problem of stagflation where it produces changes in prices and employment that resemble the aftermath of the oil shock.[6]

An observable variable X_t can be divided into two components, a permanent component, X_t^p, and a transitory component X_t^q. X_t^q and ΔX_t^p are normally distributed random variables with mean zero and known, constant variances, σ_{xp}^2 and σ_{xq}^2. People cannot observe X_t^p or X_t^q but must infer the permanent value by observing current and past values of X_t.

$$X_t = X_t^p + X_t^q ,$$

The expectation of X_t, conditional on all information available in period t, is X_t^p.

The inability to separate permanent and transitory components makes the optimal forecast of X a distributed lag of past observations. Contrary to much of the rational expectations literature,[7] we find that

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[6]Brunner, Cukierman and Meltzer (1979). This application considers the effects of real shocks. The role of the permanent-transitory confusion in the transmission of monetary shocks to real variables introduces additional problems.

[7]Benjamin Friedman (1979) is an exception.

using a distributed lag of past observations is an optimal method of forecasting. The reason is that repetitive observation of an aggregate are required to learn whether a permanent change has occurred. If permanent changes are frequent, and transitory changes are infrequent, a change in X is more likely to be treated as permanent soon after it occurs. At the opposite extreme, transitory changes are frequent and permanent changes are rare, so it is optimal to observe a relatively long series of observations before concluding that a permanent change has occurred. In more technical terms, the larger the ratio $\frac{\sigma^2_{xp}}{\sigma^2_{xq}}$ the faster people correctly infer that a permanent change has occurred; the smaller the ratio, the larger is the number of observations required to sustain the inference that a permanent change has occurred.

We can put more content into the terms "frequent" or "infrequent" by using the computed standard deviations for the two quarter and three-year moving averages in Tables 1 and 2 to estimate the relative variance of permanent and transitory components and to find the implied length of the lag in reaching rational judgments about permanent shocks. The permanent variance of the growth rate of the monetary base is set equal to the variance of the three-year growth rates. The two quarter moving average growth rates include both permanent and transitory components. We assume that permanent and transitory variances are independent and compute the transitory variance by subtracting the variance of the twelve quarter average from the variance of the two quarter average. Muth (1960, pp. 302-4) shows that the best (minimum variance) linear estimator of the permanent value of a variable can be computed from past actual values using the variances of the permanent and transitory components. For the problem at hand, the calculations for the three periods of relatively constant growth of the monetary base show that the relative variances of the growth rates of the base are:

	1955-60	1964-71	1973-78
$\frac{\sigma_p^2}{\sigma_q^2}$	.04	.19	.14

These ratios imply very different lags in the adjustment of the expected growth of the base. In 1955-60, only 55% of the adjustment of expectations occurs within three years. The reason is that the very low variance around the three-year average growth of base money obscures the change in the maintained rate of growth, when it occurs. Rational individuals interpret most of the permanent change as transitory and fail to adjust fully for several years. In the two remaining samples, the variance of the permanent component is higher relative to the variance of the transitory component. Expectations adjust more quickly; more than 95% of the full adjustment occurs in the first three years.[8]

Expectations of inflation are related to the growth of money that individuals expect to be maintained. The expected growth of base money can be reduced permanently only if the actual growth of base money is reduced. The speed of adjustment of expected to actual growth can be reduced, also, if the variability of the growth rate of the base is reduced. For example, if the Federal Reserve reduces the variance of the two quarter growth rate to equal the variance of the twelve quarter

[8]"Transitory" variances are computed from two quarter moving averages, so two quarters are used as one period when computing the lags.

growth rate, 85% of the adjustment of expectations about the permanent growth occurs in the first year. Expectations of inflation respond more rapidly to monetary policy; the length of the lag of inflation behind money growth declines.

It is, no doubt, a mistake to use these numbers as precise estimates of the expected length of the lag. Fortunately, the principal implications do not depend on the precision with which we measure the speed of adjustment of expectations. If short-term policies are less variable, the speed of adjustment increases. Faster adjustment of expectations lowers the length of time between changes in the growth rate of the monetary base and changes in the expected growth of the base and, therefore, in the expected rate of inflation. The shorter the lag, the smaller, *ceteris paribus*, is the persistence of inflation.

A related, but distinct, implication explains why short-term changes in the growth rate of the base have little effect on maintained inflation. The larger the transitory variance of the growth rate of the base, given the long-term or permanent variance, the longer is the lag. Short-term reductions in the growth rate of the base have little effect on long-term expectations if the short-term growth of the base is highly variable. The real costs of reducing inflation are higher, under these circumstances. The costs take the form of recession and rising unemployment. Recession encourages the Federal Reserve to shift to a policy of monetary expansion thereby reinforcing expectations that the maintained average growth rate of the base will not be reduced. Chart 1, above, shows that past periods of anti-inflation policy have, in fact, had little effect on the maintained growth rate of the base.

The calculations in Tables 1 and 2 imply that the lag in the formation of expectations is shorter now than in the fifties. The data suggest, however, that the reason for the shorter lag is the increase in the measured variance of the permanent component, not a reduction in the measured variance of the transitory component.

THE POLICY PROBLEM

The Federal Reserve can reduce the short-term variance of the growth of the monetary base by adopting targets expressed in terms of the base. Reserves and currency, the uses of the base, are approximately equal to the sum of reserve bank credit and international reserves. With floating (or adjustable) exchange rates, the Federal Reserve can control the two quarter growth rate of the base by controlling the stock of Reserve bank credit. To control the base the Federal Reserve need not solve an impossible or even a difficult problem. All they must do is control the asset side of their balance sheet.

As is well-known, the Federal Reserve cannot control both interest rates and the growth rate of the base. By specifying short-term targets in terms of values (or ranges) of the Federal funds rate, the Federal Open Market Committee surrenders control of short-term changes in the base. The problem of separating permanent and transitory changes helps to explain how loss of short-term control of the base contributes to persistent movements of the base even if the dominant shocks in the economy are real, not nominal shocks.

To illustrate the problem, I use the three equation, equilibrium model based on Brunner, Cukierman and Meltzer (1979). All variables are natural logarithms. Production or output, y_t, is given by a neoclassical production function

$$(1) \quad y_t = u_t + \delta l_t$$

with l_t, the number of man hours of labor and u_t a productivity shock; δ is the elasticity of output with respect to labor. Real aggregate spending is always equal to output, y_t, and depends on expected or permanent income, y_t^p, on the real rate of interest and on shocks to aggregate demand, ε_t. The anticipated rate of inflation is the difference between the logarithms of the price level anticipated for next period (${}_tp_{t+1}$) and today's prices (p_t). The market rate of interest is i_t.

$$(2) \quad y_t = a+by_t^p + c[i_t - ({}_tp_{t+1}-p_t)] + \varepsilon_t$$

$$b > 0 \; ; \; c < 0$$

Equation (3) equates the current stock for base money, $B + \Psi_t$, to the demand for base money, where Ψ_t is the shock to the level of nominal money balances.[9] Some part of the shock to spending, ε_t, affects the demand for money; the rest affects the demand for bonds and the supply of labor. Increases in spending are financed by reducing the demand for money so θ is positive and increases in ε reduce the demand for money.

$$(3) \quad B + \Psi_t = \alpha + p_t + \beta i_t + y_t^p + \gamma\,(y_t-y_t^p) - \theta\varepsilon_t$$

$$\beta < 0$$

$$1 > \gamma, \; \theta > 0$$

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[9]The analysis can be cast in terms of growth rates of money by making minor adjustments.

The three equations form an augmented IS-LM model. The principal novelties are the distinction between permanent and current income and the introduction of permanent and transitory shocks. The three shocks, u_t, ε_t and Ψ_t, have permanent and transitory components, but people are not able to distinguish the permanent and transitory components when observing the shocks. For example, $u_t = u_t^p$ with known variances σ_{up}^2 and σ_{uq}^2, normal distributions and expected values Eu_t^q and $E\Delta u_t^p$ equal to zero.

Substituting eq. (1) into (2) and (3) and solving for i_t reduces the system to two equilibrium relations. The money market equilibrium or LM, in eq. (4) and the IS curve, eq. (5) relate i_t to the three shocks, to the price level and to other variables. For the current analysis, I treat y_t^p and l_t as given and independent of the shocks.[10]

$$(4) \quad \beta i_t = B + \Psi_t - p_t - \gamma u_t + \theta\varepsilon_t - \gamma^{\delta} l_t - (1-\gamma)y_t^p - \alpha$$

$$(5) \quad ci_t = c({}_t p_{t+1} - p_t) + u_t - \varepsilon_t + \delta l_t - b\, y_t^p - a$$

During most of its existence, the Federal Reserve used the market interest rate (or some surrogate like the level of free reserves) as the operating target. Suppose the Federal Reserve sets the target interest rate at i_o and supplies or absorbs base money to keep $i_t = i_o$.

[10]A full solution is given in Brunner, Cukierman and Meltzer (1979) by specifying the labor market equations. The additional detail would not alter the conclusions of this discussion. The principal differences that have been neglected are the dependence of y_t^p on the expected values of the real shocks and the dependence of l_t on the actual values of the real shocks. The reader who is disturbed by the partial solutions can substitute permanent and actual values of shocks -- real shocks -- for y_t^p and l_t. For the analysis that follows what matters is that the responses of IS and LM to the shocks cause i_t to differ from i_o.

The stock of base money $B + \Psi_t$ changes only as required to maintain the interest rate at i_o, which is to say that the stock of money now depends on the real shocks.

(6) $\Psi_t = \Psi(\varepsilon_t, u_t)$

Equations (4) and (5) are shown as solid lines in Figure 1. The slope of LM from eq. (4) is positive in the i, p plane. The slope of IS is -1. The price level is p_o. The policy of fixing interest rates, temporarily at i_o, makes the interest rate pre-determined at i_o. Monetary policy keeps the interest rate constant by changing money. Whenever there are real shocks to productivity or to spending and the demand for money, the Federal Reserve changes the stock of money enough to hold interest rates fixed until it decides that the shock is permanent.

Consider the effect of a negative productivity shock, $du_t < 0$. From (4) and (5) we compute the elasticities

$$\left.\frac{di_t}{du_t}\right|_{LM} = \frac{-\gamma}{\beta} > 0 \quad \text{and} \quad \left.\frac{di_t}{du_t}\right|_{IS} = \frac{1}{c} < 0.$$

A negative shock shifts both the LM curve and the IS curve to the right in Figure 1. If γ is small, the demand for money changes very little, and interest rates rise. The Federal Reserve offsets the rise in interest rates by increasing the money stock.

$$\frac{di_t}{d\Psi_t} = \frac{1}{\beta} < 0$$

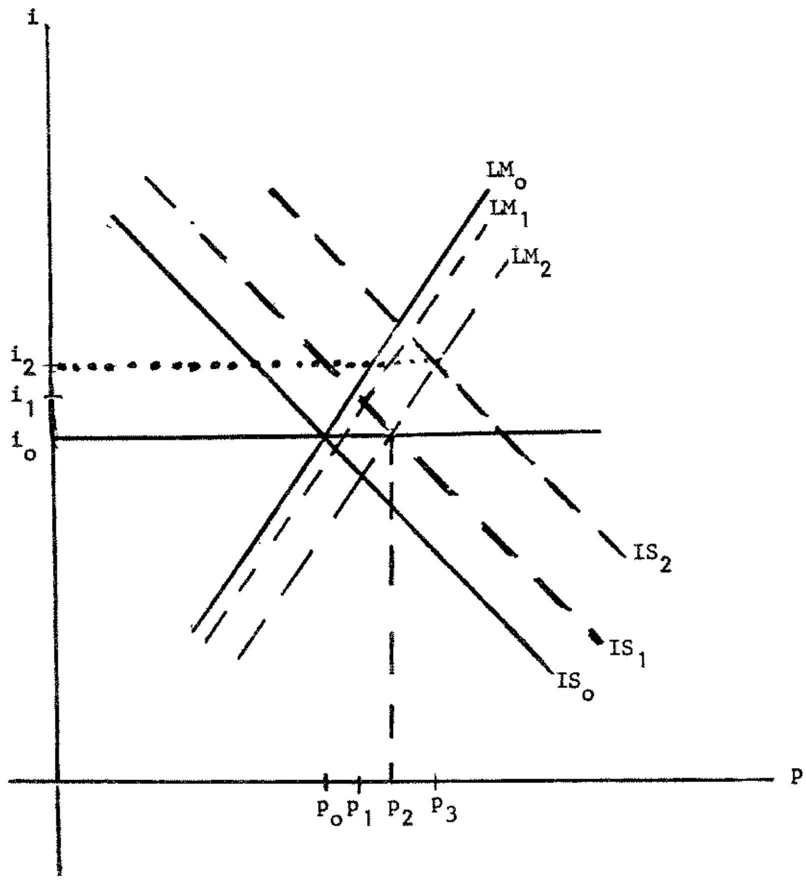

FIGURE 1

If the negative productivity shock is transitory, Federal Reserve policy eliminates any effect on interest rates but increases the price level by more than the increase resulting from the transitory decline in productivity. The dotted lines IS_1 and LM_1 in Figure 1 show the effect of the transitory change in u_t. Prices and interest rates rise; p_1 is the log of the price level at the intersection of IS_1 and LM_1, and i_1 is the interest rate. Federal Reserve policy shifts the LM curve further to the right, shown by LM_2, restoring the interest rate i_o and increasing the price level to p_2; $p_2 - p_1$ is the relative rate of change in the price level resulting from Federal Reserve policy, and $p_1 - p_o$ is the rate of price increase caused by the decline in productivity.

The mean values of the transitory shocks are zero so the effect of Federal Reserve's response to transitory shocks is on the variance of rates of price change and not on their average over time. A policy of pegging interest rates increases the variability of the measured rates of price change resulting from transitory shocks. Our earlier finding that the variance of the rate of price change rose during the period in which there were oil shocks is consistent with this implication.[11]

Suppose, however, that the negative productivity shock is permanent, or persistent, not transitory. In this case, the price level fluctuates around p_2 following the increase in money to LM_2. Because permanent and transitory shocks cannot be observed separately, or

[11] There are, of course, other causes of variability including the shocks to spending and the demand for money (ε_t) and the Federal Reserve's response to these shocks.

separated reliably, people must decide whether the observed rate of price increase, $p_2 - p_o$, the change in money, Ψ_t, and other changes have caused a one-time price change or a persistent change in the rate of price change. If the inferences drawn from available information lead people to believe that some part of the change in the measured rates of price change and money are persistent changes in the rates of change, instead of one-time changes in level, the IS curve shifts further to the right. The size of the shift depends on the degree to which the anticipated rate of inflation, ${}_tp_{t+1} - p_t$, rises.[12]

The Federal Reserve policy of fixing the interest rate at i_o sustains the inference that the observed changes in prices and money reflect a persistent increase in rates of change, not a one-time change in levels. The reason is that, when IS shifts to the right the policy of fixing interest rates requires the Federal Reserve to again increase the money stock, shifting LM further to the right.

The additional changes in money and prices reinforce beliefs about the persistence of the changes in money and prices. As the perceived and measured rates of inflation rise, anticipated inflation rises, and there is a further rightward shift in IS. Additional increases in money are now required to hold the market interest rate at i_o.

Each increase in the stock of money reinforces the belief that there has been a persistent change in the rate of money growth. Each increase in the equilibrium price level reinforces the belief that the

[12] A run of transitory, negative shocks to productivity produces a similar result. ${}_tp_{t+1}$ is today's expectation of next period's price. The rational expectation takes the form of a distributed lag, as indicated earlier, so expectations adjust gradually.

rate of price change has increased. The Federal Reserve's policy of maintaining the level of interest rates converts a one-time change in the price level into a series of price changes that strengthen perceptions that there has been a change in the rate of change.

Rational investors "know" the model, so they know that anticipations about the price level adjust slowly because they and others are unable to separate persistent and transitory changes. The policy of holding the interest rates at i_o implies that the price level will rise as long as the money stock grows. That is, as long as ${}_tp_{t+1} - p_t$ is positive, the policy of fixing interest rates will require the Federal Reserve to let the money stock rise.

The Federal Reserve can eliminate the bulge in the money stock and in the measured rate of price change by raising the target rate of interest. I have drawn a dotted line at the intersection of IS_2 and LM_2 in Figure 1 to show the rise in interest rates required to keep the price level from exceeding p_3. The dotted line shows that the required interest rate is i_2; $i_2 - i_1$ is the additional increase in interest rates resulting from Federal Reserve policy. The increase $i_2 - i_1$ is temporary, not permanent. Once people recognize that the money stock is constant, anticipations of rising prices decay; IS shifts to the left; the market rate of interest falls to i_1; and the price level falls between p_2 and p_3. (The precise level of prices is at the value of i_1 on LM_2.)

The combination i_1, p_1 is the interest rate and price level combination to which the economy moved following the permanent loss of productivity. It is not an accident that the economy eventually settles at the rate of interest i_1 following the "anti-inflationary" increase in interest rates to i_2; it is an implication of the neutrality of money. Monetary policy, at first, allowed the money stock to rise, then held the money stock constant, eliminated the anticipation of rising prices and allowed the interest rate to decline. The lasting effect of the interest rate policy is a higher price level. The amount of increase depends, of course, on the speed with which the Federal Reserve abandons the interest rate target $i_t = i_o$.

This discussion of policy has neglected many complicating features. The adjustment of prices and interest rates has been analyzed as if these changes occur without real effects. The gradual adjustment of employment when rational individuals cannot distinguish permanent and transitory productivity changes has not been emphasized. The case for fixing the level of interest rates is not strengthened by these omitted effects.

A principal result of the policy of fixing market interest rates is that additional changes in prices (and output) are induced by monetary policy. People are forced to decide how much of the observed change in money is persistent and how much is transitory. The determination of the new permanent price level is made more difficult.

The permanent decline in productivity produces a temporary increase in unemployment and a permanent loss of real income. Unemployment rises because people do not recognize instantly that the shock is permanent. Hence, they do not instantly adjust their real incomes (and real wages) to the level they eventually reach. Monetary policy can reduce this cost of adjustment only if the monetary authority can succeed in reducing real wages to their new, permanent level without setting off anticipations of rising prices. The monetary authority must have superior information on the speed with which people recognize the permanent loss of real income and the speed with which anticipations of price changes form and decay. There is no reason to believe that monetary authorities have information of this kind or are able to set market interest rates in a way that minimizes the cost of adjusting to real shocks. On the contrary, monetary policy produced persistently higher rates of price change following the productivity shocks of this decade.

THE CASE FOR GRADUALISM

Reliance on market interest rates as the operating target of monetary policy produced high rates of growth of the monetary base and sustained inflation. The low variance of the long-term average growth of the base suggests that the 8.5% growth rate of the base is perceived as a "permanent" rate of change. To end inflation the rate of growth of the base must be reduced.

If expectations form and decay quickly in the presence of new information, the problem of ending inflation is made easier. A credible policy to stop inflation causes prompt revision of expectations. Revised expectations, and slower growth of base money bring inflation to an end. Rational individuals recognize that sunk costs or contracts must be forgotten, so as contracts are revised, they enter into agreements or commitments that reflect their revised expectations. Even in this case, there are benefits to gradualism if costs of adjustment can be reduced by permitting people to learn about the new environment.

The analysis in the preceding section suggests some of the difficulties people face when forming judgments about the persistent rate of change of money. Some of these difficulties can be reduced if policy makers announce the intended rate of money growth. Announcements are not sufficient to change anticipations permanently. A principal reason is that policymakers statements are not entirely credible. Past promises to slow money growth and reduce inflation have been followed within a few quarters by renewed expansion. Consequently, rational individuals treat any initial reduction in money growth (or budget expenditures) as temporary, not permanent, changes. An announced reduction in the growth of money, initially, will not be interpreted as a reduction in the maintained rate of money growth.

Gradual reduction in money growth can reduce the cost of lowering the rate of inflation in three ways. First, maintaining the growth of the base at a steady rate lowers the variance of the transitory component and reduces the lag in the formation of expectations. Second, the maintained average rate of money growth falls gradually, so people have time to adjust future commitments to reflect revised expectations. Third, if costs of adjusting to a lower rate of inflation are not proportional to the total adjustment but increase with the rate per period, costs of adjustment are reduced by lowering the rate per period.

If the rate of adjustment of money growth is very low, the variance of the permanent component is low, so the lag in adjustment of expectations increases. If the rate of adjustment of money growth is rapid, the variance of the transitory component increases, so costs of adjustment rise. The optimum rate of adjustment is achieved by increasing the variance of the permanent component and reducing the variance of the transitory component of money growth. This is equivalent to finding the minimum lag in the formation of anticipations.

The policy of gradual, pre-announced reductions in money growth advocated by the Shadow Open Market Committee did not emerge as a solution to the problem of finding an optimal lag. The choice of an optimal policy depends on information that is not yet available. Our proposal, like most policies, depends more on empirical judgments about the length of lags and costs of adjustment than on hard evidence. I have no doubt that future research will find a better path.

SOME FINAL SPECULATIONS

The chief difficulty in the policy of gradualism is the length of time required to reach the rate of growth consistent with non-inflationary growth in the economy. If we use the long-run growth of real output as a guide, the rate of base money growth must fall from the current rate of 8% to no more than 3%. If payments technology continues to improve, base velocity will rise in the future as it has for at least the past quarter century. The non-inflationary rate of base money growth is then no more than 1 or 2%.

Is a seven year program of sustained reductions in money growth the best that can be done? I expect not. There is reason to believe that policymakers can increase their credibility by meeting pre-announced targets. Increased credibility permits policymakers to lower the maintained growth rate while lowering the relative variance of the transitory component of money growth. Credible announcements mean that individuals distinguish permanent changes closer to the time they occur by using announcements of proposed changes as a reliable indicator of future money growth.

No one can be very certain about these issues. The evidence on which we rely comes from experience in Germany, Switzerland, the United Kingdom and our own experience in the middle seventies. Each of these experiences suggests that within two to three years at most, the anticipated rate of inflation declines. The rate of price and wage change falls; long-term interest rates decline, and real output rises or accelerates.

Those who desire "incomes policies" to reduce the lag for adjustment might find pre-announced monetary policies more attractive than either the failed incomes policies of the past or present, or complicated, inefficient programs to tax wage and price changes. Instead of announcing the rate of price and wage changes that the government favors, the government can announce the rates of monetary and fiscal expansion that the government intends to maintain. These announcements, if they are credible, help individuals to form expectations about future rates of inflation.

Analysis of the length of the lag in the adjustment of anticipations relates these adjustments to the adjustment of permanent values or maintained rates of change. The evidence we have is neither inconsistent with the theory of expectations that I have sketched nor more consistent with any other explanaion I have seen. This is not a strong claim, but it is considerably better founded than the belief that inflation is intractable.

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FEDERAL BUDGET POLICIES OF THE 1970s: SOME LESSONS FOR THE 1980s

Michael E. Levy

At the close of the 1970s, the public and the politicians alike perceive inflation as the foremost economic challenge of the day. Other important economic and social issues will carry over into the 1980s; forsaken claims will be revived and new demands are bound to surface. But our effectiveness in coping with all these -- in fact the very survival of this country's traditional economic, social, and political structures -- may well depend on our ability to contain and control inflation in the coming decade.

There is a growing belief that inflation control may require fiscal restraint, a slowing of government spending, a reduction in the size of the <u>realized</u> budget deficit. Yet, as we approach the threshold of the 1980s, I can think of at least five major policy issues in search of solutions, each of which would place new claims on our fiscal resources.

- Half a decade after the initial "energy crisis," we are still in search of an energy policy that generates widespread public and political support for economically viable solutions.

- Our efforts to channel the hardcore unemployed into the mainstream of our economy have yet to succeed.

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o Success in slowing the nuclear arms race -- even if attained through SALT II -- may have to be bought at the cost of accelerating defense spending for years to come.

o Welfare reform has been the subject of several aborted proposals of the 1970s; it is bound to resurface as a major issue in the 1980s.

o National health insurance -- a major unfulfilled social promise of the 1970s -- is high on the public agenda of the coming decade.

It is all too easy to add to this list of enlarged public claims -- even at a time when inflation control is our top priority and budget restraint is promulgated. (Note that I have omitted any mention of "safety" or "environmental issues.") Such are the complexities and contradictions of budgetary policy which would seem to place inflation control practically beyond our reach.

Yet my monetarist friends are able to collapse the social and political complexities of inflation control into the simple issue of "monetary integrity." To them, the deep-seated inflation of the last decade-and-a-half is strictly a monetary phenomenon. Its "cause" (like that of every inflation) was excessive monetary growth reinforced, perhaps, by a few nasty "shocks," such as the oil price escalations of 1973 and 1979. Its "cure" (like that of every inflation) is secured through a persistent slowdown in money growth. On a purely technical level, the monetarists have, of course, all the answers. In fact, some of my own econometric exercises have tended to reconfirm their valuable, if somewhat simplistic, generalizations.[1]

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[1]Michael E. Levy, assisted by Steven Malin, <u>International Influences on U.S. Inflation, 1971-1976</u>, a study prepared for the U.S. Department of Commerce, September 7, 1977 (unpublished, available from the author).

However, even if they were formally correct, these simple monetary propositions would tell us nothing about the changes in social attitudes and national priorities which generated the political pressures that bent the economic structure and drove the monetary printing press. They provide no clues as to how and why the economic and social structure was changed and whether this process is reversible or cumulative.[2]

By contrast, analysis of "budgetary policy," such as it is, promises to shed some light on these unanswered questions, because the government budget is a fulcrum of social and political change. Unfortunately, it is difficult, at best, to chart a course of fiscal and budgetary policy over years and decades. In fact, one may even question the existence of a meaningful "course" other than the drift created by the complex and contradictory forces and events that shape the federal budget from year to year.

Obviously, if this "drift" were governed by a powerful current and if "bends" in this current could be discerned, we should expect far-reaching economic implications, because the federal budget powerfully touches all social groups, all segments of our economy. I have interpreted my assignment as the search for such bends in the current.

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[2] For more formal analyses that question the independent contribution of money growth in "explaining" the inflationary process, see, for example, Franco Modigliani and Lucas Papademos, "Targets for Monetary Policy in the Coming Year," Brookings Papers on Economic Activity, 1:1975, pp. 141-63; George L. Perry, "Slowing the Wage-Price Spiral: The Macroeconomic View," esp. pp. 45-46, in Curing Chronic Inflation, Arthur M. Okun and George L. Perry, eds., The Brookings Institution, Washington, D.C. 1978; also Martin Neil Baily, ibid., p. 58.

VIETNAM: THE ORIGINS OF U.S. INFLATION

There is widespread agreement that the persistent U.S. inflation of the last decade-and-a-half got under way in 1965 as "Keynesian" excess demand inflation.[3] In 1965, rapidly escalating defense expenditures for the Vietnam War were superimposed on a full-employment economy that was on the verge of a private investment boom. Not only did we fail to enact timely tax increases (until the belated ten-percent surcharge of 1968-1969), but our exuberant "guns and butter" (or "guns and Great Society") policy added new and rapidly escalating civilian programs (Medicare, Medicaid, Food Stamps, Job Corps, Model Cities).

Vietnam War costs rose rapidly from about $100 million in fiscal 1965 to almost $29 billion at their peak, in fiscal 1969.[4] Total defense expenditures rose by nearly $32 billion, or 67 percent, during this period; and the share of GNP devoted to national defense advanced from 7.2 percent in fiscal 1965 to 9.5 percent in fiscal 1968 -- its high for the decades of the 1960s and 1970s.

Yet it would be a mistake to attribute the persistence of U.S. inflation first and foremost to the Vietnam War -- even if one's time horizon is limited to the period preceding the oil crisis of late 1973.

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[3] E.g., see Perry, loc. cit., p. 23. Note, however, that some monetarists have pointed out that the onset of this inflation was preceded by about two years of what was considered at that time rapid monetary growth.

[4] These are "full-cost" estimates. For further details and for "incremental-cost" estimates, see Michael E. Levy with Juan de Torres, Delos R. Smith and Vincent Massaro, The Federal Budget: Its Impact on the Economy, fiscal 1973 edition, The Conference Board, New York, 1972, esp. pp. 26-27.

From fiscal 1969 through fiscal 1973 annual expenditures for Vietnam dropped by about $18 billion in current dollars -- the decline in real terms was, of course, much greater -- while total defense expenditures declined by nearly $5 billion. The share of GNP devoted to national defense dropped from its 1968 peak of 9.5 percent to 6 percent in fiscal 1973 and continued to decline to 5 percent by fiscal 1979. Yet the large Vietnam "peace dividend" of the early 1970s brought no end to U.S. inflation. When the 1970 recession barely reduced the inflation rate, a ninety-day wage and price freeze was introduced on August 15, 1971. It followed by four phases of wage and price controls that lasted through the third quarter of 1973. (The final decontrol phase ended in April 1974.) Yet these controls brought, at best, a modest and inadequate respite, before the quadrupling of OPEC oil prices pushed the economy into double-digit inflation in 1974.

"SHOCKS" AND THE INFLATION OF THE 1970s

A significant part, if not a major one, of the inflation surge of 1973-1974 that resulted in double-digit inflation has been attributed to special factors -- "shocks" of a largely international nature. Three distinct inflationary influences deserve to be distinguished:

o The depreciation of the external value of the dollar. (It got under way around mid-1970 and accelerated after the closing of the "gold window" on August 15, 1971, hitting bottom in July 1973.)

o The escalation of agricultural commodity prices, particularly grains, from late 1972 through 1973. (It was caused largely by the prior depletion of U.S. agricultural stocks, the temporary disappearance of the Peruvian anchovies, bad weather and poor crops in many parts of the world in 1972, the "Russian wheat deal" of 1973, and the worldwide boom that raised consumption of high-protein foods.)

- The sharp rise in the prices of fuels and some industrial commodities, but mainly the quadrupling of OPEC oil prices during the last quarter of 1973.

Elsewhere I have described these special events and reviewed the best available evidence as to their impact on U.S. inflation.[5] This combined inflationary impact seems not to have been significant before mid- or late 1972. It increased rapidly thereafter, appears to have peaked during the second half of 1974, and faded during the second half of 1975.[6] On the basis of econometric estimates, I concluded that "the joint impact of these major identifiable 'international shocks' accounted for about 5.5 percentage points -- or roughly 60 percent -- of the dramatic increase in the inflation rate of the implicit GNP deflator from about 3.5 percent (annual rate) in the second half of 1971 to around 12.5 percent in the second half of 1974. The elimination of this shock-induced inflation during 1975 accounted for over 70 percent of the decline in the inflation rate of the GNP deflator to an average of about 5 percent by the second half of 1976."[7]

Research evidence developed more recently leads me to believe that these estimates of international influences on U.S. inflation may well represent upper limits of these "shock effects." In any case, the

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[5] Michael E. Levy, assisted by Steven Malin, International Influences on U.S. Inflation, 1971-1976, op. cit., esp. chap. 1.

[6] Ibid., chap. 4, esp. Table 10.

[7] Ibid., p. 8.

evidence suggests that U.S. inflation would have remained substantial throughout the first half of the 1970s -- though well below the double-digit level -- even in absence of these special price-escalating international developments. In fact, a convincing case could be made that the "basic" inflation rate embedded in the U.S. economy was trending higher, irregularly but persistently, during the last decade-and-a-half and that this uptrend was masked mainly by temporary deviation caused by the controls of the early 1970s on the one hand, and by special international shocks on the other.[8] Not even the 1974-1975 recession -- by far the most severe of all postwar declines -- was able to brake this long-term (1965-1979) uptrend of U.S. inflation rates.

"INFLATIONARY EXPECTATIONS" AND "INFLATION INERTIA"

Most econometric models designed to explain this persistence of U.S. inflation have assigned a major role to "inflationary expectations" that influence future wage agreements and pricing patterns, and to increased "inflation inertia" (a concept which implies simply that the longer inflation persists, the more persistent it becomes). In the words of one leading expert "the significance of ongoing inflation has risen together with the rising rate of inflation."[9]

To the layman, this may seem a bit like a dog chasing its own tail, but for the econometrician, the loop has been closed: econometric

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[8]This uptrend is clearly illustrated by Perry, loc. cit., esp. p. 24, Table 1, when the two periods labelled "Controls (1972-73)" and "Food-fuel explosion (1974-75)" are excluded. The latest international shocks came from the rapid slides in the value of the dollar in 1978 (until November) and in 1979 (May through October), and from the 1979 round of OPEC oil price increases.

[9]Perry, loc. cit., p. 37.

requirements for a technical "explanation" have been satisfied. The end result of these elaborate econometric exercises is a widely accepted model -- Perry calls it a "mainline model" -- that explains 15 years of accelerating U.S. inflation on the basis of a few initial years of excess demand, a few years of price escalations caused by special "shocks," and a lot of "inflationary expectations" and "inflation inertia" designed to link and extend these inflationary spurts and to bridge all the intervening years when inflation should have subsided -- but did not.[10]

I would like to propose a somewhat different approach: a search for fundamental changes in our economic and social system that appear to have originated in the mid-1960s and persisted -- if not gained momentum -- during the past decade-and-a-half. If such structural changes could be identified, and if they carried strong inflationary implications, they would go a long way toward explaining the persistence of inflationary expectations and the increase in inflation inertia. Analysis of U.S. budgetary policies of the last two decades proves to be extremely useful in this search.

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[10]Leading supporters of the "mainline model" are well aware of this difficulty. Thus, Perry notes: "From 1975 through 1977, all available measures of tightness in either labor markets or product markets registered ample slack. And no large upward movements have occurred in particular components of the price level since the Organization of Petroleum Exporting Countries increased oil prices in 1974. Yet despite all these disinflationary developments, the rate of inflation, by any broad measure, has continued at a historically high rate and now shows signs of creeping still further upward."

U.S. BUDGETARY POLICY: LOOKING FOR TRENDS

Analyses of budgetary policy often tend to be too global in approach, focusing mainly on what is perceived to be the overall expansionary (or restrictive) impact of the budget on the economy. Because of our narrow preoccupation with "fiscal policy" as a major neo-Keynesian tool for economic stimulation (or restraint), we have tended to lose sight of the more complex ways in which the size, composition, and rate of growth of the federal budget may affect the economic system. Moreover, the tendency to focus on short periods -- usually a single fiscal year or two -- and excessive reliance on simple, rather inadequate, measures of "fiscal impact" (such as the "full-employment budget surplus") has compounded the myopia of traditional fiscal analysis.

Since I have chosen U.S. inflation as the focus for the present review of federal budgetary policies, I am concerned mainly with longer-term trends and their implications, rather than with short-term fiscal impact. Such an analysis should pay special attention to those budget components that tend to create special inflationary pressures. It seems to me that national defense spending and transfer payments to individuals deserve special attention in this context.

Defense expenditures have an inherent inflationary tendency. They create employment and income, but do not produce any "market goods," nor do they yield the kind of "public benefits" that are perceived by the "average consumer" as an immediate enhancement of well-being (as, say, public spending for health care, education, or police and fire protection). This inflationary tendency of defense spending becomes, of course, particularly pronounced in the case of war expenditures.

Among civilian programs, transfer payments to individuals give rise to special inflationary pressures. Designed to redistribute income within the private sector (often in favor of the poor and the needy), transfer payments tend to increase short-term inflationary pressures if the income gainers tend to spend a higher proportion of their marginal income than the "contributors" (as is usually the case). More important for the present analysis, these transfers tend to generate longer-term inflationary pressures in at least two distinct ways:

- They impair incentives to work and to invest among the "contributors," if not also among the income gainers.[11] Reductions in productivity gains and in growth of real GNP are the more obvious inflationary consequences.

- If the "contributors" consider themselves reluctant losers (rather than "voluntary donors") -- as may often be the case -- they will strive to recapture what they consider their "rightful" (e.g., traditional or expected) share of real income, or real growth. If the "losers" are concentrated in the productive sector of the private economy, while the income gainers are mainly nonproducers, this attempt at "recapturing rightful shares" will manifest itself in wage and price escalations.

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[11]The list of theoretical studies and empirical research on disincentive effects on "income gainers" from unemployment insurance and welfare payments is too extensive for review here. Lately, additional evidence on this subject has become available from analyses of various "negative income-tax experiments."

With these analytical considerations in mind, I have reviewed trends in total federal budget outlays as well as national defense expenditures and transfers to individuals.[12] The results are summarized in Chart 1 and Table 1. Unemployment compensation has been excluded from transfers to individuals as shown there (but not from my own detailed analyses) because its large cyclical fluctuations tend to mask the trends that concern us here.

FOUR PHASES OF NATIONAL DEFENSE SPENDING

National defense expenditures of the 1960s and 1970s may be divided into four distinct phases: (1) the "cold war" phase preceding Vietnam; (2) the escalation phase of the Vietnam War (fiscal 1966 through 1968); (3) the de-escalation phase until the completion of the troop withdrawal in February, 1973; and (4) the recent post-Vietnam phase. Only during the escalation phase did defense spending grow much faster than GNP; during the pre-Vietnam phase of the early 1960s, it barely advanced, and during the deescalation phase it declined rapidly (see Chart 1 and Table 1). More recently, the growth rate of defense spending has accelerated, but it has remained below the growth rate of GNP. If this latest uptrend continues (as is suggested by the current political climate and initial congressional debates of the SALT II

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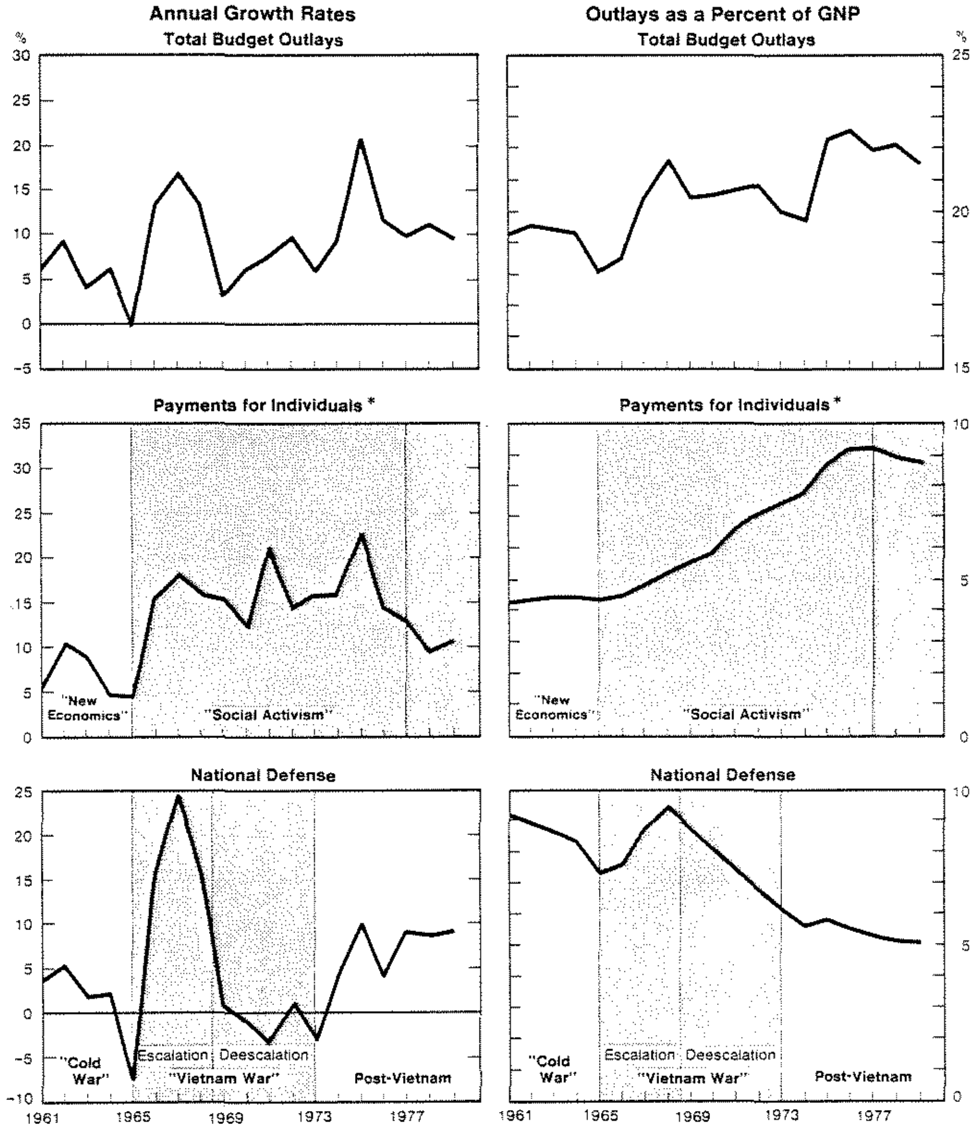
[12] For the analysis of transfers to individuals, unpublished tabulations from the Office of Management and Budget on direct and indirect "payments for individuals" were used, rather than federal transfer payments to individuals as tabulated for the national-income-accounts (NIA) budget. The former data are more appropriate for the analysis at hand, since they include, for example, both Medicare and Medicaid, while the NIA data treat Medicaid as a purchase of health services by state and local governments.

Chart 1.

FEDERAL BUDGET OUTLAYS BY MAJOR COMPONENTS, FISCAL 1961–1979



* Includes all direct and indirect transfer payments, except unemployment compensation, which was excluded here as the major cyclical component.
Sources: Office of Management and Budget; The Conference Board.

Table 1
Selected Data for Analysis of Federal Budget Policy, Fiscal 1961-1979

	1961-65 Average	1966-79 Average	1961-65 Average	1966-69 Average	1970-73 Average	1974-79 Average
			Annual Growth Rates			
Total Budget Outlays	5.2	10.8	5.2	11.9	7.6	12.3
Payments for Individuals*	6.6	15.3	6.6	16.1	15.9	14.5
National Defense	1.1	6.7	1.1	14.1	—1.6	7.4
Productivity	3.2	1.6	3.2	2.4	2.0	0.7
Real GNP	4.2	2.9	4.2	4.6	3.2	1.6
Inflation (Implicit GNP Deflator)	1.5	5.9	1.5	3.6	4.9	8.0
			Percent of GNP			
Total Budget Outlays	19.1	21.0	19.1	20.3	20.5	21.7
Payments for Individuals*	4.3	7.1	4.3	5.0	6.7	8.8
National Defense	8.5	6.8	8.5	8.7	7.1	5.4
Budget Deficit	0.8	1.7	0.8	1.1	1.5	2.3
Fiscal Thrust	1.4	2.0	1.4	1.5	1.8	2.5
Expenditure Component	1.0	2.1	1.0	2.2	1.7	2.3
Revenue Component	0.4	0.0	0.4	—0.7	0.2	0.1

*Includes all direct and indirect transfer payments, except unemployment compensation, which was excluded here as the major cyclical component.

Sources: Office of Management and Budget; The Conference Board.

agreement), a point may soon be reached when the share of GNP devoted to national defense will be rising again.

But with the exception of the early Vietnam War escalation -- its contribution to the inflation of the second half of the 1960s was discussed earlier -- defense spending as a percent of GNP has been declining. The decline in the share of GNP devoted to national defense could have been expected to moderate (rather than stimulate) inflationary pressures during the 1970s.

TRANSFER PAYMENTS: THE BEND IN THE TREND

Transfers to individuals present a drastically different picture. Fiscal 1965 marks a clear dividing line between the moderate growth of these transfers during the first half of the decade and the much higher growth rates that began with fiscal 1966 and lasted at least through fiscal 1977 (see Chart 1). During fiscal years 1978 and 1979, the growth of transfers to individuals slowed significantly. The share of GNP redistributed through federal transfer programs rose rapidly and persistently from 4.2 percent in fiscal 1965 to 9.1 percent in fiscal 1976 and 1977; it declined slightly during fiscal years 1978 and 1979. Clearly, it is much too early to tell whether fiscal 1977 marked the end of the rapid-growth phase of these transfers and the beginning of a new phase of relative containment, or whether it represents simply a brief "pause." Whether pause or change, this is the first noticeable downward deflection in a trend that started in fiscal 1966.[13]

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[13] Note that payments for individuals grew at an average annual rate of 15.3 percent during fiscal 1966-1979, compare with 6.1 percent during fiscal 1961-1965. As a percent of GNP, these payments averaged 4.3 percent in fiscal 1961-1965, 5 percent in fiscal 1966-1969, 6.7 percent in fiscal 1970-1973, and 8.8 percent in 1974-1979 (see Table 1).

Clearly, fiscal 1965 marked a watershed for transfer programs: it was the end of the "New Economics" and the beginning of a new "Social Activism."

The relatively moderate growth of transfers to individuals during the first half of the 1960s reflected the basic policy approach to the Kennedy Administration's "New Economics." The acceleration of real growth and the reduction in the unemployment rate were to be achieved through stimulation of the private sector, rather than through public programs and an expansion of the government sector. The major policy tools were the liberalized depreciation of 1962, the investment tax credit of 1963, and the corporation and personal income tax cuts of 1964 and 1965. The New Economics proved remarkably successful. During fiscal 1961-1965, the unemployment rate declined gradually toward the 4 percent full-employment target (as defined in the 1960s), real GNP grew at an average annual rate of 4.2 percent and annual productivity gains averaged 3.2 percent. All these were far better performances than those obtained during the 1970s, yet price stability was preserved right up to the onset of the Vietnam War.

The assassination of President Kennedy in 1963 and, in its wake, the assumption of power by Lyndon B. Johnson, the passage of the Civil Rights Act in 1964, and the burning of the inner cities during the long, hot summer of 1965, ushered in a new era of "Social Activism." President Johnson -- one of the great parliamentarians of this century and a great admirer of President Roosevelt's New Deal -- secured the passage of far-reaching new social and economic legislation; this included the Economic Opportunity Act of 1964, the Permanent Food Stamp Act of 1964, the Social Security Amendment of 1965 which created

"Medicare" and "Medicaid," and the Demonstration Cities and Metropolitan Development Act of 1966 which established the new "Model Cities" program.

Many of the new federal programs took the form of transfers to individuals and expanded at a very rapid pace even during the 1966-1968 expansion phase of the Vietnam War. In fiscal 1965, federal expenditures for Food Stamps, Medicare and Medicaid were negligible; by fiscal 1968, they amounted to $0.2 billion, $5.3 billion, and $2.0 billion, respectively; and by fiscal 1978, the latest year for which actual data (rather than estimates) are available, they had risen to $5.5 billion, $25.2 billion, and $10.7 billion -- for a combined total equal to 2.0 percent of GNP.

This rapid expansion of social programs with heavy reliance on transfer payments extended from the second half of the 1960s through the 1970s. After repeated large adjustments in Social Security benefits far in excess of inflation, the entire Social Security program was put under the umbrella of a cost-of-living escalator clause in 1975, while real after-tax take-home pay of many workers and real returns on investment were lacking such protection and declined during a major part of the 1970s.

Rapidly growing transfers, mainly from the producing to the non-producing sectors (such as the retired, the disabled, the nonworking poor), were financed in what would appear to be highly inflationary ways:

o By frequent large increases in Social Security taxes which are, in the view of many economists, among the most inflationary taxes.

o By large budget deficits that contributed to excessive money growth.[14]

o By inflation itself which fattened the federal government's income-tax take, while eroding real after-tax purchasing power of workers and real after-tax return on investment.

The limited statistics available on the subject tend to confirm this erosion of real purchasing power of the producing sector. For example, real after-tax weekly earnings of nonfarm production workers -- the best measure available from the Bureau of Labor Statistics -- grew at an average annual rate of 2 percent during 1948-1965, as compared with 0.1 percent during 1966-1978 (see Chart 2). Even after allowing for all the limitations of these data, the sharp erosion since

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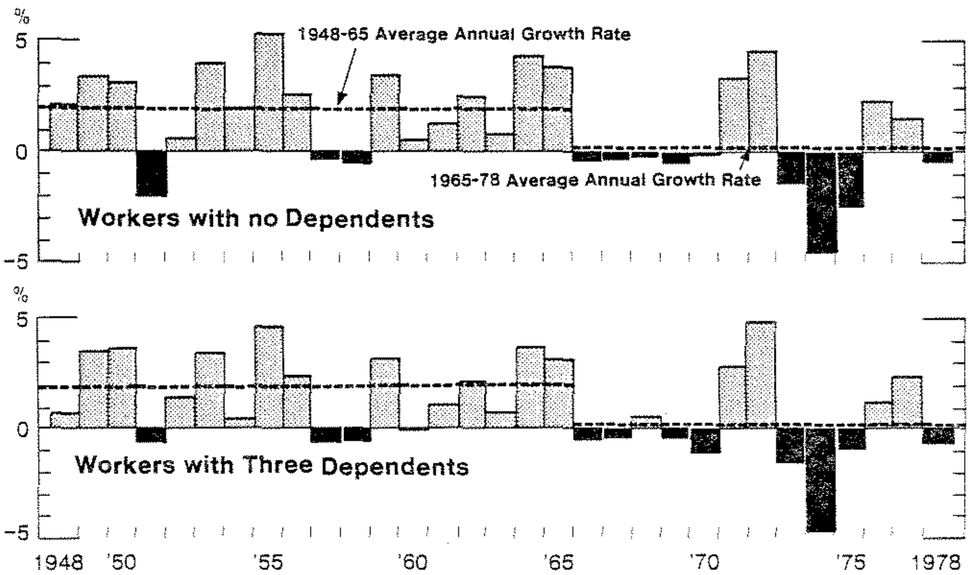
[14]While there is no simple, positive, short-term relationship between budget deficits and inflation (e.g., deficits may be induced or enlarged by a recession which also tends to curtail inflation), persistent high budget deficits during relatively prosperous periods exert strong upward pressure on money growth. This linkage was illuminated during the September 5, 1979 testimony of Paul Volcker, Chairman of the Federal Reserve Board, before the House Budget Committee.

> Representative Simon: "There are those who say there is no relationship between money supply and the money supply policies of the Fed and our deficits?.... How do you describe it and what kind of relationship is there between that increase in the money supply and the deficits?"
>
> Mr. Volcker: "The degree to which the budgetary deficit puts pressure on the Federal Reserve, puts pressure on the credit markets and through the credit markets pressure on the Federal Reserve to increase the money supply, depends a great deal on what else is going on. And the relationship becomes much more difficult in a boom period than in a recession period. But all things equal, over a period of time, the deficit means at the very least that credit markets will be tighter than they otherwise would have been with a constant Federal Reserve money-supply target and that the money-supply target will have to be increased, which in turn has inflationary repercussions."

Chart 2.

ANNUAL PERCENT CHANGES IN REAL AFTER-TAX WEEKLY EARNINGS

Private Nonfarm Production Workers



Sources: Bureau of Labor Statistics; The Conference Board.

1965 is obvious. In its 1979 Annual Report, the Council of Economic Advisers discussed the erosion of investment incentives and stressed the need for stimulating investment.[15] After reviewing four alternate measures of profitability, the CEA concluded: "Of the four measures of profitability, only one, the rate of return on stockholders' equity, has regained the 1955-70 average. The other three are well below the 1955-70 average and still further below the average for 1962-66, when investment outlays rose very strongly."[16]

Not only were investment incentives eroded in the 1970s, but a large and increasing amount of investment had to be devoted to "non-productive uses" in order to meet new safety and enviromental regulations. In this setting of poor real after-tax gains for workers and low investment incentives, productivity and real growth could be expected to suffer. In fact, average productivity gains have been declining steadily since the first half of the 1960s and real growth of GNP during the 1970s averaged well below that of the previous decade. (For details, see Table 1.)

Thus, not only did the federal government redistribute a steadily rising share of real income -- mainly from the producers to nonproducers -- but this redistribution appears to have contributed to, and was in turn affected by, a slowdown in real growth. Thus, workers conditioned during the 1950s and early 1960s to sizable real-income

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[15] Op. cit., pp. 124-34. The CEA concluded: "If the investment needed to reach our economic goals in 1983 is to be realized, policy actions are required that will strengthen investment incentives and reduce investment costs and risks" (p.130). It went on to recommend "tax reductions designed to strengthen investment incentives."

[16] Ibid., p. 129.

gains were doubly disappointed as they received a smaller part of a more slowly growing pie. In such an environment, attempts to restore real gains of workers through higher wage demands, and to shore up profitability through price increases, could be expected to recur frequently, since they were bound to fail against the power of the federal government to enforce its own priorities.

In the struggle to recapture a "fair share" of real income growth (probably based on the patterns of an earlier and happier period), strongly positioned groups could be expected to do better than those in relatively weaker bargaining positions. Thus, highly paid skilled workers and strong unions would experience less erosion of real gains than unskilled or unorganized labor. Some recent evidence presented by Perry indicates that this is precisely what happened in the 1970s. He concludes that "for the eight years as a whole (1970-77), union wages have risen an average of 1 percent a year faster [than average wages]. But while they have outpaced average wages over this period, the 1.7 percent average annual increase in real wages in the union sector during the 1970s just maintained the average rate of real wage increase of the previous decade."[17]

During the 1970s, the federal government -- unwilling to adjust its own inflationary policies and priorities -- applied wage and price freezes and controls intermittently. These "incomes policies" were intended to suppress inflationary pressures from the private productive sector that had been created, or at least intensified, by the government's own policies. In order to minimize the political

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[17] Loc. cit., pp. 31-32.

pressures that arise from large and frequent tax increases (and that ultimately led to the "taxpayers' revolt" of the late 1970s), the federal government relied mainly on increases in Social Security taxes (which are less "visible" and create less popular resistance than income taxes), on the inflationary feedback that swells income-tax receipts as it erodes real after-tax buying power, and on deficit financing. During fiscal 1961-1965, annual federal budget deficits as a percent of GNP averaged 0.8 percent; this percentage rose steadily to 1.1 percent during fiscal 1966-1969; 1.5 percent during fiscal 1970-1973; and 2.3 percent during fiscal 1974-1979 (see Table 1).

FISCAL POLICY: THE EXPANSIONARY "FISCAL THRUST" OF THE 1970s

I have sketched some of the processes through which the diversion of an increasing share of GNP to transfers (mainly from the producing to the nonproducing sector) added inflationary pressures after 1965. Implicit in this analysis were the following two propositions:

- Direct and indirect transfers to individuals, jointly with national defense spending, dominated the patterns of fiscal growth over the last decade-and-a-half. (But except for the Vietnam escalation phase, transfers were by far the most prominent component shaping fiscal growth.)

- The budgetary policies and processes described here resulted in far more expansionary budgets in the 1970s than had been the case in the previous decade. Moreover, this increased expansionary thrust originated from rapidly growing spending programs (mainly transfers), rather than from tax reductions.

The extent to which the first proposition is true may be gleaned from Chart 1. To my knowledge, the second proposition is new and has, so far, been unproven. Therefore, it calls for empirical investigation and evidence.

Until recently, I had suspected but had been unable to document satisfactorily that, on the average, fiscal policy of the 1970s had been more expansionary. With the cooperation of the Bureau of Economic Analysis of the Department of Commerce, I have been able to develop reasonably consistent (preliminary) quarterly and annual estimates of "fiscal thrust" back to fiscal 1959 -- just in time for this meeting (see Table 2).[18] This measure consists of an "expenditure component" which measures change in autonomous government expenditures,[19] and a "revenue component" which measures the initial revenue loss (expansionary (+)) or revenue gain (restrictive (-)) from structural changes in tax provisions (rates or base). Each component, as well as total "fiscal thrust" (their sum) is best measured as a percent of GNP, in

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[18] I coined the term "fiscal thrust" in 1974 when I published my first annual estimates in The Federal Budget: Its Impact on the Economy, The Conference Board, New York, 1974, fiscal 1975 edition, p. 12. My first quarterly estimates were published in 1976 (op. cit., fiscal 1977 edition, p. 11). The measure itself is, of course, derived from Keynesian macroeconomic analysis. Previous uses of similar measures may be found in William H. Oakland, "Budgetary Measures of Fiscal Performance," Southern Economic Journal (April 1969), pp. 348-58; E. Gerald Corrigan, "The Measure and Importance of Fiscal Policy Change," Federal Reserve Bank of New York Monthly Review (June 1970), pp. 135-45; Paul W. McCracken, "Federal Budget Discipline and National Priorities of the 1970s," in Michael E. Levy, editor, Major Economic Issues of the 1970s, The Conference Board, New York, 1973, esp. p. 9.

[19] National-income-accounts (NIA) budget data were used; induced expenditures (mainly regular unemployment compensation) are excluded; and long-lead defense expenditures are adjusted from their "delivery basis" to a timing that reflects more closely actual production.

Table 2
Quarterly and Annual Estimates (Preliminary) of "Fiscal Thrust" and Its Major Components, Fiscal 1959-1980[1]
(NIA budget data; $ billion at seasonally adjusted annual rates)

		Expenditure Contribution[2] (1)	Tax-change Contribution[3] (2)	Fiscal Thrust (3)=(1)+(2)	As a % of GNP: Expenditure Contribution (4)	As a % of GNP: Tax-change Contribution (5)	As a % of GNP: Fiscal Thrust (4)=(5)+(6)
FY 1959		3.5	−0.9	2.6	0.74	−0.18	0.55
	III	5.3	0.3	5.6	1.17	0.07	1.24
	IV	1.6	0.2	1.8	0.34	0.05	0.39
	I	−2.3	−1.4	−3.7	−0.48	−0.29	−0.77
	II	−1.1	0.0	−1.1	−0.22	0.00	−0.22
FY 1960		1.5	−2.6	−1.1	0.30	−0.52	−0.22
	III	1.2	0.0	1.2	0.25	0.00	0.25
	IV	0.2	−0.6	−0.4	0.04	−0.12	−0.08
	I	−0.5	−2.0	−2.5	−0.10	−0.39	−0.49
	II	0.6	0.0	0.6	0.12	0.00	0.12
FY 1961		10.2	−0.4	9.8	2.00	−0.07	1.93
	III	1.8	−0.1	1.7	0.36	−0.02	0.34
	IV	2.0	0.0	2.0	0.40	0.00	0.40
	I	2.7	−0.3	2.4	0.53	−0.06	0.47
	II	3.7	0.0	3.7	0.71	0.00	0.71
FY 1962		7.1	0.7	7.8	1.30	0.13	1.43
	III	1.2	0.0	1.2	0.23	0.00	0.23
	IV	1.0	0.0	1.0	0.18	0.00	0.18
	I	5.4	0.3	5.7	0.98	0.05	1.03
	II	−0.5	0.4	−0.1	−0.09	0.08	−0.01
FY 1963		4.3	−2.4	1.9	0.75	−0.42	0.33
	III	2.2	0.0	2.2	0.38	0.00	0.38
	IV	1.9	0.2	2.1	0.33	0.04	0.37
	I	−0.2	−2.5	−2.7	−0.03	−0.44	−0.47
	II	0.4	−0.1	0.3	0.07	−0.02	0.05
FY 1964		5.3	10.1	15.4	0.86	1.64	2.50
	III	−1.0	0.0	−1.0	−0.17	0.00	−0.17
	IV	5.3	0.1	5.4	0.87	0.01	0.88
	I	0.6	4.6	5.2	0.10	0.74	0.84
	II	0.4	5.4	5.8	0.06	0.86	0.92
FY 1965		2.1	3.4	5.5	0.32	0.52	0.84
	III	0.0	−0.1	−0.1	0.00	−0.01	−0.01
	IV	−0.7	0.0	−0.7	−0.11	0.00	−0.11
	I	0.2	1.7	1.9	0.03	0.26	0.29
	II	2.6	1.8	4.4	0.38	0.27	0.65
FY 1966		19.9	−2.1	17.8	2.75	−0.29	2.46
	III	5.8	2.9	8.7	0.83	0.42	1.25
	IV	3.4	0.2	3.6	0.48	0.02	0.50
	I	7.2	−5.0	2.2	0.98	−0.68	0.30
	II	3.5	−0.2	3.3	0.47	−0.03	0.44
FY 1967		21.2	−2.3	18.9	2.74	−0.30	2.44
	III	7.1	−0.5	6.6	0.94	−0.07	0.87
	IV	4.8	−0.2	4.6	0.62	−0.02	0.60
	I	6.9	−1.9	5.0	0.89	−0.25	0.64
	II	2.4	0.3	2.7	0.30	0.04	0.34
FY 1968		20.4	−5.2	15.2	2.46	−0.63	1.83
	III	2.0	0.0	2.0	0.25	0.00	0.25
	IV	5.6	0.2	5.8	0.68	0.03	0.71
	I	3.3	−5.5	−2.2	0.39	−0.65	−0.26
	II	9.5	0.1	9.6	1.10	0.01	1.11
FY 1969		7.3	−14.8	−7.5	0.81	−1.64	−0.83
	III	−0.3	−6.3	−6.6	−0.03	−0.72	−0.75
	IV	2.7	−1.0	1.7	0.30	−0.11	0.19
	I	1.5	−7.1	−5.6	0.16	−0.77	−0.61
	II	3.4	−0.4	3.0	0.37	−0.05	0.32
FY 1970		16.2	5.8	22.0	1.69	0.60	2.29
	III	0.1	3.6	3.7	0.01	0.38	0.39
	IV	4.3	−0.4	3.9	0.45	−0.04	0.41
	I	0.9	3.1	4.0	0.09	0.32	0.41
	II	10.9	−0.5	10.4	1.12	−0.05	1.07

Table 2 (continued)
Quarterly and Annual Estimates (Preliminary) of "Fiscal Thrust" and Its Major Components, Fiscal 1959-1980[1]

(NIA budget data; $ billion at seasonally adjusted annual rates)

		Expenditure Contribution[2] (1)	Tax-change Contribution[3] (2)	Fiscal Thrust (3)=(1)+(2)	As a % of GNP: Expenditure Contribution (4)	As a % of GNP: Tax-change Contribution (5)	As a % of GNP: Fiscal Thrust (4)=(5)+(6)
FY 1971		**14.9**	**7.9**	**22.8**	**1.46**	**0.77**	**2.23**
	III	−1.7	6.7	5.0	−0.17	0.67	0.50
	IV	3.6	−0.3	3.3	0.36	−0.03	0.33
	I	6.7	1.8	8.5	0.65	0.17	0.82
	II	6.3	−0.3	6.0	0.60	−0.03	0.57
FY 1972		**23.6**	**−5.1**	**18.5**	**2.12**	**−0.46**	**1.66**
	III	1.4	2.6	4.0	0.13	0.24	0.37
	IV	3.7	−2.3	1.4	0.34	−0.21	0.13
	I	11.7	−8.0	3.7	1.04	−0.71	0.33
	II	6.8	2.6	9.4	0.59	0.22	0.81
FY 1973		**18.3**	**−4.8**	**13.5**	**1.48**	**−0.39**	**1.08**
	III	−4.9	1.9	−3.0	−0.41	0.16	−0.25
	IV	21.4	0.4	21.8	1.75	0.04	1.79
	I	1.6	−7.5	−5.9	0.12	−0.59	−0.47
	II	0.2	0.4	0.6	0.02	0.03	0.05
FY 1974		**31.0**	**−3.5**	**27.5**	**2.28**	**−0.26**	**2.02**
	III	2.3	0.2	2.5	0.17	0.02	0.19
	IV	7.0	0.5	7.5	0.52	0.03	0.55
	I	7.5	−4.4	3.1	0.55	−0.32	0.23
	II	14.2	0.2	14.4	1.01	0.02	1.03
FY 1975		**60.0**	**−1.4**	**58.6**	**4.12**	**−0.10**	**4.02**
	III	14.0	0.2	14.2	0.98	0.01	0.99
	IV	3.4	−2.8	0.6	0.23	−0.19	0.04
	I	23.9	−1.8	22.1	1.64	−0.12	1.52
	II	18.7	3.0	21.7	1.25	0.20	1.45
FY 1976		**26.0**	**12.9**	**38.9**	**1.60**	**0.79**	**2.39**
	III	9.0	39.8	48.8	0.58	2.54	3.12
	IV	13.0	−30.6	−17.6	0.81	−1.91	−1.10
	I	4.4	−0.6	3.8	0.27	−0.04	0.23
	II	−0.4	4.3	3.9	−0.02	0.25	0.23
	III T.Q.	5.9	−0.7	5.2	0.34	−0.04	0.30
FY 1977		**46.9**	**7.0**	**53.9**	**2.54**	**0.38**	**2.92**
	IV	19.1	−3.2	15.9	1.09	−0.18	0.91
	I	1.2	4.0	5.2	0.07	0.22	0.29
	II	9.6	2.5	12.1	0.51	0.13	0.64
	III	17.0	3.7	20.7	0.88	0.19	1.07
FY 1978		**32.0**	**−9.3**	**22.7**	**1.55**	**−0.45**	**1.10**
	IV	12.9	−4.1	8.8	0.65	−0.20	0.45
	I	4.4	−0.3	4.1	0.22	−0.02	0.20
	II	2.7	−0.2	2.5	0.13	−0.01	0.12
	III	12.0	−4.7	7.3	0.56	−0.22	0.34
FY 1979		**45.9**	**9.8**	**55.7**	**1.99**	**0.42**	**2.41**
	IV	17.8	−2.4	15.4	0.80	−0.11	0.69
	I	6.0	15.8	21.8	0.26	0.69	0.95
	II	8.0	−1.7	6.3	0.34	−0.07	0.27
	III prel.	14.1	−1.9	12.2	0.59	−0.08	0.51
FY 1980		**33.7**	**−0.1**	**33.6**	**1.36**	**0.00**	**1.36**
	IV est.	10.8	−8.8	2.0	0.45	−0.37	0.08
	I est.	7.1	9.7	16.8	0.29	0.40	0.69
	II est.	4.8	−0.6	4.2	0.19	−0.02	0.17
	III est.	11.0	−0.4	10.6	0.43	−0.02	0.41

[1]Author's preliminary estimates derived from the best available published and unpublished sources. Data revisions and refinements have not yet been completed.

[2]Increases (+) or reductions (—) in "adjusted" NIA budget expenditures. Adjustments include subtractions of changes in "regular" unemployment benefits and of the NIA "defense timely adjustment."

[3]Initial increases (—) or reductions (+) in tax revenues resulting from structural changes in tax bases or rates, based on best published and unpublished estimates from the Treasury Department and the Bureau of Economic Analysis. Timing of the effect of the increases in the tax base on the employee's part of contributions to social security has been changed by author to concentrate this increase mainly in the last two calendar quarters.

T.Q.—Transitional quarter

Sources: Bureau of Economic Analysis; The Conference Board.

order to permit historical comparisons and minimize inflation-induced distortions of these measures.[20]

In short, fiscal thrust and its components are designed to measure the initial expansionary impact originating from the federal budget to which the traditional Keynesian multipliers could be applied (or which could trigger fiscal simulations in econometric models.)

What concerns us for the present analysis are not so much the quarterly, or even the annual, levels or changes in fiscal thrust, but rather the average degree of stimulation of the budget over the broad longer time periods distinguished here. The results, summarized in Table 1, confirm the proposition that, on balance, the budgets of the 1970s were more expansionary than those of the 1960s, largely as the result of much faster spending growth.

Fiscal thrust averaged 1.4 percent of GNP during fiscal 1961-1965, compared with a 2.0 percent average for fiscal 1966-1979. Within the latter period, average fiscal thrust rose from 1.5 percent of GNP during fiscal 1966-1969 to 1.8 percent during fiscal 1970-1973 and 2.5 percent during fiscal 1974-1979. The expenditure component was dominant throughout. But tax cuts provided significant stimulation during the period of the "New Economics"; tax increases provided belated and limited restraint during the escalation phase of the Vietnam War (partially off-setting the "guns and Great Society" spending); and tax changes were nearly neutral over the course of the 1970s.

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[20] A "weighted fiscal thrust" could be constructed (analogous to the "weighted full-employment budget surplus"), but the complications created by such a refinement are hardly warranted in the light of the use of any simple overall measures of fiscal impact and the crudeness of the basic estimates.

THE NEW "SOCIAL REGULATION"

Changes in the composition and growth of the federal budget and its components were not the only inflationary manifestations of what has been termed here a new "social activism." The same emphasis on social welfare and on the consumer, rather than on real growth and the producer, gave rise to a new wave of "social regulation" in the mid-1960s and the early 1970s.[21] The impetus came from consumer groups, environmentalists, labor unions, civil rights advocates and diverse public interest groups, who felt that the traditional regulatory agencies were not achieving "social goals," such as product safety, clean air and water, equal employment opportunities, safer and healthier working conditions.

In response to these public pressures, twenty new "social regulation" agencies have been created since 1970. Among these, the most important ones are the Consumer Product Safety Commission, the Environmental Protection Agency, the Equal Employment Opportunity Commission, and the Occupational Safety and Health Administration. These new agencies charged with social regulation were among the most prominent "growth industries" of the 1970s; their full-time staff increased from 17,324 in fiscal 1970 to 69,258 in fiscal 1979 (86 percent of the federal government's total regulatory staff). The administrative and

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[21]For further discussion of the evolution of new "social regulation" and some cost estimates, see Michael E. Levy, assisted by Delos R. Smith and Steven Malin, The Federal Budget: Its Impact on the Economy, fiscal 1980 No. 2, pp. 12-14. For an encompassing critical review of the impact of government regulation, see Murray L. Weidenbaum, Business, Government, and the Public, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1977; also Murray L. Weidenbaum, The Impacts of Government Regulation, Working Paper No. 32, Center for the Study of American Business, Washington University, St. Louis, July 1978.

reporting costs imposed on businesses grew accordingly. More important, business had to divert large and increasing amounts of cash flow and capital into investments designed mainly to achieve compliance with new social regulation. A major part of these investments -- regardless of whatever their social benefits -- was "unproductive" in terms of our traditional measures of real output and productivity. In fact, according to the best available estimates, productivity of the nonresidential business sector was 1.4 percentage points lower in 1975 than it would have been under the regulatory conditions of 1967.[22]

The tendency of the new "social activism" to pursue socially desirable goals without any proper regard for economic implications, without due consideration of benefit-cost relationships, also has been felt in the regulatory area. Excessively short deadlines for meeting regulatory standards, detailed prescriptions of specific technological solutions, absolute prohibition of the use of certain substances or processes have often raised marginal compliance costs well in excess of marginal benefits.[23] Consequently, the new social regulation -- regardless of whatever its social merits -- has been highly inflationary. In its 1979 Annual Report, the Council of Economic Advisers

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[22] Edward Denison, "Effects of Selected Changes in the Institutional and Human Environment upon Output per Unit of Input," Survey of Current Business, January 1978, pp. 21-44.

[23] For a discussion of these problems, see the section on "Regulatory Reform" in the 1978 Annual Report of the Council of Economic Advisers (pp. 206-216); also the section on "Regulatory Policy" in the 1979 Annual Report of the CEA (pp. 85-91).

described the dynamics of the inflationary process induced by the new social regulation in the following way:

> Once incurred, the costs of regulatory actions enter into the wage- and price-setting mechanisms of the economy. Most of the costs of regulatory action show up not as governmental budget expenditures, but as increased costs to industry. Acceptance of higher prices relative to wages and other money incomes is the way in which society pays for the benefits of social regulation. In fact, however, our economic institutions and measures of prices do not distinguish between these sources of price increases and others. Individuals and groups try to escape paying the costs of regulation by increasing wages and other forms of income to match the higher prices. The result is an additional round of price increases. But the costs of regulation cannot be avoided, and widespread attempts to do so simply add to inflation.[24]

SOME LESSONS FOR THE 1980s

My journey along the inflation road of the last decade-and-a-half has ended with a thesis, rather than with solid conclusions. The search for an explanation of the largely unexplained aspects of our inflation (or of the "excessive" money growth, if you will) -- its duration, persistence and steady escalation -- uncovered basic changes in social and political orientation and in our public policy. These changes -- I referred to them as a new social activism -- originated in the mid-1960s and gained momentum in the 1970s. This social activism manifested itself in increased reliance on the federal government to achieve socially desirable goals through new, or enlarged, budgetary and regulatory programs. The consumer and "social benefits" were stressed, often at the expense of higher costs, slower real growth and lower productivity gains. Among consumers -- many of whom are, after

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[24] Op. cit., p. 87.

all, producers as well -- these new social benefits were often to be focused on the <u>nonproducers</u> (who tend to be perceived as "more needy" and, hence, more deserving of "social benefits").

The "costs" of this new social activism included increased disincentives to work and to invest, slower growth of real GNP, and lower productivity gains. A main result was a persistent increase in inflationary pressures of our entire economic system.

If this thesis has any merit, if it contributes in any significant way to the explanation of the ongoing U.S. inflation, the implications are clear: Successful inflation control depends on removal of the fundamental causes of U.S. inflation. Fiscal and monetary policy restraint, while necessary, will not be sufficient. New policies to encourage greater productive efforts and faster real growth will be essential, if price stability is to be restored in the 1980s.

DISCUSSION OF THE LEVY AND MELTZER PAPERS

William Poole

Michael Levy has assumed the task of explaining the persistence of inflation. I confess, though, that I got off to a bad start at the very beginning of his paper. His second sentence reads: "Monetarist explanations of this deep-seated inflation provide no insights as to its economic, social, and political causes" (emphasis added). And a sentence towards the end of his summary reads: "Fiscal and monetary policy restraint will be necessary, but may not be sufficient [to control inflation]." Fortunately, however, Levy does not really believe these claims. On page two of his paper he says that, "on a purely technical level, the monetarists have, of course, all the answers. In fact, some of my own econometric exercises have tended to reconfirm their valuable, if somewhat simplistic, generalizations."

If we strip away the loaded words such as "simplistic," then it is clear that Levy accepts the basic argument that inflation cannot occur in the absence of excessive money growth. Accepting this proposition, Levy surely does not believe that successful control of inflation would be possible without slowing money growth. Indeed, I cannot believe that Levy would claim that slowing money growth would fail to reduce inflation. He simply does not in fact believe that monetarist explanations provide no insight into the economics of inflation.

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Levy's paper is not about monetarist propositions linking money growth to inflation, but about the causes of excessive money growth. This issue is obviously important. But the reasons monetarists have not paid much attention to this issue to date are, first that it was important to gain agreement that inflation is indeed a monetary phenomenon -- a proposition not widely accepted thirty years ago -- and, second, that the methods of economic analysis may not provide great insight into the causes of excessive money growth. Levy feels that the important issues concern changes in the economic and social structure that have produced an inflationary environment.

Before commenting further let me introduce a qualification to the simple monetarist view. Clearly, insofar as changes in the economic and social structure, in the average tax rate, and in the regulatory burden affect incentives and productivity, the rate of productivity growth may slow down. Reduction in the growth of real output, given the rate of money growth, will raise the rate of inflation. As a first approximation, what matters is the money stock per unit of real GNP. But the slow-down in productivity growth and therefore in output growth can directly account for only a very small part of our inflation. We might be able to explain one to two percentage points of the inflation in recent years by the slow-down in output growth. But that is not what all the shouting is about. If the current rate of inflation were only one or two percentage points above the rate of the early sixties, then the subject of this conference would not be inflation but rather productivity or some other issue.

If I understand Levy correctly, he feels that sociological and non-monetary factors have accelerated the rate of inflation and that the monetary authorities have been dragged along -- forced to accommodate with money growth the more fundamental factors producing inflation. Even on this view, however, Levy should be much more interested than he is in what he calls the simplistic monetarist explanation.

If the price level were very closely linked to the money stock, with a very small margin of error, then it would be absolutely clear that non-monetary factors could work to increase inflation only insofar as they operated quite directly on the Federal Reserve. The greater the amount of slack or imprecision in the money/price relation, the more credible Levy's argument becomes. If the relation is imprecise, especially in the short run, there is much room for non-monetary factors to produce an acceleration in the rate of inflation directly, and for the Federal Reserve to be drawn into monetary expansion later by pressures to sustain the ongoing inflation process. The very word "accommodation" has the flavor of the central bank responding to an inflation that has already occurred in order to prevent longer-run forces from reversing the inflation through a process involving unemployment.

Levy presents data showing changes in defense spending, government transfers, and so forth. But he presents no evidence whatsoever that even bears on the validity of his claim that factors such as these are responsible for the inflation. Surely time series evidence on United States inflation relative to government spending would be relevant. Also, cross section evidence relating the rate of inflation to the size of the government budget or its rate of growth in different countries would be relevant. Does Levy dispute the common finding that inflation follows rather than leads money growth, a finding that seems inconsistent with the accommodation argument?

Since Levy has presented no evidence, I'm forced to make a few comments based on casual empiricism and *a priori* plausibility. One of Levy's claims is that the erosion in the growth of real incomes has led workers and firms to seek higher wages and prices in an attempt to recoup their lost income growth. If this argument is true, why did wages and prices fall sharply as people became poorer between 1929 and 1933? Is the short-run Phillips curve -- which shows that wage inflation slows as people become poorer through unemployment -- consistent with Levy's proposition? If growth in taxes has been a major factor in reducing growth in disposable income, then why have we not seen more activity to reduce government spending and taxes rather than the activity claimed by Levy to raise nominal wages and prices? I may be wrong, but Proposition 13 pressures seem awfully weak to me at the federal level, and in any event seem to be a lagged result of the inflation process rather than part of a process that can explain the inflation.

What other evidence beside nominal wage and price increases can we look at? What about strike activity, or union membership, or concentration ratios in industry? All of these would seem to have some possible connection to inflation, or at least as symptoms of the process Levy is talking about. My impression is that these factors all cut in the wrong direction in the United States. Most fundamentally, how can real factors, other than through productivity effects and effects on Federal Reserve behavior, have anything to do with nominal magnitudes?

Levy seems to recognize the importance of explaining Federal Reserve behavior; his footnote on page seventeen deals at some length with the question of the role of budget deficits in explaining Federal Reserve money creation.

I believe that a number of factors, some of which are closely connected to the ones Levy has emphasized, should be examined in terms of their effect on Federal Reserve behavior. My list of important items is this:

1. Since the mid-sixties there have been consistent underestimates of the natural rate of unemployment by the Federal Reserve and by the economics profession. These underestimates have led to money growth that on average has been too high, even accepting the view that monetary policy should aim for an unemployment rate close to the natural rate.
2. There has been a great over-emphasis on nominal interest rates and a view that short-run money growth doesn't really matter. Although the Federal Reserve has long recognized the importance of long-run money growth, it always seems to be operating in a series of short runs that never add up to a long run.
3. The Federal Reserve has from time to time made political miscalculations based on a combination of overly optimistic forecasts of the effectiveness of fiscal actions and overly optimistic forecasts of when fiscal actions would occur. Probably the best example of this point is the Fed's delay in tightening money in 1967 while waiting for Congress to pass a tax increase.
4. The Federal Reserve's policy horizon has been too short. Ordinarily, the Fed looks ahead long enough to see significant impacts of monetary policy on employment and output but not long enough to see any important impact on prices.

5. The Federal Reserve has used a poor control mechanism based on the federal funds rate. This mechanism has produced a procyclical monetary policy because it makes persistent procyclical mistakes so easy.
6. The Federal Reserve is obviously responsive to political pressures, especially from the administration. These political considerations may have reflected concern, from time to time, over reelection of a President and over reappointment of a Federal Reserve Board Chairman. I continue to believe that Federal Reserve behavior is not at all a simple function of broad societal trends. Accidents of history such as assassinations do happen and are important. While I certainly would not rule out the importance of research on general principles of political behavior, I still feel that neglecting the interplay of personalities and events is a mistake. In an endeavor of this type, traditional historical analysis can provide very substantial insights.

In summary, I believe that Levy provides a misleading interpretation of what monetarism is all about. Monetarism involves the economics of the relations between money, output, prices, and interest rates, and the economic processes responsible for these relations. It does not pretend to offer an economic explanation of money growth and should not, therefore, be criticized for not doing so.

Now that monetarist propositions -- at least in their long-run form -- are so widely accepted, it clearly makes sense to move on to issues concerning why the monetary authorities behave the way they do. Levy has offered a number of interesting hypotheses on this question, but has not provided any evidence. To my taste, his approach is less productive than it might be because he pays so little attention to the monetary authority itself. Surely the Federal Reserve should be the focal point of the political and sociological analysis. The Fed has far more than a caretaker function. If the factors Levy discusses are important, we need to know how they impinge on the Federal Reserve in order to have much confidence in the argument.

Now let me turn to the paper by Allan Meltzer. I will start with an outline of his argument as I understand it.

First, Meltzer believes that expectational errors affect output. The expectational errors that he stresses are those between the normal, or permanent plus the transitory components. He mentions in passing that this view is different from that of Lucas. While it is true that Lucas uses a spatial rather than a temporal model, I think that it really comes to much the same thing. Additional output can be obtained in the Lucas model only if labor is willing to substitute hours intertemporarily.

In any event, the Meltzer view is that when prices are viewed as temporarily high the level of output is expanded, and when prices are temporarily low the level of output is contracted. Actually, it is probably better for me to state Meltzer's proposition a bit differently: the permanent level of prices depends on the permanent level of the money stock and it is deviations of the actual money stock from the permanent level that are most clearly related to deviations of output from normal full employment output.

Since deviations of output from potential output are related to expectational errors, it is important to investigate the formation of these expectations. To illustrate the basic idea, Meltzer uses a simple model from the statistics literature in which a time series has known properties consisting of permanent and transitory variations. The inference problem is to use the past data to make the best guess as to the permanent component in the next period. The solution to the problem requires knowledge of the permanent and transitory variances. Given that information, the next-period forecast depends on a distributed lag of the past observations of the series, with the distributed lag weights depending on the permanent and transitory variances. This basic idea can be generalized easily -- although the technical problems may not be solved easily -- by considering more complicated time series models including multivariate frameworks. However, the basic idea comes through quite clearly in the univariate model analyzed by Meltzer. His tables 1 and 2 provide the flavor of how the means and permanent and transitory variances might be extracted from the data for different periods.

Now let me make an important distinction that does not seem very clear in Meltzer's paper. When we examine a policy of gradualism there are two analytically distinct considerations. One concerns the time series of agents' forecasts of permanent values and the magnitudes of expectational errors under the assumption that agents' estimates of the permanent and transitory variances remain fixed and given an assumed money growth path. Here, it is clear that if money growth slows sharply, then the market will interpret the initial slow-down as being largely transitory; if the slow-down is in fact permanent, then there will be a large and persistent expectational error. Under these assumptions, the case for gradualism is compelling. Only with a gradual decline in money growth would it be possible to avoid large expectational errors and the accompanying losses in output.

An entirely separate issue -- and one that I think is at the heart of the problem -- concerns the way in which agents change their estimates of the permanent and transitory variances over time. Meltzer's discussion is much less helpful on this issue. If the Federal Reserve could convince agents that the money growth process had changed and could convince agents that it would slow money growth sharply, then forecasts of the permanent money stock would not be determined by the old distributed lag on past observations. Under these assumptions, the Fed could slow money growth abruptly without producing expectational errors and there would be no case for gradualism.

Meltzer has not offered any formal analysis of how agents learn from experience to change their estimates of the permanent and transitory variances. Nor has Meltzer offered an analysis of how agents might be led to change their estimates of these variances by the Fed introducing a new policy, a process which would not require any learning from past money stock observations at all. My comment on this point is not meant to reflect a criticism of Meltzer's paper; I do not know of any interesting models of learning and I do not have the foggiest idea of how to go about modeling this process. My point is simply that it is important to separate the issue of calculating permanent values <u>given</u> estimates of the variances from the issue of how agents form <u>new</u> estimates of these variances over time.

The only constructive thought I can offer is that prescriptions as to the best path for the money stock in the future might be based in part on an analysis of the effects of reducing transitory variance.

money growth has been high in the recent past; if the actual rate of money growth is brought down only slowly from this high initial starting point and if the transitory variance is compressed by making this slow-down smooth and in accordance with announced intentions, then it is possible that the initial effects would actually be to raise agents'estimates of the permanent rate of money growth for the next few periods. This result would occur if a significant part of the recent high money growth had been regarded by agents as transitory and therefore had not been built into their estimates of the permanent part of money growth. The likelihood of the perverse result could be investigated by examining the effect of a reduced transitory variance on money growth expectations for next year in a time series model applied to actual money growth over the past few years.

I have two final comments. First, as John Taylor has emphasized, there is considerable uncertainty about the relative validity of purely expectational theories of the business cycle and theories that stress lagged adjustment due to contracts and similar types of institutions. As Meltzer has noted but not emphasized, the case for gradual reduction of money growth is considerably strengthened by this uncertainty because insofar as the contract view has validity, a sharp reduction in money growth -- even if fully anticipated -- would produce a sharp decline in output.

Secondly, although we have concentrated on economic factors, I think it is worth mentioning political processes. It is not obvious to me that maintainance over a long period of time of a gradual reduction of the money stock is politically feasible. It is certainly conceivable that a quick and dirty reduction of money growth, accepting the severe output effects that would occur, is the only solution that is politically viable. I am not sure whether or not I believe that a quick purging of inflation would be better politically, and even if I did know what I believe I would not have any idea of why I believed it. Nevertheless, this issue is surely important for a full policy analysis of winding down inflation. An economic analysis of the minimum cost method of reducing inflation is obviously important, but unfortunately it is not at all clear that the cost-benefit calculation that governs the political process is very closely connected to the economic costs and benefits, however firmly we may establish them.

DISCUSSION OF THE LEVY AND MELTZER PAPERS

Albert E. Burger

What did the experience of the last half of the 1960s and the decade of the 1970s teach us about the effects of monetary policy actions? It did not teach us anything "new." It only gave us another set of empirical observations to support the long-standing proposition that a maintained excessive growth of money will generate an acceleration in inflation and will raise inflationary expectations. The policy actions that engineered the move from price stability in the first half of the 1960s to a 6 percent rate of maintained inflation by 1973 were an accelerated rate of purchase of government securities by the Federal Reserve which resulted in a faster growth of monetary base and bank reserves and, hence, a rise in the trend growth of money from 1-2 percent to 6 percent.

Prior to the mid-1960s there already existed a very large amount of evidence that this would be the expected result of these types of policy actions. Indeed, one does not have to use highly sophisticated methods of analysis to come to this conclusion. Simply a close look at the data should be enough to convince most people of this strong relationship between the growth of money and inflation.

The experience since 1973 has reminded us that price theory can be useful in analyzing macroeconomic developments. Severe supply

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shocks raise the level of prices and, hence, contribute to the measured rate of inflation. However, as 1975-1976 illustrate, these effects do not result in sustained inflation.

Both Meltzer and Levy point out that sustained inflation is a monetary phenomenon. They differ with respect to whether monetary actions are the "fundamental" cause of inflation. Meltzer puts the blame for inflation and its acceleration directly at the door of the Federal Reserve. He rejects the assertion that the Vietnam War, deficits, and government spending of the mid-1960s were the origin of inflation or were the motivating force causing the Fed to expand money. I agree with Meltzer that the Fed must accept the blame for starting and maintaining inflation. The money stock grew at steadily more rapid rates because the Fed allowed it to do so by providing the necessary bank reserves. If the Fed had not supplied more reserves, money growth would not have accelerated and, hence, inflation would not have accelerated. The Fed can make excuses about why it followed such a policy, but the fact remains that it did follow such a policy.

Levy raises the interesting question of why policy moved from one that underwrote price stability to one that underwrote accelerating inflation. His conclusion is that, in the mid-1960s, there were major political and social changes that led to greater social activism on the part of the government (such as a shift toward increased "nonproductive" transfer payments and regulation) that reduced productivity and set off the inflationary spiral. I would interpret his conclusion as meaning the Federal Reserve was caught up in this process and essentially pulled along the path it followed by forces over which it had no control.

There is a growing body of evidence supporting the idea that the factors Levy discusses operated to lower potential real output growth. However, if these factors had not been accompanied by a surge in monetary expansion, there is considerable doubt we would have had the acceleration in inflation that we experienced.

This still leaves open the question of why, despite repeated statements of policy intent to halt inflation, the Federal Reserve allowed its policy actions to feed inflation. If the Fed had actually planned an acceleration in inflation, it could not have followed a program that was better grounded in theory and supported by empirical evidence. I have difficulty accepting the explanation that the Federal Reserve was simply pulled along by the tide of expansionary sentiment. To some extent, that may have been the case. Especially, one can point to the repeated failure of certain members of Congress to accept the interest rate consequences of their deficit spending. However, the basic cause of the high and rising interest rates that have characterized the last 15 years has been the inflation generated by Federal Reserve actions and the resulting rise in inflationary expectations.

I would ascribe the failure of monetary policy to achieve its objective of stable overall prices to a failure to accept and remain committed to a few very basic principles. These are: (1) the primary job of a central bank is to prevent an acceleration in the basic rate of inflation and monetary policy cannot fine tune real output; (2) excessive money growth means an acceleration in inflation; (3) money grows at a sustained, faster rate only when the central bank provides more monetary base; (4) if there is a surge in government demand for credit or private demands for credit or a surge in measured inflation, short-term interest rates will rise and Federal Reserve attempts to prevent this rise will only ensure that interest rates remain at these higher levels; (5) the Federal Reserve can control the trend growth of money; and (6) although in theory, money growth can be controlled by operating on the federal funds rate, in practice this is a very unsatisfactory procedure. If the Federal Reserve had remained committed to these six basic principles, it seems very unlikely that monetary policy would have followed the path that characterized the last 15 years.

Of the above six principles, the last two have been the hardest for the Federal Reserve to accept: ability to control money and the flaws in a federal funds target. More than anything else, these two items have contributed to the failure to achieve policy objectives. Too often the question of "can the Fed control money?" has gotten mixed up with the question of "should the Fed control money?" If the central bank can control the growth of the monetary base, it can control the supply of money. This should be a lesson that is learned in an introductory money and banking course. During the past 15 years the Federal Reserve has tried to control the federal funds rate, not growth of monetary base and bank reserves. Hence, the Federal Reserve has not "controlled" money.

This is why the most important aspect of the policy actions announced by the Fed's Open Market Committee on October 6, 1979, was the part announcing a change in operating procedures. Primary emphasis was shifted from the federal funds rate to growth of a reserve aggregate. If the Federal Reserve remains committed to this change, monetary actions may start to match the intent of monetary policy.

It is much easier to analyze how we got into our current predicament than it is to state how to get out of it. Obviously, to lower the trend rate of inflation, the growth rates of the monetary base and money must be reduced. However, the objective of monetary policy is not just to slow inflation, but to do so with a minimum loss of real output. As other papers at this conference have emphasized, there is a great deal of uncertainty about the effects of alternative "slowing" policies on real output and employment as well as their short-term effects on the financial markets. Traditional macroeconomic models usually assign a fairly large and prolonged real output effect to anti-inflationary monetary policy. However, as Taylor points out in his paper, recent developments in economic theory raise serious questions about implications of traditional models.

Despite our uncertainty about the exact magnitude of the effects on real output, it is becoming generally accepted that the less the degree of uncertainty about the path of monetary actions the less effect these actions will have on real output and the larger and quicker their effect on inflation. Meltzer discusses this issue under the heading of the "basic inference problem." He shows that, if transitory changes in the growth of money are frequent, it is optimal to observe a relatively long series of observations before concluding that a permanent change has occurred. The past behavior of the Federal Reserve with respect to the growth of money has made this a good rule to follow. The Federal Reserve has announced monetary targets and then repeatedly failed to hit these targets. The Federal Reserve has announced major policy actions designed to slow money growth, as it did in November 1978, and then actually substantially reduced money growth for five months.

However, this was apparently only a transitory change in money growth, as the last six months have completely reversed the pattern of slow money growth.

Hopefully, one lesson that the Federal Reserve has learned is that it must make its policy announcements credible to the public. Credible means taking actions, and maintaining those actions that are consistent with its stated policy intent. Also, when the Federal Reserve makes a major change in its method of implementing policy, it should clearly explain this new procedure. The immediate case in point is the October 6 announcement of a move toward a reserve targeting procedure. To minimize disturbances in financial markets and to have a maximum effect on inflationary expectations, the Federal Reserve should clearly explain the new rules of the game. How much more short-run flexibility does the Fed plan to allow in the federal funds rate? Exactly which reserve aggregate is going to be the new target? What is the Federal Reserve's growth target for this reserve aggregate? How is the Federal Reserve going to project the relationship between the reserve aggregate and money? An improved monetary policy for the 1980s must include answers to these questions.

FLEXIBLE EXCHANGE RATES IN THE 1970s

Jacob A. Frenkel

INTRODUCTION

Our recent experience with a system of flexible exchange rates had led to a renewed interest in the operations of foreign exchange markets and in studying the principal determinants of exchange rates. The 1970s witnessed the dramatic evolution of the international monetary system from a regime of pegged exchange rates which prevailed for about a quarter of a century since the Bretton Woods conference into a regime of flexible (though managed) rates. The emergence of the new legal and economic system confronted traders, national governments and international organizations with new economic problems, choices and instruments. During the 1970s exchange rates have fluctuated widely and inflation rates accelerated. The international monetary system had to accommodate extraordinarily large oil related shocks which affected trade flows in goods and assets. Huge oil payments had to be recycled. Uncertainties concerning future developments in international politics reached new heights and the prospects for the world economy got gloomier. These developments have placed unprecedented pressures on the markets for foreign exchange as well as on other asset markets.

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They have been associated with a large slide in the value of the U.S. dollar, and have resulted in speeding up the creation of new institutions like the European Monetary System which provides the formal framework for the management of exchange rates among members. The increased interdependence among countries and the recognition that exchange rate policies by one national government exert influence on other economies have also induced a legal response from international organizations. For example, in late April 1977, the Executive Board of the International Monetary Fund approved the details of the second amendment to Article IV of the amended Articles of Agreement dealing with the principles and procedures for surveillance of member countries' exchange rate policies.

These developments provide the background for this paper which is intended to present a brief survey of key issues and lessons from the experience with floating rates during the 1970s. The main orientation of the paper is empirical and the analysis is based on the experience of three exchange rates: the Dollar/Pound, the Dollar/French Franc and the Dollar/DM. In the second section I analyze the efficiency of the foreign exchange markets by examining the relationship between spot and forward exchange rates; in that context I also examine and interpret the extent of exchange rate volatility. The analysis of the foreign exchange markets is important because it sheds light on several questions like: 1) have exchange rates fluctuated "excessively?" 2) is there evidence that speculation in the foreign exchange markets is destabilizing? 3) is there evidence that there is "insufficient" speculation in the foreign exchange markets? 4) is there evidence for a market failure in the sense that there are unexploited profit opportunities? These issues are relevant for assessing the performance of floating rates as well as for discussing whether there is a case for government intervention in the foreign exchange markets. The analytical framework that is used for interpreting the volatility of exchange rates and the association between spot and forward rates is the modern theory of exchange rate determination. Within this perspective exchange rates are viewed as the prices of assets that are traded in organized markets and, like the prices of other assets, are strongly influenced by expectations about future events.

The relationship between exchange rates and interest rates is analyzed in the third section from the perspective of the monetary approach to the exchange rate. This analysis is of particular relevance in view of the new policies of the Federal Reserve Board, which were announced on October 6, 1979, that are intended to curb inflation and to support the dollar. One of the key issues that is raised in this section is the distinction between anticipated and unanticipated changes in rates of interest. The policy implication of this distinction is obvious. As an analytical matter this distinction is important because the modern approach to exchange rate determination implies that exchange rates are strongly influenced by "news" which by definition is unpredicted. Therefore, unanticipated rather than anticipated changes in interest rates should have a strong effect on changes in exchange rates. This prediction is tested empirically.

The fourth section analyzes the relationship between exchange rates and prices by examining the patterns of deviation from purchasing power parities. This examination is relevant for assessing whether the flexible exchange rate system was successful in insulating national economies from foreign shocks, and whether it provided policymakers with an added instrument for the conduct of macroeconomic policy. The evidence on deviations from purchasing power parities is also relevant for the discussion of whether there is a case for managed float. The fifth section concludes the paper with some concluding remarks.

THE EFFICIENCY OF THE FOREIGN EXCHANGE MARKET AND THE MOVEMENT OF EXCHANGE RATES

In this section I analyze the principal characteristics of the relationship between spot and forward exchange rates which seem to emerge from the experience of the 1970s. Following an analysis of the efficiency of the foreign exchange market I discuss the more general issues underlying the relationships between spot and forward rates and their volatility.

The Efficiency of the Foreign Exchange Market

One of the central insights of the monetary (or the asset market) approach to the exchange rate is the notion that the exchange rate, being a relative price of two assets, is determined in a manner similar to the determination of other asset prices and that expectations concerning future course of events play a central role in affecting current exchange rates.[1]

If the foreign exchange market is efficient and if the exchange rate is determined in a fashion similar to the determination of other asset prices, we should expect current prices to reflect all currently

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[1] For collections of articles summarizing this approach see the Scandinavian Journal of Economics, no. 2, 1976, and Frenkel and Johnson (1978).

available information. Expectations concerning future exchange rates should be incorporated and reflected in forward exchange rates. Thus, to examine the efficiency of the market, I first regress the logarithm of the current spot exchange rate, $\ell n\ S_t$, on the logarithm of the one-month forward exchange rate prevailing at the previous month, $\ell n\ F_{t-1}$, as in equation (1).[2]

(1) $\ell n\ S_t = a + b\ \ell n\ F_{t-1} + u_t$

If the market for foreign exchange is efficient and if the forward exchange rate is an unbiased forecast of the future spot exchange rate, then we expect that: 1) the constant term in equation (1) should not differ significantly from zero,[3] 2) the slope coefficient should not differ significantly from unity and, 3) the residuals should be serially uncorrelated. I examine three exchange rates: the Dollar/Pound, the Dollar/Franc and the Dollar/DM. Equation (1) was estimated using monthly data for the period June 1973 - July 1979. The beginning of the period was determined by the attempt to concentrate on the experience of the current exchange rate regime (following the initial post Bretton-Woods transition period). The resulting ordinary least-

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[2]For an application of the same methodology in analyzing the efficiency properties of the foreign exchange market during the German hyperinflation of 1921-1923 see Frenkel (1976, 1977, 1979). For an application to other exchange rates during the 1920s, see Frenkel and Clements (1980), for an application to the 1920s and the 1970s, see Krugman (1977); for an interesting analysis using time-series and cross-section data, see Bilson (1979), for an analysis of market efficiency using novel econometric techniques, see Hakkio (1979a), and Hansen and Hodrick (1980), and for surveys, see Levich (1978, 1979).

[3]More precisely, if (assuming risk neutrality) the forward rate measures the expected value of the future spot rate, then the constant term in the logarithmic equation (1) should be $-0.5\sigma_u^2$; see Frenkel (1979).

squares estimates are reported in Table 1. Also reported in Table 1 are additional regressions which will be analyzed shortly. As may be seen for the Dollar/DM exchange rate, the hypotheses that (at the 95 percent confidence level) the constant term does not differ significantly from zero and that the slope coefficient does not differ significantly from unity cannot be rejected. These hypotheses are rejected for the Dollar/Franc exchange rate and are rejected (marginally) for the Dollar/Pound exchange rate. The joint hypotheses, however, that the constant is zero <u>and</u> that the slope coefficient is unity cannot be rejected at the 95 percent for the Dollar/Pound and the Dollar/DM exchange rates and at the 99 percent for the Dollar/Franc exchange rate. The test statistics for testing the joint hypotheses are reported in the column headed by F in Table 1.

It was argued above that in an efficient market, expectations concerning future exchange rates are reflected in forward rates, and that spot exchange rates reflect all currently available information. If forward exchange rates prevailing at period t-1 summarize all relevant information available at that period, they should also contain the information that is summarized in data corresponding to period t-2. It thus follows that including additional lagged values of the forward rates in equation (1) should not greatly affect the coefficients of determination and should not yield coefficients that differ significantly from zero. The results reported in Table 1 are consistent with this hypothesis; in all cases the coefficients of $\ell n\ F_{t-2}$ do not differ significantly from zero and the inclusion of the additional lagged variables does not improve the fit. Furthermore, in all cases the Durbin-Watson statistics are consistent with the hypothesis of the

Table 1

Efficiency of Foreign Exchange Markets
Monthly Data: June 1973 - July 1979
(standard errors in parentheses)

Dependent Variable: $\ln S_t$	Estimation Method	Constant	$\ln F_{t-1}$	$\ln F_{t-2}$	R^2	s.e.	D.W.	F	m
Dollar/Pound	OLS	.033	.956		.96	.027	1.72	1.86	
		(.017)	(.024)						
	OLS	.031	1.047	-.088	.96	.027	1.94		
		(.018)	(.116)	(.113)					
	IV	.035	.953		.96	.027	1.72		.90
		(.018)	(.024)						
Dollar/Franc	OLS	-.237	.843		.79	.029	2.23	4.83	
		(.078)	(.051)						
	OLS	-.225	.706	.146	.79	.029	1.90		
		(.082)	(.117)	(.117)					
	IV	-.219	.855		.79	.029	2.25		2.73
		(.079)	(.052)						
Dollar/DM	OLS	-.023	.971		.93	.032	2.12	.51	
		(.027)	(.032)						
	OLS	-.019	.913	.063	.93	.032	1.96		
		(.028)	(.119)	(.122)					
	IV	-.022	.972		.93	.032	2.12		.02
		(.028)	(.033)						

Note: s.e. is the standard error of the equation and R^2 is the coefficient of determination; in the case of instrumental variables estimation the R^2 was computed as $1-\mathrm{Var}(\hat{u}_t)/\mathrm{Var}(\ln S_t)$. The F statistic tests the joint restriction that the constant equals zero and the slope equals unity. The test statistic is distributed as F(2,71). Critical values for F(2,71) are 3.13 (95 percent) and 4.92 (99 percent). The instrumental variable (IV) estimation method is used in order to allow for the possibility of errors in variables arising from using $\ln F_{t-1}$ as a proxy for the expected future spot rate; the instruments are a constant and Durbin's rank variable. The m-statistic which tests for the absence of errors in variables is distributed χ^2 with 2 degrees of freedom. The critical value for $\chi^2(2)$ is 5.99 (95 percent).

absence of first-order autocorrelated residuals and an examination of higher order correlations (up to 12 lags) shows that no correlation of any order is significant.

To further examine the relationship between the various exchange rates we note that one of the assumptions underlying equation (1) was the notion that the forward exchange rate measures the unobservable value of the expected future spot exchange rate. This assumption provided the justification for using equation (1) instead of the more fundamental relationship that is embodied in equation (2):

$$(2) \quad \ell n\, S_t = a + b\, \ell n(S_t^e \mid t - 1) + \varepsilon_t$$

where $(S_t^e \mid t-1)$ denotes the expected spot exchange rate for period t based on the information available at period t - 1. If, however, the forward exchange rate at t - 1 is a "noisy" proxy for the expected future value of the spot rate, (i.e., it measures it with a random error) then we would obtain that

$$(3) \quad \ell n\, F_{t-1} = \ell n(S_t^e \mid t - 1) + v_{t-1};\ E(v_t) = 0$$

and substituting equation (3) into equation (2) yields:

$$(4) \quad \ell n\, S_t = a + b\, \ell n\, F_{t-1} + (\varepsilon_t - bv_{t-1}).$$

In this case the error term in equation (1) would be $u_t = \varepsilon_t - bv_{t-1}$, and the assumption that the covariance between $\ell n\, F_{t-1}$ and u_t is zero would entail a specification error, and the application of the ordinary least-squares (OLS) procedure would yield inconsistent estimates due to the classical errors in variables bias.

In order to examine the possibility that the OLS estimates might be subject to the errors in variables bias, one needs to test the hypothesis that $\text{cov}(u_t, \ell n\, F_{t-1}) = 0$. This test follows the specification test outlined by Hausman (1978).[4] To perform the test equation (1) was estimated by applying the OLS procedure as well as by using an instrumental variables (IV) estimation method. Under the null-hypothesis of no misspecification the OLS coefficients vector $\hat{b}_0$ is an efficient and an unbiased estimate of the true coefficient vector. Under the alternative hypothesis of misspecification the vector $\hat{b}_0$ is biased and an unbiased coefficient vector $\hat{b}_1$ can be obtained by applying an instrumental variables estimation procedure. The test-statistic relevant for testing the null-hypothesis can be written as

$$(5) \quad m = (\hat{b}_1 - \hat{b}_0)'(\text{var}\, \hat{b}_1 - \text{var}\, \hat{b}_0)^{-1}(\hat{b}_1 - \hat{b}_0)$$

where $\text{var}(\hat{b}_1)$ and $\text{var}(\hat{b}_0)$ denote the variance-covariance matrices of $\hat{b}_1$ and $\hat{b}_0$, respectively. Under the null-hypothesis m is distributed (in large samples) as χ^2 with two degrees of freedom. Table 1 reports the results of estimating equation (1) by applying the instrumental variables estimation method. As may be seen for all exchange rates the two vectors of coefficients b_1 and b_0 are very close to each other. For example, for the Dollar/Pound exchange rate the constants are .033 and .035 and the slopes are .956 and .953, consequently, the resulting m statistic is .90 which is well below 5.99 -- the critical value of

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[4]This test was recently applied by Obstfeld (1978) to the analysis of the foreign exchange market during the 1970s and by Frenkel (1980a, 1980b) to the analysis of the foreign exchange markets during the 1920s.

$\chi^2(2)$ at the 95 percent confidence level. The m statistics corresponding to the other exchange rates are also below this critical value. It is concluded, therefore, that the use of the forward exchange rate as a proxy for expectations does not introduce a significant errors in variables bias and thus the use of the OLS estimation procedure seems appropriate.

The efficiency of the foreign exchange market and the rationality of using data from the forward market to measure expectations can also be analyzed from a different angle. Consider equation (6):

$$(6) \quad x_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{n} \beta_i x_{t-i} + \gamma\pi_{t-1} + w_t$$

where x_t denotes the percentage change in the spot exchange rate ($\ell n\ S_t - \ell n\ S_{t-1}$), π_{t-1} denotes the forward premium on foreign exchange ($\ell n\ F_{t-1} - \ell n\ S_{t-1}$), t denotes time, n denotes the number of lags, and w denotes an error term. If π_{t-1} summarizes all available information concerning the future evolution of the exchange rate, then given the value of the forward premium π_{t-1}, the past history of the percentage change of the exchange rate should not "help" the prediction (i.e., the past history should not be viewed as Granger-causing future changes), and the joint hypotheses that α_1 and β_i are zero should not be rejected. The results of applying these tests to the three exchange rates for various number of lags are reported in Table 2. Also reported in Table 2 are the results of testing the joint hypotheses that α_1 and β_i are zero and that γ, the coefficient of the forward premium, is unity. The relevant statistic for testing the null-hypothesis is an F-statistic which is reported in Table 2. As is evident in all cases the null-hypothesis cannot be rejected at the 95 percent confidence level since the values of the various F-statistics fall well below the corresponding critical values. It is concluded, therefore, that the forward premium on foreign exchange may be viewed as a rational expectations measure of the percentage depreciation of the currency in that it incorporates the available information that is contained in the series of past depreciations.

The principal conclusions that may be drawn from the previous discussion are that the behavior of the foreign exchange market during the 1970s has been broadly consistent with the general implications of the efficient market hypothesis and that the forward exchange rate summarizes the relevant available information concerning the future evolution of the rate.

Exchange Rate Movement: Volatility and Predictability

In this section I analyze the volatility of exchange rates and the extent to which this volatility is predictable. To set the stage for the analysis, I present in Figure 1 the daily and quarterly percentage changes in the three exchange rates. This figure indicates that the various exchange rates have been very volatile and that the degree of volatility of day-to-day changes in the exchange rates have been extraordinarily high and has been much smaller when averaged over longer periods. Further, the standard errors of the regressions in Table 1 indicate that the forecasts of future spot exchange rates based on the forward rates are imprecise: the standard errors of the equations are about 3 percent per month.

These characteristics of price changes are typical to auction and to organized asset markets. In such markets current prices reflect

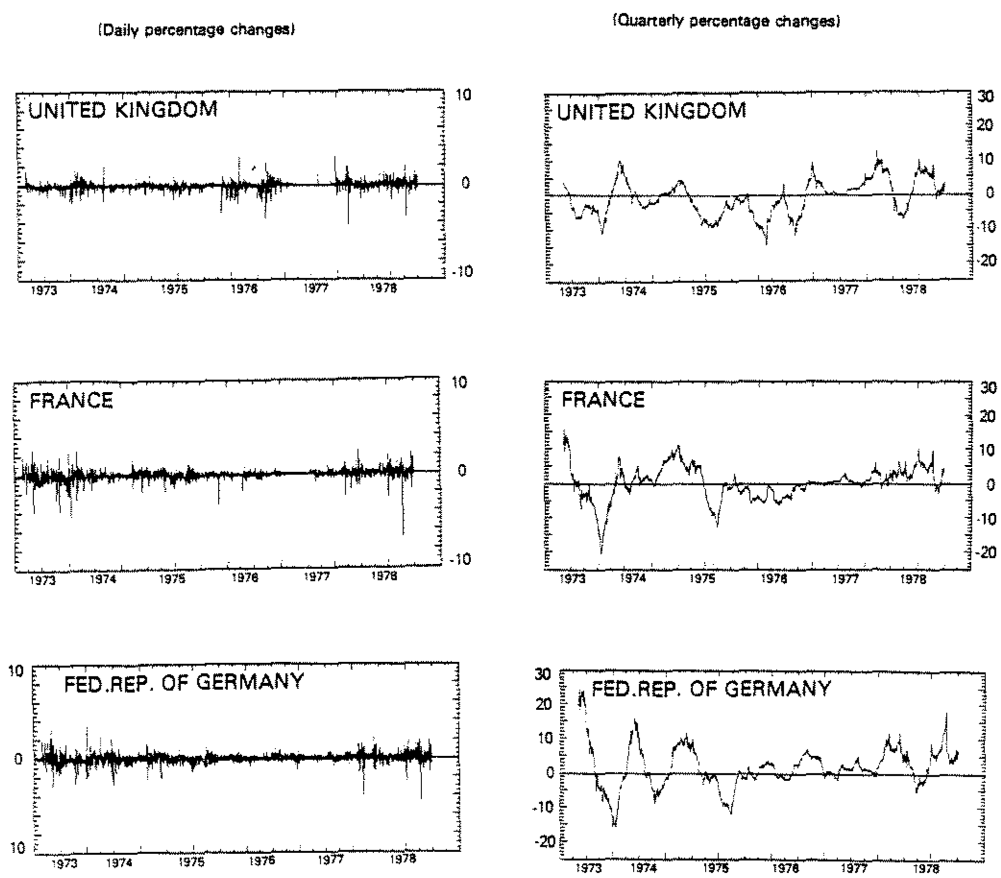
Table 2

Test of Rationality of Forward Premium Prediction of Currency Depreciation
Monthly Data, June 1973 - July 1979

Dependent Variable $\ell n\ S_t - \ell n\ S_{t-1}$	Null Hypothesis	Number of Lags	F-statistic
Dollar/Pound			
	$\alpha_1 = 0,\ \beta_i = 0$	3	F(4,64) = 1.680
		4	F(5,62) = 1.610
		5	F(6,60) = 1.231
		6	F(7,58) = 1.141
	$\alpha_1 = 0,\ \beta_i = 0,\ \gamma = 1$	3	F(5,64) = 1.555
		4	F(6,62) = 1.518
		5	F(7,60) = 1.207
		6	F(8,58) = 1.131
Dollar/Franc			
	$\alpha_1 = 0,\ \beta_i = 0$	3	F(4,64) = 1.175
		4	F(5,62) = 1.327
		5	F(6,60) = 1.087
		6	F(7,58) = 1.014
	$\alpha_1 = 0,\ \beta_i = 0,\ \gamma = 1$	3	F(5,64) = 1.436
		4	F(6,62) = 1.519
		5	F(7,60) = 1.146
		6	F(8,58) = 1.063
Dollar/DM			
	$\alpha_1 = 0,\ \beta_i = 0$	3	F(4,64) = 1.123
		4	F(5,62) = 1.262
		5	F(6,60) = 1.321
		6	F(7,58) = 1.342
	$\alpha_1 = 0,\ \beta_i = 0,\ \gamma = 1$	3	F(5,64) = 1.183
		4	F(6,62) = 1.287
		5	F(7,60) = 1.403
		6	F(8,58) = 1.525

Figure 1

ˌHORT-RUN VARIABILITY IN EXCHANGE RATES IN TERMS OF U.S. DOLLARS, APRIL 2, 1973 - DECEMBER 31, 1978



Source: Artus and Young (1979).

expectations concerning future course of events, and changes in expectations are immediately reflected in corresponding changes in prices. Periods which are dominated by uncertainties, new information, rumors and announcements are likely to be periods in which changes in expectations are the prime cause of fluctuations in asset prices. Further, since the information which alters expectations must be new, the resulting fluctuations in price cannot be predicted by lagged forward exchange rates which are based on past information.[5] Therefore, during such periods, one should expect exchange rates to exhibit large fluctuations and to be unbiased but imprecise forecasts of future spot rates.

To gain further insights into the implications of this perspective on the relationship between predicted and realized changes in exchange rates, I present in Figures 2-4 plots of predicted and realized changes in exchange rates for the three pairs of currencies where the predicted change is measured by the lagged forward premium. Also presented in these figures are the differentials in national inflation rates which are discussed in the fourth section. The key fact which emerges from these figures is that predicted changes in exchange rates account for a very small fraction of actual changes.[6]

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[5]The analysis of the role of "news" in determining current exchange rates and in explaining forecast errors from the forward rate has been made forcefully by Mussa (1976a, 1976b, 1977, 1979a). See also Dornbusch (1978). The large degree of volatility is also analyzed by McKinnon (1976) who attributes it to insufficient speculation.

[6]These and the following empirical regularities are analyzed in detail in Mussa (1979a). See also Frenkel and Mussa (1980). An interesting extension would examine the relationship between the variances of predicted and actual changes in exchange rates in a manner analogous to that of Shiller (1979).

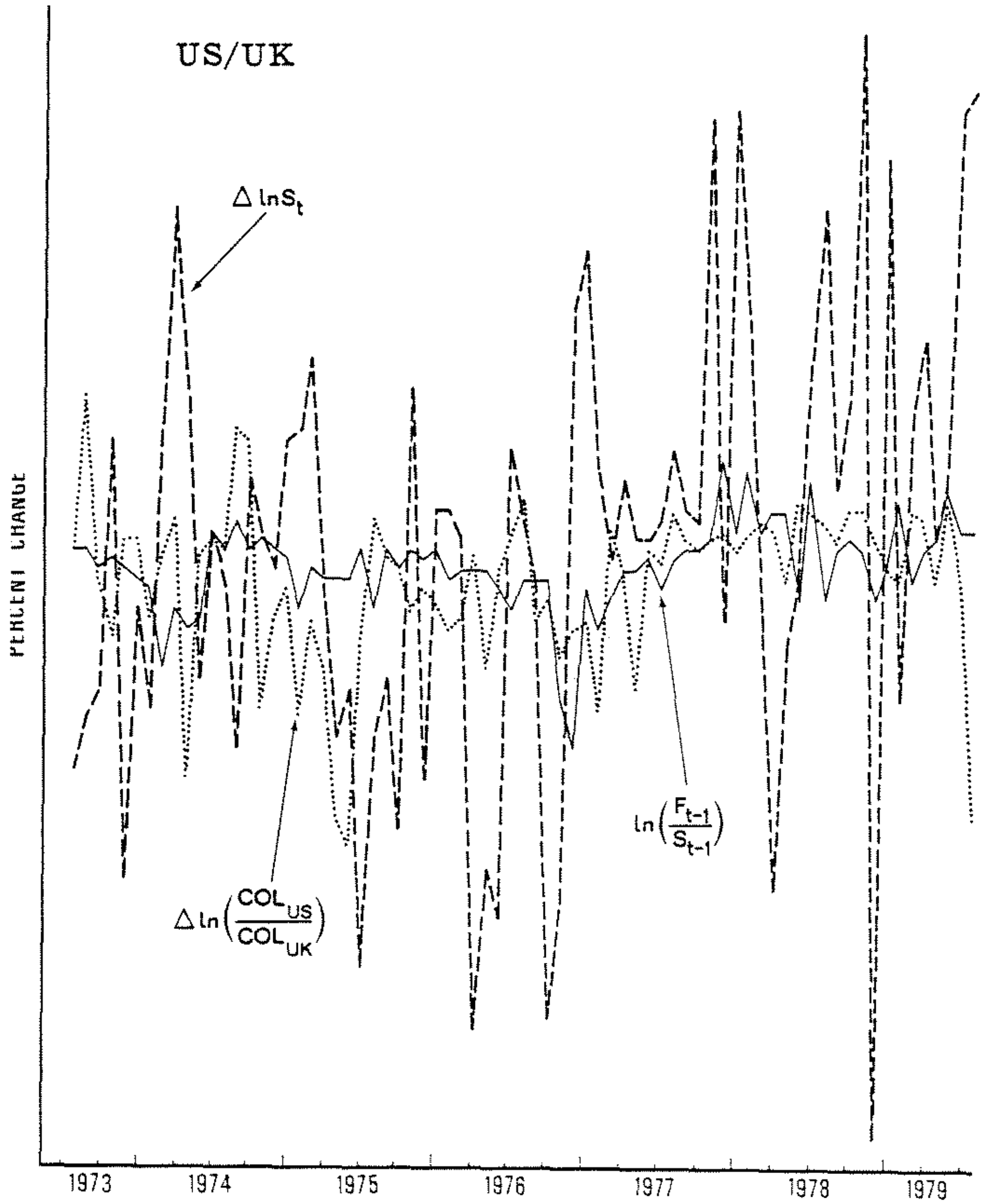


Figure 2: Monthly percentage changes of the U.S./U.K. consumer price indices [$\Delta(\ell n\ COL_{US}/COL_{UK})$], of the \$/£ exchange rate, ($\Delta\ \ell n\ S_t$), and the monthly forward premium; [$\ell n(F_{t-1}/S_{t-1})$] July 1973 - July 1979.

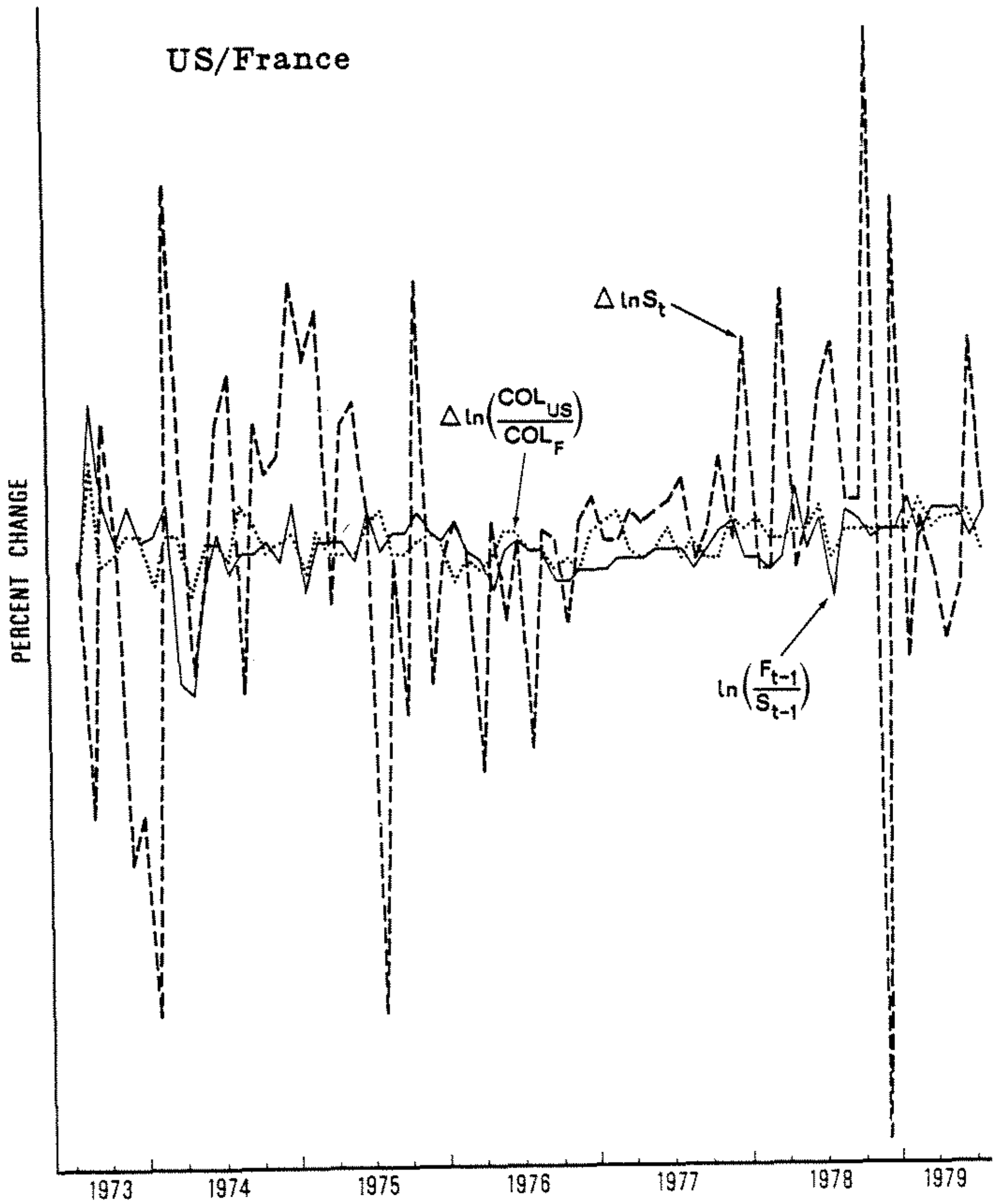


Figure 3: Monthly percentage changes of the U.S./France consumer price indices, $[\Delta(\ell n\ COL_{US}/COL_F]$, of the \$/F.Fr. exchange rate, $(\Delta\ \ell n\ S_t)$, and the monthly forward premium; $[\ell n(F_{t-1}/S_{t-1})]$ July 1973 - July 1979.

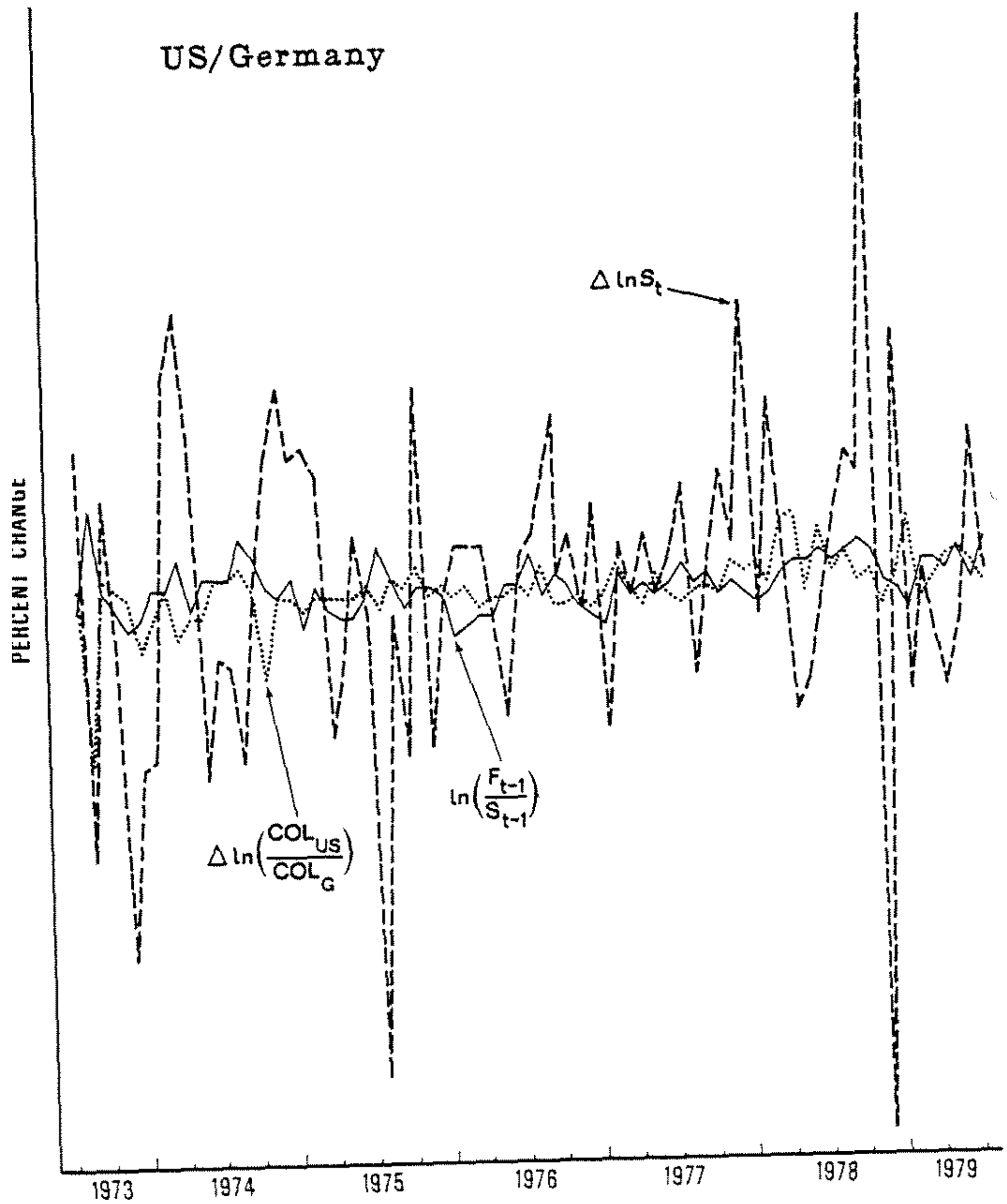


Figure 4: Monthly percentage changes of the U.S./German consumer price indices, $[\Delta(\ell n\ COL_{US}/COL_G)]$, of the \$/DM exchange rate, $(\Delta\ \ell n\ S_t)$, and the monthly forward premium; $[\ell n(F_{t-1}/S_{t-1})]$ July 1973 - July 1979.

This fact suggests that the bulk of exchange rate changes seem to be due to "new information" which, by definition, could not have been anticipated and reflected in the forward premium or discount which prevailed in the previous period.

In order to examine this hypothesis, I present in Figures 5-7 plots of the spot and the contemporaneous forward exchange rates for the three pairs of currencies. Also presented are the ratios of national price levels which are discussed in the fourth section. If the dominant factor underlying changes in rates is new information, which alters views about current and expected future exchange rates by approximately the same amount, then one should expect a high correlation between movements of spot and forward rates. This fact is clearly demonstrated by Figures 5-7 where it is seen that spot and forward exchange rates tend to move together and by approximately the same amplitude (the vertical difference between the two rates correspond to the forward premium of discount on foreign exchange). The high correlation between movements in spot and forward rates is expected since the two rates respond at the same time to the same flow of new information. This characteristic is typical to the foreign exchange market as well as to other markets for stocks and durable assets. The recent pattern of gold prices provides a useful example of this general principle. Table 3 reports the spot and the future price of gold as recorded recently in the New York Commodity Exchange on four recent consecutive days. The two key facts which are illustrated by this table are the extent of day-to-day volatility in gold prices and the uniformity by which these changes are reflected in the price of gold for immediate delivery as well as in the prices for the twelve future delivery dates.

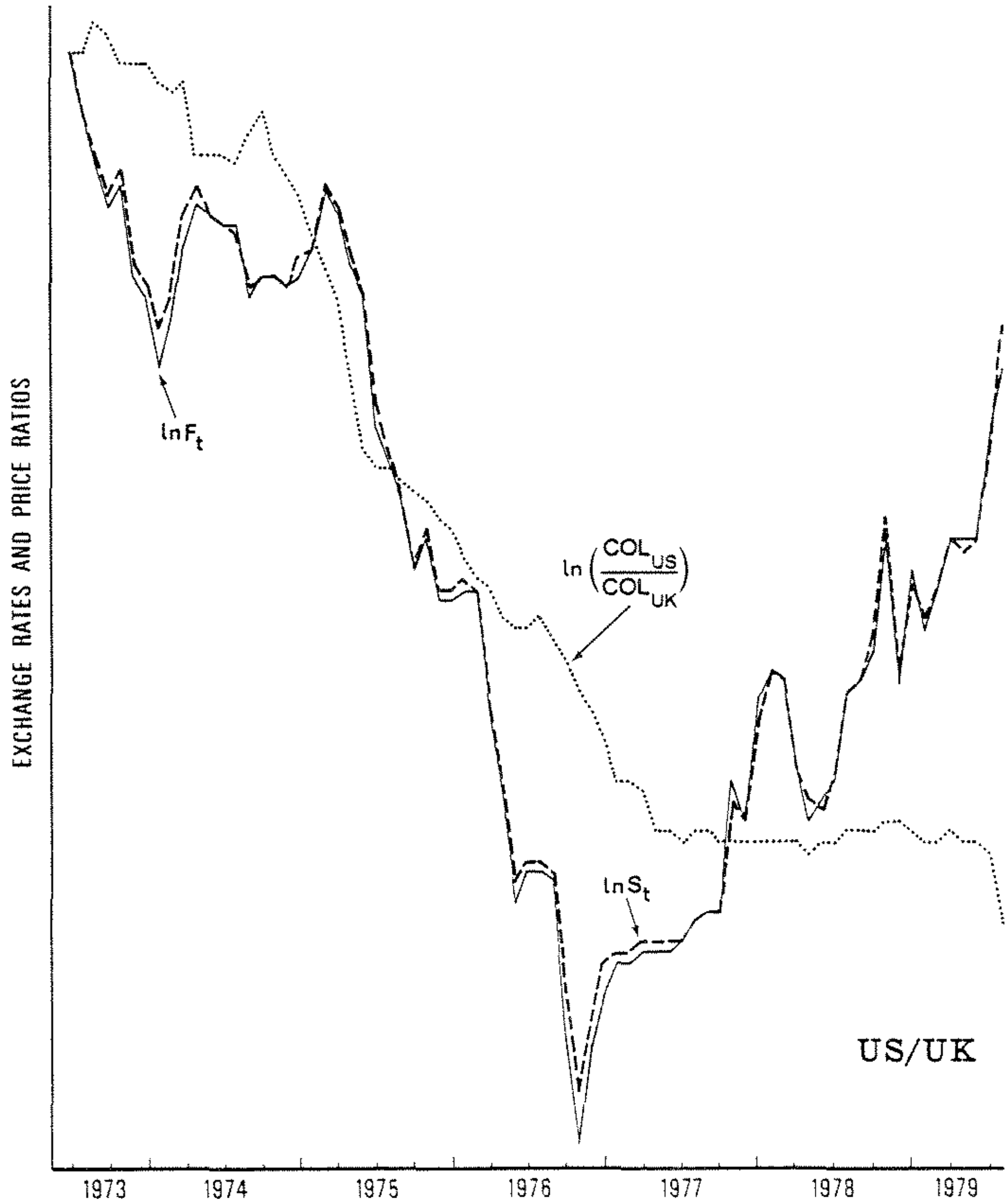


Figure 5: Monthly observations of the Dollar/£ spot ($\ell n\ S_t$) and Forward ($\ell n\ F_t$) Exchange Rates and the Ratio of the U.S./U.K. Cost of Living Indices [$\ell n\ (COL_{US}/COL_{UK})$(scaled to equal the spot exchange rate at the initial month)]:June 1973 - July 1979.

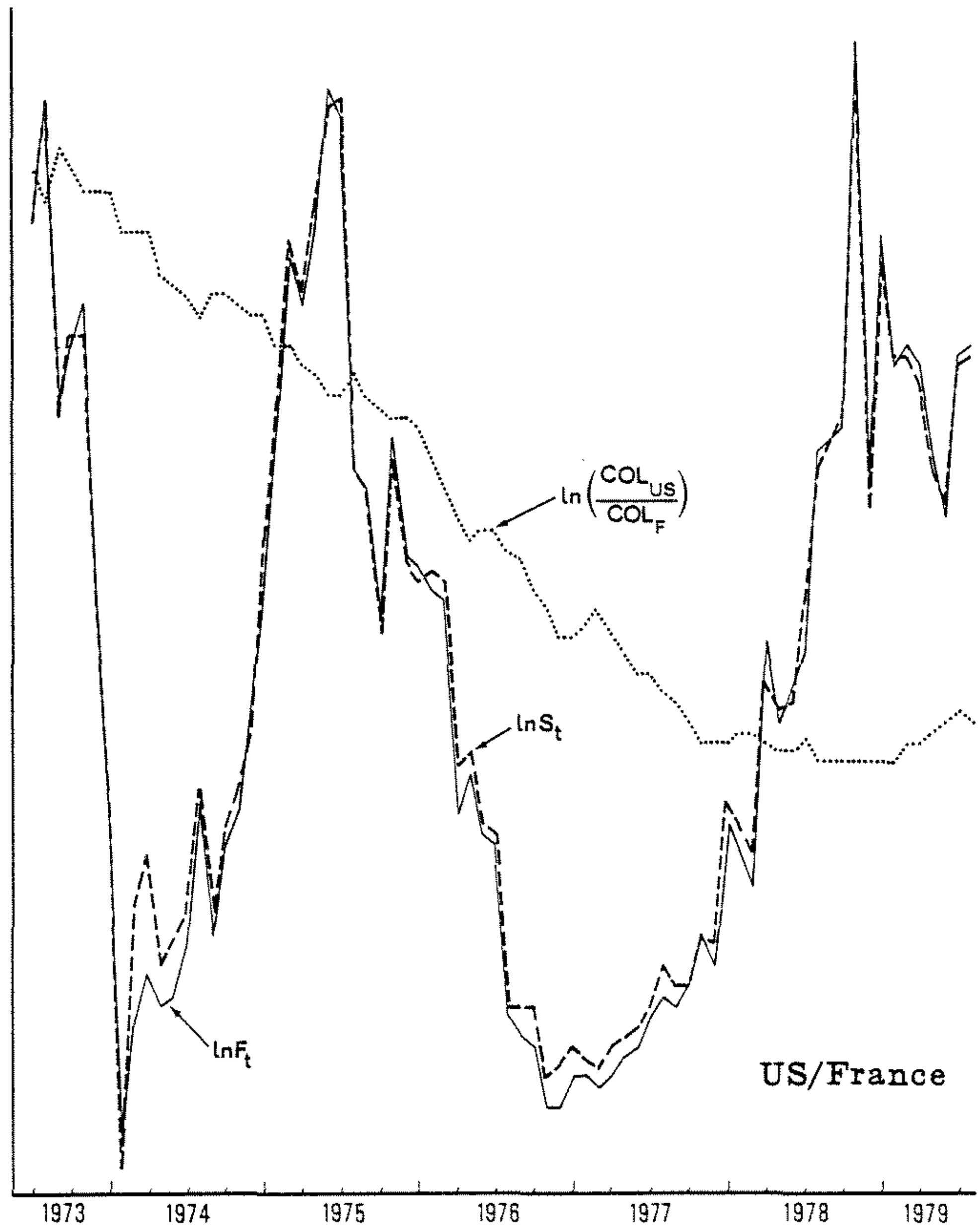


Figure 6: Monthly observations of the Dollar/F.Fr. spot ($\ell n\ S_t$) and Forward ($\ell n\ F_t$) Exchange Rates and the Ratio of the U.S./French Cost of Living Indices [$\ell n(COL_{US}/COL_F)$(scaled to equal the spot exchange rate at the initial month)]:June 1973 - July 1979.

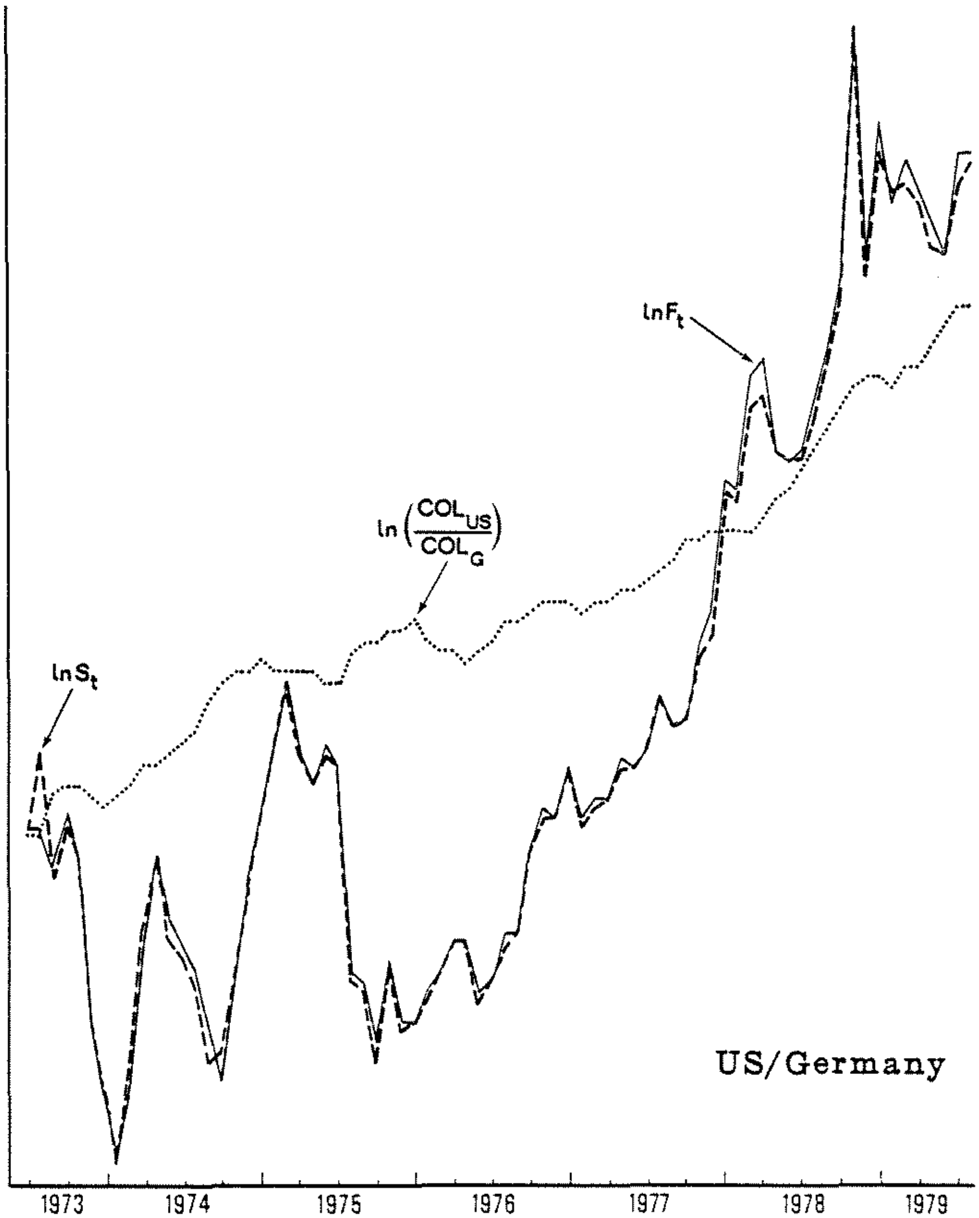


Figure 7: Monthly observations of the Dollar/DM spot ($\ell n\ S_t$) and Forward ($\ell n\ F_t$) Exchange Rates and the Ratio of the U.S./German Cost of Living Indices [$\ell n(COL_{US}/COL_G)$(scaled to equal the spot exchange rate at the initial month)]:June 1973 - July 1979.

Table 3

Futures Price of Gold on Consecutive Days
Daily Data: October 1, 1979 - October 4, 1979

	Price (per ounce) and change from previous day							
Delivery Date	Oct. 1, 79	Change	Oct. 2, 79	Change	Oct. 3, 79	Change	Oct. 4, 79	Change
1979 October	416.0	21	411.0	-5.0	393.5	-17.5	369.7	-23.8
November	419.5	20	416.0	-3.5	397.7	-18.3	377.7	-20.0
December	424.5	20	421.0	-3.5	402.5	-18.5	382.5	-20.0
1980 February	432.8	20	429.6	-3.2	410.7	-18.9	390.7	-20.0
April	440.9	20	438.0	-2.9	418.8	-19.2	398.8	-20.0
June	448.6	20	446.0	-2.6	426.6	-19.4	406.6	-20.0
August	456.3	20	454.0	-2.3	434.4	-19.6	414.4	-20.0
October	464.0	20	462.0	-2.0	442.2	-19.8	422.2	-20.0
December	471.5	20	469.8	-1.7	449.8	-20.0	429.8	-20.0
1981 February	478.9	20	477.5	-1.4	457.5	-20.0	437.5	-20.0
April	486.1	20	485.0	-1.1	465.0	-20.0	445.0	-20.0
June	493.3	20	492.5	-0.8	472.5	-20.0	452.5	-20.0
August	500.5	20	500.0	-0.5	480.0	-20.0	460.0	-20.0

Note: These prices are settlement prices at the Commodity Exchange, New York as reported in the Wall Street Journal October 2-5, 1979

Another feature which is revealed by Figures 5-7 is that the ontemporaneous spot and forward exchange rates are approximately equal hus indicating that the market's best forecast of the future spot rate s (approximately) the current spot rate. This phenomenon reflects the act that, as an empirical matter, exchange rates have followed approximately) a random walk process. For such a process, current rices are indeed the best forecasts of future prices. To the extent hat the exchange rate had some drift, the above statement should be nterpreted in reference to that drift. This empirical phenomenon eems to correspond to the actual paths of exchange rates even though t does not reflect a theoretical necessity.

The final characteristic of the foreign exchange market is decribed by Figures 8-10, which plot for the three pairs of currencies he spot exchange rate and the forward premium on forward exchange. ince the units of the spot rate and the forward premium are fundaientally different, the two series were normalized by subtracting from ach series its mean and by dividing by the corresponding standard rror. The fact which emerges from these figures is that generally though not always) there is a positive correlation between the exected depreciation of the currency (as measured by the forward premium n foreign exchange) and the spot exchange rate. This positive corelation may be rationalized by noting that currencies which are exected to depreciate are traded at a discount in the forward market nd, on average, these currencies also command a lower foreign exchange alue in the spot market. This correlation is interpreted further in he next section.

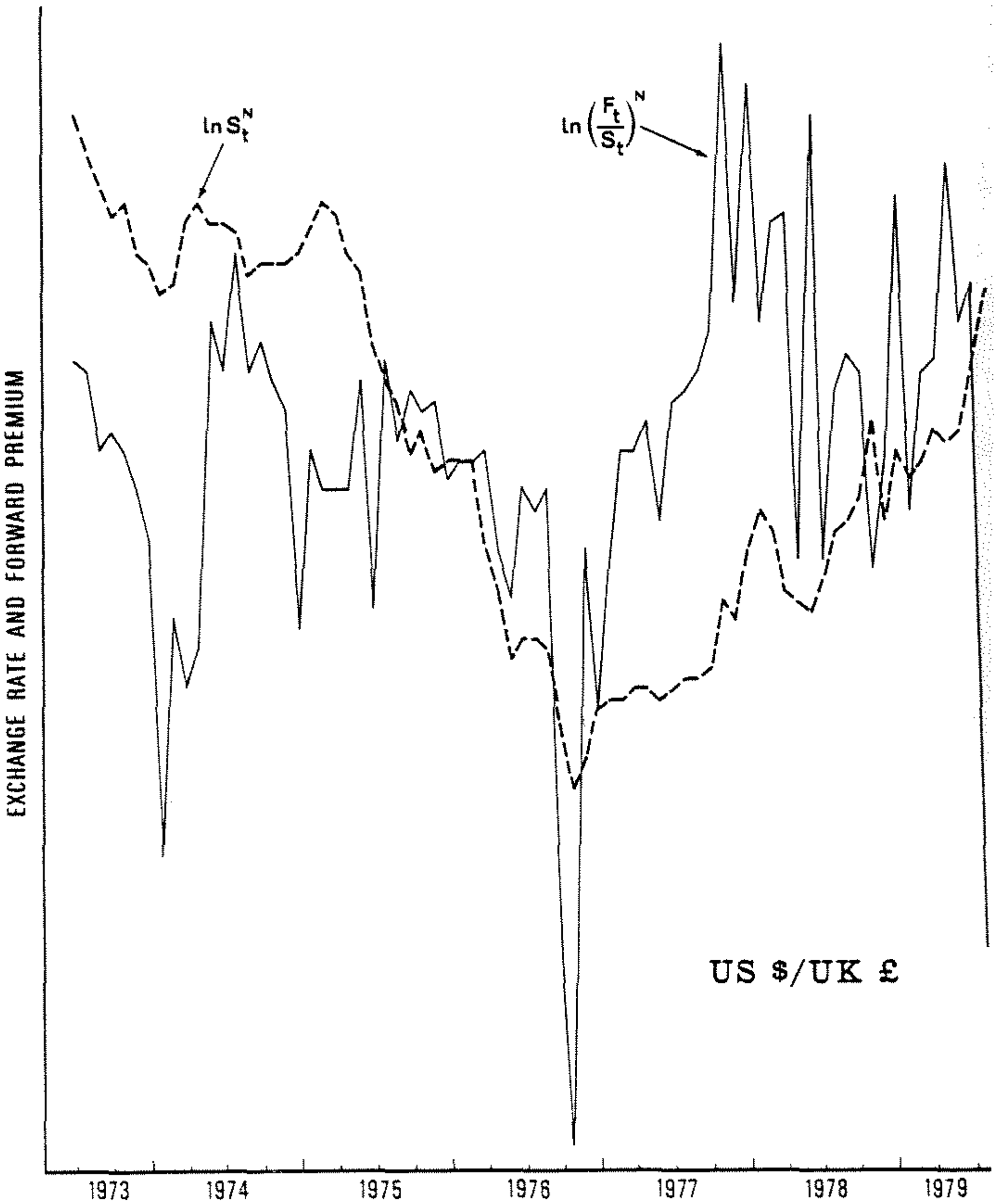


Figure 8: Monthly observations of the normalized Dollar/£ spot exchang rate ($\ell n\ S_t^N$) and the normalized forward premium [$\ell n(F_t/S_t)^N$] Both series are normalized by subtracting from each series i mean and by dividing by the corresponding standard error: June 1973 - July 1979.

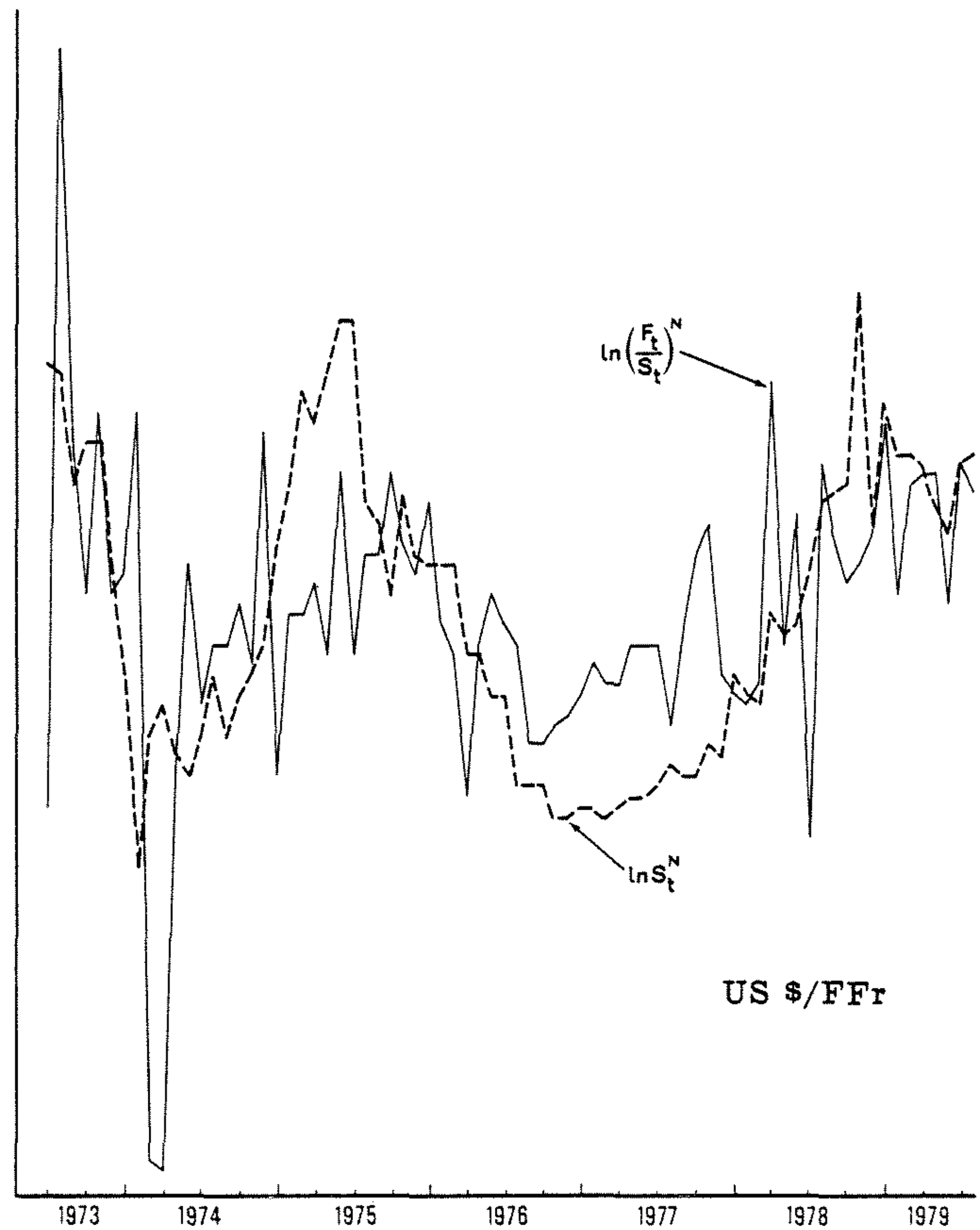


Figure 9: Monthly observations of the normalized Dollar/F.Fr. spot exchange rate ($\ell n\ S_t^N$) and the normalized Forward Premium $[\ell n(F_t/S_t)^N]$. Both series are normalized by subtracting from each series its mean and by dividing by the corresponding standard error: June 1973 - July 1979.

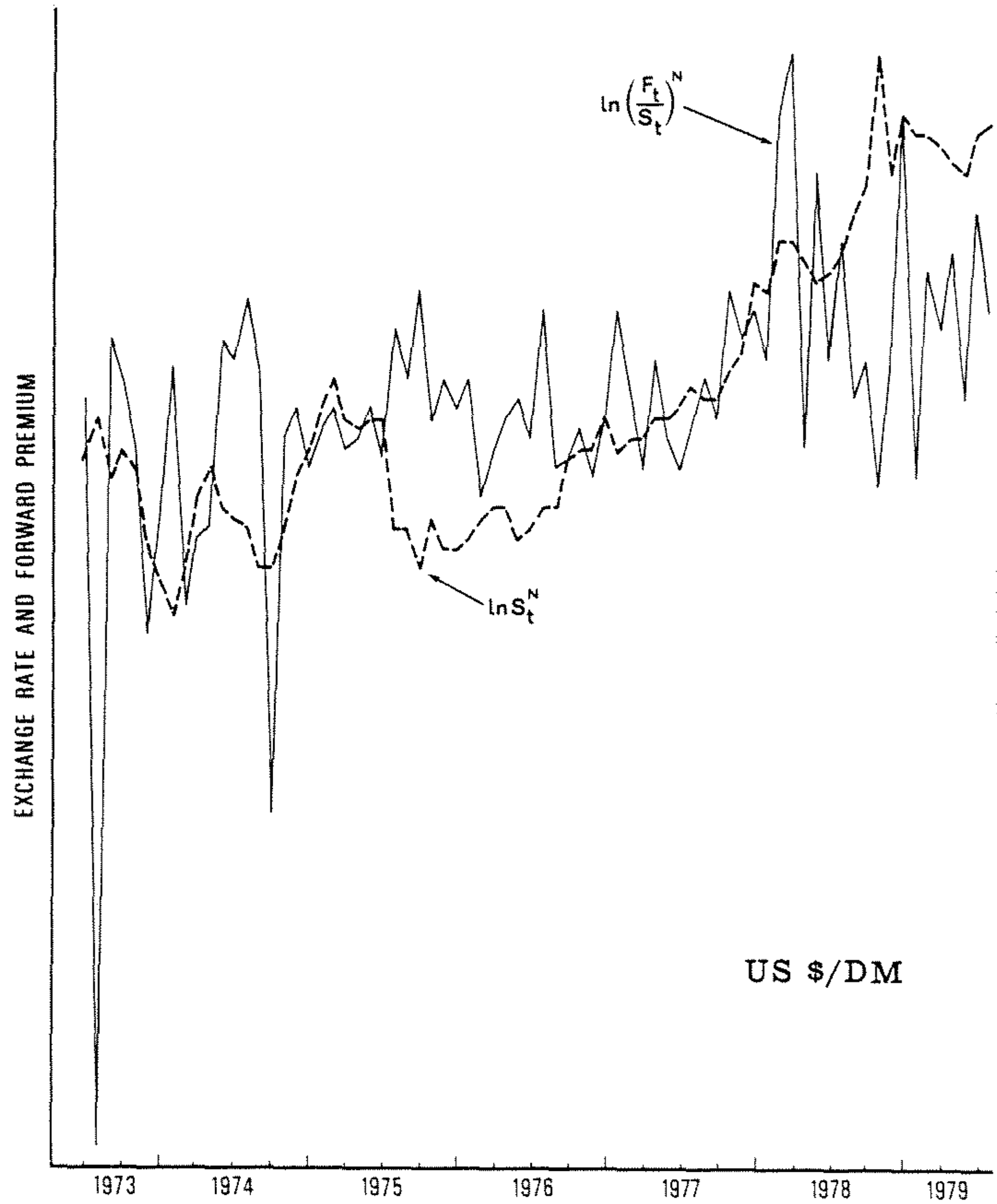


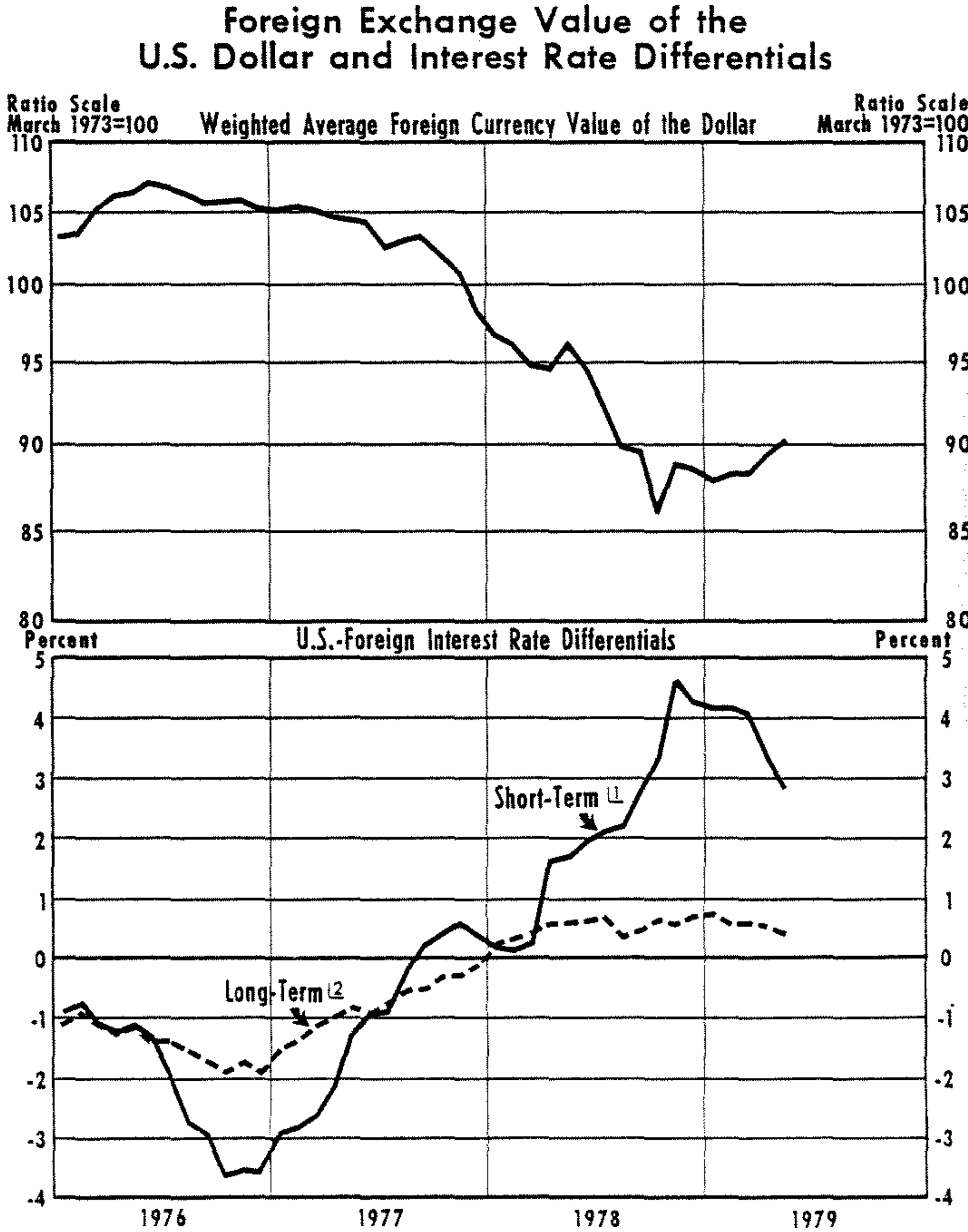
Figure 10: Monthly observations of the normalized Dollar/DM spot ($\ln S_t^N$) and the normalized Forward Premium [$\ln(F_t/S_t)^N$]. Both series are normalized by subtracting from each series its mean and by dividing by the corresponding standard error: June 1973 – July 1979.

EXCHANGE RATES, INTEREST RATES AND INNOVATIONS

In this section I analyze the relationship between exchange rates and interest rates from the analytical perspective of the monetary approach to the exchange rate. To set the stage for the analytical development it is useful to recall the typical analysis which generally predicts a negative association between the rate of interest and the exchange rate. According to that analysis, a higher rate of interest attracts foreign capital which induces a surplus in the capital account of the balance of payments and thereby induces an appreciation of the domestic currency (i.e., a lower spot exchange rate). Another variant of the popular approach states that the higher rate of interest lowers spending and thus induces a surplus in the current account of the balance of payments which results in a lower spot exchange rate. A third variant of this approach claims that the higher rate of interest implies (via the interest parity theory) a higher forward premium on foreign exchange and to the extent that at a given point in time the forward exchange rate is predetermined by past history, (an assumption that is clearly rejected by the evidence on the comovements of spot and forward rates), the required rise in the forward premium will be brought about by a lower spot rate (i.e., by an appreciation of the domestic currency). Whatever the route, this approach predicts a negative relationship between the rate of interest and the spot exchange rate (or alternatively, a positive relationship between the rate of interest and the foreign exchange value of the domestic currency).

These predictions, however, do not seem to be in accord with the broad facts. Over the recent period the rise in the rate of interest in the U.S. (relative to the foreign rate of interest) has been

Figure 11



Sources: Federal Reserve Statistical Release H.13; Federal Reserve Bulletin; International Monetary Fund, International Financial Statistics.

1 Secondary market rates for 90-day large certificates of deposit in the United States less the weighted average of foreign three-month money market rates.

2 U.S. long-term government bond yields less the weighted average of foreign long-term government bond yields.

Latest data plotted: May

Source: D. R. Mudd (1979).

associated with a rise in the spot exchange rate (i.e., with a depreciation of the dollar). Figure 11 illustrates the point by plotting the foreign exchange value of the U.S. dollar against the interest rate differential. As is evident, in contrast with the popular prediction, the higher (relative) rate of interest in the U.S. has been associated with a higher exchange rate (i.e., with a lower foreign exchange value of the dollar). This contradiction, however, does not arise when the exchange rate is analyzed from a monetary (or an asset market) perspective to which we now turn.

The major building blocks of the monetary approach are hypotheses concerning the properties of the demand for money and money market equilibrium and hypotheses concerning the link between domestic and foreign prices.[7] Consider first the equilibrium in the money markets. The supplies of domestic and foreign real balances are M/P and M^*/P^* where M and P denote the nominal money supply and the price level, respectively, and where variables pertaining to the foreign country are indicated by an asterisk. Denoting the demands for real balances by L and L^* (both of which are functions which are specified below), equilibrium in the money markets is attained when

(7) $L = M/P$ and

(8) $L^* = M^*/P^*$.

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[7]For theoretical developments and applications of the approach see, for example, Dornbusch (1976a, 1976b), Kouri (1976), Mussa (1976a), Frenkel (1976), Frenkel and Johnson (1978), Frenkel and Clements (1980), Bilson (1978), Hodrick (1978), and Frankel (1979).

From equations (7)-(8), equilibrium in the money markets implies that the ratio of the two price levels is:

$$(9) \quad \frac{P}{P^*} = \frac{M}{M^*}\,\frac{L^*}{L}\,.$$

The second building block links domestic and foreign prices. Assuming the simple version of purchasing power parity implies that:[8]

$$(10) \quad P = SP^*$$

Using equation (10) in (9) yields

$$(11) \quad S = \frac{M}{M^*}\,\frac{L^*}{L}$$

which expresses the exchange rate in terms of domestic and foreign supplies and demands for money. To gain further insight into the determinants of the exchange rate and to set the stage for the empirical estimation, assume that the demand for money depends on real income (y) and the rate of interest (i) according to:

$$(12) \quad L = ay^{\eta}e^{-\alpha i}$$

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[8] For a discussion of the choice of the relevant price index to be used in equation (10), see Frenkel (1978). This simple version of the purchasing power parity theory is used here to simplify the exposition. To the extent that there are systematic deviations from purchasing power parity they can be incorporated into the final exchange rate equation. Similarly, to the extent that purchasing power parities holds in the long run but not in the short run, the final exchange rate equation will reflect these dynamic characteristics. To the extent that purchasing power parity pertains to traded goods only, the exchange rate equation would also contain terms which relate to the relative prices of traded to non-traded goods; for a formulation along these lines, see Dornbusch (1976b) and for an empirical application, see Clements and Frenkel (1980). A more refined specification would allow for the effects of tariffs on the relationship between domestic and foreign prices as well as for short-run effects of unanticipated money on output rather than only on prices and the exchange rate.

(13) $L^* = b^* y^{*\eta^*} e^{-\alpha^* i^*}$

Using equations (12)-(13) in (11) and assuming for simplicity of exposition that foreign and domestic parameters of the demand for money are the same, i.e., that $\alpha = \alpha^*$, and that $\eta = \eta^*$, we obtain:

(14) $\ell n\ S = C + \ell n \frac{M}{M^*} + \eta\ \ell n \frac{y^*}{y} + \alpha(\ i - i^*)$

where $C \equiv \ell n(b^*/a)$.

Equation (14) relates the exchange rate to the ratios of domestic to foreign money supplies and incomes and to the interest rate differential.[9] Most pertinent to the present purpose and in agreement with the facts summarized by Figure 11, equation (14) yields a positive relationship between the rate of interest and the exchange rate. The economic interpretation of this association in the context of the U.S. dollar and the inflationary environment is as follows: a rise in the domestic (relative) rate of interest is primarily dominated by a rise in the expected (relative) rate of inflation which induces a decline in the demand for real cash balances; for a given path of the nominal money supply, asset market equilibrium requires a price level which is higher than the price which would have prevailed otherwise. Since the domestic price level is linked to the foreign price through some form of purchasing power parity, and since the path of the foreign price is

[9] It should be noted that a similar set of variables would also appear in the reduced form of a variety of alternative models. The dependence of the demand for domestic money on the domestic rate of interest and the dependence of the demand for foreign money on foreign rate of interest is assumed only for simplicity of exposition. A more general formulation would recognize that the demands for domestic and foreign monies depend on all margins of substitution. See Frenkel and Clements (1980).

assumed to be given, the higher domestic price can only be achieved through a rise in the spot exchange rate (i.e., through a depreciation of the currency).

This explanation of the positive association between interest rates and exchange rates has an intuitive appeal in that it implies that, in an inflationary environment, a relatively rapid rise in prices is associated with high nominal rates of interest as well as with a depreciation of the currency in terms of foreign exchange. The traditional prediction of a negative relationship between interest rates and the exchange rate may, however, be reconciled with the monetary approach under the assumption that it concentrates on the short-run liquidity effects of monetary changes. Accordingly, in the short-run, a higher rate of interest may arise from tight money which induces an appreciation rather than a depreciation of the currency.[10] It should be emphasized, however, that during an inflationary environment (like the one prevailing in the U.S. in recent years) the variations in the rate of interest are most likely to be dominated by variations in inflationary expectations rather than by liquidity effects associated with changes in the ratio of money to bonds. In such an environment the rate of interest is expected to be positively correlated with the exchange rate.

The discussion provides an illustration of the difficulties associated with using the rate of interest as the relevant monetary indicator. Traditionally, the height of the rate of interest was the

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[10]The short-run liquidity effects is emphasized in Dornbusch (1976b). The role of inflationary expectations in dominating exchange rate developments is emphasized in Frenkel (1976). Frenkel (1979) and Edwards (1979) attempt to integrate these two factors.

ʼiterion for assessing whether monetary policy has been easy or tight: high interest rate was interpreted as indicating a tight monetary ɔlicy while a low interest rate was interpreted as indicating an easy ɔnetary policy. By now it is well recognized that during inflationary ɘriods it is vital to draw a distinction between nominal and real ɜtes of interest and, as a result, during inflationary periods the ate of interest may provide a very misleading interpretation of the tance of monetary policy. The same logic applies with respect to the nalysis of the relationship between exchange rates and interest rates.

The foregoing analysis also provides the explanation for the ob- ervation (which was noted previously) that generally there is a ositive correlation between the forward premium on foreign exchange nd the level of the spot rate. Since the spot rate is expected to be ositively correlated with interest rate differential and since, ccording to the interest parity theory, that differential must equal he forward premium on foreign exchange, it follows that the forward remium is also expected to be positively correlated with the level of he spot rate.[11] That positive correlation may also be rationalized by oting that currencies which are expected to depreciate are traded at a

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[11]For evidence on the robustness of the interest parity relation- hip, see Frenkel and Levich (1977). The positive association between he spot exchange rate and the forward premium has been interpreted in erms of an explicit monetary model. It is noteworthy that this posi- ive association would be predicted by any model in which current ex- hange rate reflects immediately the expectations of future deprecia- ion. See, for example, Mussa (1976a) and Frenkel and Mussa (1980). ince the rate of interest and the exchange rate are dimensionally ncommensurate, their association raise questions that are familiar rom the discussions of the Gibson Paradox. In a separate paper, I in- end to examine the relationship between exchange rates and the forward remium (or the interest differential) in light of the various explana- ions of the Gibson Paradox.

discount in the forward market and, on average, these currencies also command a lower foreign exchange value in the spot market.

Prior to proceeding with the empirical evidence on the relationship between exchange rates and interest rates it might be useful to highlight some of the main features of the monetary approach which are reflected in equations (11) and (14). First, these equations demonstrate the symmetric roles that are being played by the supplies of domestic and foreign monies and the demands for these monies. Since the demands for monies depend on real variables like real incomes as well as on other real variables which underlie expectations and rates of interest, it is clear that the monetary approach does not imply that the exchange rate depends only on the relative supplies of money; nor does it imply that real variables do not affect the equilibrium exchange rate. Second, from the policy perspective the monetary approach brings to the forefront the implications of the homogeneity postulate: ceteris paribus a rise in the quantity of money results in an equiproportionate rise in the exchange rate. This illustrates the intimate connection between monetary policy and exchange rate policy. Third, the positive relationship between interest rates and exchange rates and the central role played by inflationary expectations imply that policies which attempt to induce an appreciation of the currency should aim at reducing inflationary expectations. The reduction in inflationary expectations would halt the depreciation of the currency in terms of goods and in terms of foreign exchange, and would result in lower nominal rates of interest while maintaining (or even raising) real rates of interest.

The discussion in the second section and, in particular, the con-ributions by Mussa (1977, 1979a) and Dornbusch (1978) emphasized that e predominant cause of exchange rate movements is news which could ot have been anticipated. It was also argued in the second section at the forward rate seems to summarize the information that is avail-ble to the market when the forward rate is being set. We may there-ore express the spot rate at period t as a function of factors which ave been known in advance and are summarized by the lagged forward ate, as well as a function of the "news."

$$\ell n\ S_t = a + b\ \ell n\ F_{t-1} + \text{"news"} \tag{15}$$

The empirical difficulty is in identifying the variable which easures the "news." Assuming that asset markets clear relatively fast nd that the "news" is immediately reflected in (unexpected) changes in he rates of interest we may write equation (15) as

$$\ell n\ S_t = a + b\ \ell n\ F_{t-1} + \alpha[(i - i^*)_t - E_{t-1}(i - i^*)_t] \tag{16}$$

here the bracketed term denotes the innovation in the interest differ-ntial and where $E_{t-1}\ (i - i^*)_t$ denotes the interest differential which as expected to prevail in period t based on the information available t t - 1. The expected interest rate differential was computed from a egression of the interest differential on a constant and on two lagged alues of the differential.[12] The previous analysis of the relationship

[12] An alternative way to compute the expected differential would se data on the term structure of interest rates. Since data on the ifferential of 2-month rates are not readily available, this computa-ion would require interpolations.

between interest rate differential and the exchange rate implies that the coefficient α is expected to be positive.

Table 4 reports the OLS estimates of equation (16) for the three exchange rates over the period June 1973-July 1979. As may be seen, in all cases the coefficients of the unexpected interest differential are positive and in most cases the coefficients are statistically significant. In order to verify the importance of using the series of innovations in the interest differential, Table 4 also reports estimates of regressions which replace the innovations by the actual series of the interest differential as well as regressions which include both the innovation and the actual differential. In all cases the coefficients of the actual interest differential do not differ significantly from zero.[13] To allow for a simultaneous determination of interest rates and exchange rates, equation (16) was also estimated using a two-stage-least-squares estimation procedure. These results are reported in Table 5, and again in all cases the coefficients of the unexpected interest differential are positive. These coefficients are highly significant in the Dollar/Pound exchange rate but insignificant in the other two rates. On the whole, the record shows that during the 1970s exchange rates and interest rate differential have been associated positively and thus indicating that during that inflationary period the same factors which induced a rise in the interest differential also induced a rise in the spot exchange rates. Furthermore, consistent with

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[13] In order to check whether the dollar rescue policies of November 1978 have had a systematic effect on the estimates, these regressions were also estimated for the period up to September 1978. The results did not change materially.

Table 4
Interest Rate Differentials and Exchange Rates
Monthly Data: June 1973 - July 1979
(standard errors in parentheses)

Dependent Variable $\ln S_t$	Constant	$\ln F_{t-1}$	$(i-i^*)_t$	$[(i-i^*)_t - E_{t-1}(i-i^*)_t)]$	s.e.	R^2	D.W.
Dollar/Pound							
	.032 (.019)	.959 (.025)	.017 (.096)		.027	.95	1.73
	.030 (.017)	.961 (.024)		.388 (.165)	.026	.96	1.77
	.019 (.019)	.968 (.024)	-.155 (.111)	.546 (.199)	.026	.96	1.80
Dollar/Franc							
	-.335 (.100)	.776 (.067)	.184 (.125)		.029	.79	2.11
	-.301 (.079)	.801 (.051)		.377 (.132)	.028	.81	2.22
	-.231 (.104)	.851 (.070)	.195 (.188)	.540 (.206)	.028	.81	2.32
Dollar/DM							
	-.070 (. 43)	.926 (.045)	.237 (.229)		.032	.93	2.02
	-.037 (.027)	.955 (.032)		.601 (.271)	.031	.94	2.08
	-.040 (.046)	.952 (.047)	.024 (.290)	.583 (.349)	.031	.94	2.08

NOTE: Interest rates are the one-month (annualized) Euromarket rates. The expected interest rate differential $E_{t-1}(i-i^*)_t$ was computed from a regression of the interest differential on a constant and on lagged values of the differential. $(i - i^*)_t$ denotes actual interest rate differential where i denotes the rate of interest on securities denominated in U.S. dollars and i* denotes the rate of interest on securities denominated in foreign currency. $[(i-i^*)_t - E_{t-1}(i-i^*)_t]$ denotes the unexpected interest rate differential.

Table 5
Interest Rate Differential and Exchange Rates
Monthly Data: June 1973 - July 1979; Instrumental Variables
(standard errors in parentheses)

Dependent Variable $\ln S_t$	Constant	$\ln F_{t-1}$	$(i-i^*)_t$	$[(i-i^*)_t-E_{t-1}(i-i^*)_t)]$	s.e.	R^2	D.W.
Dollar/Pound							
	.020 (.020)	.966 (.026)	-.153 (.117)		.027	.95	1.69
	.027 (.016)	.965 (.022)		.435 (.164)	.024	.97	1.79
	.017 (.017)	.971 (.022)	-.142 (.098)	.425 (.160)	.023	.97	1.78
Dollar/Franc							
	-.145 (.125)	.909 (.085)	-.301 (.234)		.036	.69	2.18
	-.279 (.081)	.816 (.053)		.216 (.165)	.029	.80	2.22
	-.184 (.126)	.883 (.086)	-.260 (.225)	.165 (.199)	.034	.73	2.21
Dollar/DM							
	-.006 (.047)	.987 (.049)	-.135 (.307)		.034	.92	2.11
	-.040 (.031)	.951 (.036)		.555 (.380)	.034	.92	2.07
	-.040 (.053)	.951 (.055)	-.001 (.003)	.555 (.402)	.034	.92	2.07

NOTE: Interest rates are the one-month (annualized) Euromarket rates. The expected interest rate differential $E_{t-1}(i-i^*)_t$ was computed from a regression of the interest differential on a constant and on two lagged values of the differential. Two-stage least squares estimation method was used. The instruments for the interest differential were a constant and two lagged values of the differential and the instruments for the unexpected differential were a constant and Durbin's rank variable $(i - i^*)_t$ denotes actual interest rate differential where i denotes the rate of interest on securities denominated in U.S. dollars and i* denotes the rate of interest on securities denominated in foreign currency. $[(i-i^*)_t-E_{t-1}(i-i^*)_t]$ denotes the <u>unexpected</u> interest rate differential.

the hypothesis that current changes in exchange rates are primarily a response to new information, the evidence shows the importance of the innovations in the interest differential.

The principle that current exchange rates already reflect expectations concerning the future course of events implies that changes in exchange rates are primarily due to innovations. In the present section this principle was applied to the analysis of the relationship between exchange rates and interest rate differential. The principle, however, is general. For example, it implies that the relationship between a deficit in the balance of trade and the exchange rate depends crucially on whether the deficit was expected or not. A deficit that was expected may have no effect on the exchange rate since the latter already reflected these expectations. In contrast, an unexpected deficit in the balance of trade may contain significant new information that is likely to induce a strong effect on the exchange rate.[14]

EXCHANGE RATES AND PRICES

One of the striking facts concerning the relationship between prices and exchange rates during the 1970s is the extent to which the evolution of prices and exchange rates have not coincided. The originators and proponents of the purchasing power parity doctrine (Wheatley and Ricardo during the first part of the 19th century and Cassel during the 1920s) have viewed the doctrine as an extension of the quantity

[14]For a further elaboration on the relationship between exchange rates, and the current account, see Dornbusch and Fischer (1978) and Rodriguez (1978). For a special emphasis on the role of innovations in the trade balance, see Mussa (1979c) and for empirical evidence, see Hakkio (1979b).

theory of money to the open economy. By now the consensus seems to be that purchasing power parities can be expected to hold in the long-run, if most of the shocks to the system are of a monetary origin which do not require changes in relative prices. To the extent that most of the shocks reflect "real" changes (like differential growth rates among sectors), the required changes in sectoral relative prices may result in a relatively loose connection between exchange rates and aggregate price levels. The experience during the 1970s illustrates the extent to which real shocks (oil embargo, supply shocks, commodity booms and shortages, differential productivity growth) result in systematic deviations from purchasing power parities. As illustrated in Figures 2-4, short-run changes in exchange rates have not been closely linked to short-run differentials in the corresponding national inflation rates, particularly as measured by consumer price indices. Furthermore, this loose link seems to be cumulative. As illustrated in Figures 5-7, divergences from purchasing power parities, measured in terms of the relationship between exchange rates and the ratio of consumer price indices, seem to persist.

The loose link between prices and exchange rates is illustrated in Table 6 which reports the results of regressions of changes in the exchange rates on changes in (wholesale) prices. As may be seen, for the Dollar/Pound and the Dollar/Franc exchange rate, the slope coefficients are very close to unity; for the Dollar/DM exchange rate the slope coefficient is less close to unity. Furthermore, in all cases the parameter estimates are extremely imprecise. The results are even poorer when the wholesale price indices are replaced by the cost of living indices. It should be noted, however, that to some extent this

Table 6

Relative Purchasing Power Parity; Instrumental Variables
Monthly Data: June 1973 - July 1979
(standard errors in parentheses)

Dependent Variable $\Delta\ \ell n\ S_t$	Constant	$\Delta\ \ell n(P_w/P_w^*)$	s.e.	D.W.
Dollar/Pound	.003 (.005)	.999 (.653)	.039	1.71
Dollar/Franc	-.001 (.004)	.891 (.682)	.030	2.38
Dollar/DM	-.001 (.008)	1.313 (2.057)	.036	1.92

Note: $\Delta\ \ell n\ S_t$ and $\Delta\ \ell n(P_w/P_w^*)$ denote, respectively, the percentage change in the spot exchange rate and in the ratios of the wholesale price indices. s.e. is the standard error of the regression. Two stage least-squares estimation method, is used; the instruments are a constant, time, time squared, and lagged values of the dependent and independent variables.

phenomenon is specific to the 1970s. During the floating rates period of the 1920s, the doctrine of purchasing power parities seems to have been much more reliable.[15]

The discussion in the second section emphasized that in periods which are dominated by "news," which alters expectations, exchange rates (and other asset prices) are expected to be highly volatile. Aggregate price indices, on the other hand, are not expected to reveal such a degree of volatility since they reflect the prices of goods and services which are less durable and, therefore, are likely to be less sensitive to the news which alters expectations concerning future course of events. It follows, therefore, that in periods during which there is ample "news" which cause large fluctuations in exchange rates, there will also be large deviations from purchasing power parities.[16] The different degrees of volatility of prices and exchange rates are illustrated in Table 7, which reports the average absolute monthly percentage changes in the various exchange rates and prices. As is evident, the mean absolute change in the various spot exchange rates has been about 2 percent per month (and even slightly higher for the changes in the forward rate). The magnitudes of these changes have been more than double the magnitudes of the changes in most of the various price indices, as well as in the ratios of national price levels. For example,

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[15]For evidence see Frenkel (1976, 1978, 1980b) and Krugman (1978).

[16]On this, see Mussa (1979a). It is noteworthy that the emphasis in the text has been on the words large fluctuations; this should be contrasted with periods during which there are large secular changes in the exchange rate (like the changes which occurred during the German hyperinflation). During such periods the secular changes do not stem necessarily from "news" and need not be associated with deviations from purchasing power parities.

Table 7

Mean Absolute Percentage Changes in Prices and Exchange Rates

Monthly Data: June 1973 - July 1979

	Variable					
ntry	WPI	COL	Stock Market	Exchange Rates Against the Dollar spot	forward	COL/COL_{US}
.	.009	.007	.037	–	–	–
.	.014	.012	.066	.021	.021	.007
nce	.011	.009	.054	.020	.021	.003
many	.004	.004	.030	.024	.024	.004

e: All variables represent the absolute values of monthly percentage changes in the data. WPI denotes the wholesale price index and COL denotes the cost of living index. Data on prices and exchange rates are from the IMF tape (May 1979 version). The stock market indices are from Capital International Perspective, monthly issues.

the mean monthly change in the cost of living price index was .4 percent in Germany, .7 percent in the U.S., .9 percent in France and 1.2 percent in the U.K. These differences are even more striking for the detrended series.

The notion that exchange rates have been volatile is clearly illustrated by Figures 2-4 and by Table 7. The comparison of the magnitudes of the changes in the exchange rates with the magnitudes of the changes in the price indices and in the ratios of national price levels may suggest, according to a narrow interpretation of the purchasing power parity doctrine, that exchange rate fluctuations have been "excessive." The previous discussion, however, has emphasized that exchange rates, being the relative prices of assets, are fundamentally different from the price indices of goods and services and, therefore, are expected to exhibit a different degree of volatility in particular during periods that are dominated by "news." An alternative yardstick for measuring the degree of exchange rate fluctuations would be a comparison with prices of other assets. Indeed, while exchange rate changes have been large relative to changes in national price levels, they have been considerably smaller than changes in the prices of other assets like gold, silver, many other commodities that are traded in organized markets, and common stocks. For example, Table 7 also reports the mean absolute monthly percentage change in stock market indices. As may be seen, the mean monthly change in these indices ranged from over 3 percent in Germany to over 6 percent in the U.K. By these standards it is difficult to argue that exchange rates have been excessively volatile.

The fundamental difference between the characteristics of exchange rates and national price levels is also reflected in their time series properties. The monthly changes in exchange rates exhibit little or no serial correlation while national price levels do exhibit a degree of serial correlation. The serial correlation of national price levels has been rationalized in recent macroeconomic theorizing in terms of costs of price adjustment, the existence of nominal contracts, confusion between relative and absolute prices and confusion between permanent and transitory changes. This difference between the time series properties of exchange rates and prices is reflected in the low correlation between the practically random month-to-month exchange rate changes and the serially correlated differences between national rates of inflation.

Given the short-run deviations from purchasing power parities, it is relevant to explore whether these deviations tend to diminish with time or tend to persist or even grow in size. In order to examine the patterns of the deviations, I have computed the autocorrelation functions and the partial autocorrelation functions of these deviations for the wholesale and the cost of living price indices. The deviation from purchasing power parities during month t is denoted by Δ and is defined as:

(17) $\Delta_t = \ell n\ S_t - \ell n(P/P^*)_t.$

Figures 12-14 illustrate the patterns of the deviations for the three exchange rates. As may be seen, the general pattern is very similar for the three exchange rates and for the two price indices. In all cases the autocorrelation function tails off at what seems to be an

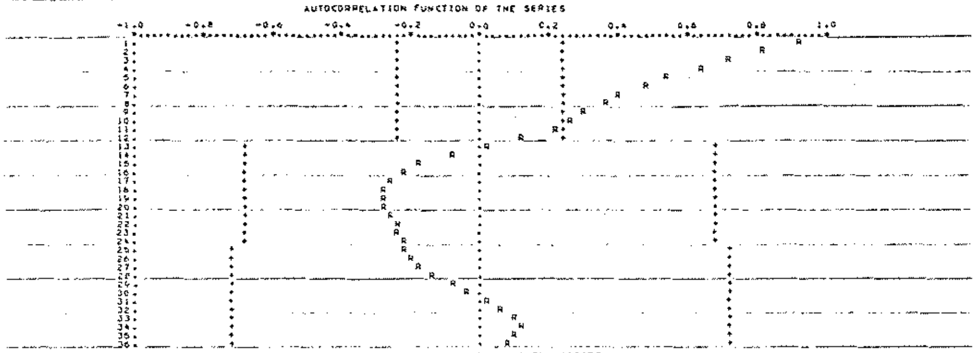
Figure 12

The Dollar/Pound: Deviations from PPP with Wholesale Price Indices

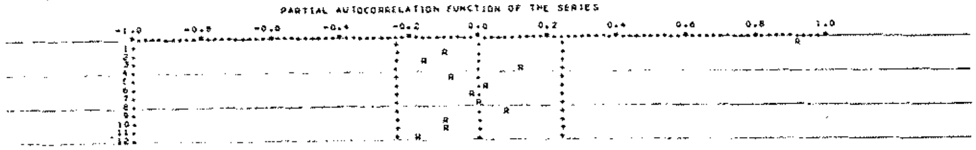
DIFFERENCE	LAGS	AUTOCORRELATIONS												EST. STD ERROR FOR ROW
$(1-B)^0 (1-B^8)^0$ VAR = 0.754E+02	1-12	0.92	0.82	0.71	0.63	0.55	0.48	0.41	0.35	0.31	0.27	0.21	0.13	0.12
	13-24	0.02	-0.09	-0.17	-0.22	-0.26	-0.27	-0.28	-0.28	-0.27	-0.25	-0.23	-0.22	0.34
	25-36	-0.21	-0.20	-0.17	-0.14	-0.09	-0.03	0.01	0.07	0.10	0.11	0.10	0.08	0.36

DIFFERENCE	LAGS	PARTIAL AUTOCORRELATIONS												EST. STD ERROR FOR ROW
$(1-B)^0 (1-B^8)^0$	1-12	0.92	-0.11	-0.15	0.12	-0.08	0.02	-0.03	0.00	0.08	-0.09	-0.10	-0.16	0.12

AUTOCORRELATION FUNCTION OF THE SERIES



PARTIAL AUTOCORRELATION FUNCTION OF THE SERIES

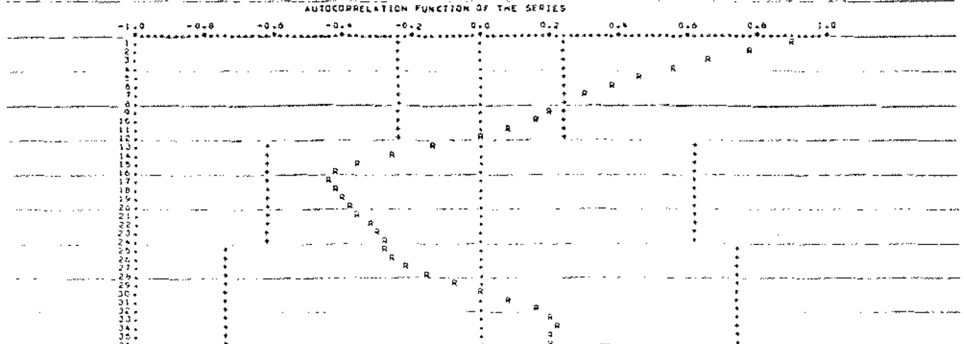


The Dollar/Pound: Deviations from PPP with Cost of Living Indices

DIFFERENCE	LAGS	AUTOCORRELATIONS												EST. STD ERROR FOR ROW
$(1-B)^0 (1-B^8)^0$ VAR = 0.482E+02	1-12	0.90	0.79	0.66	0.56	0.45	0.38	0.30	0.26	0.21	0.16	0.06	-0.00	0.12
	13-24	-0.13	-0.26	-0.36	-0.41	-0.45	-0.43	-0.41	-0.38	-0.35	-0.32	-0.30	-0.29	0.31
	25-36	-0.27	-0.25	-0.23	-0.17	-0.09	0.00	0.06	0.16	0.19	0.21	0.21	0.20	0.37

DIFFERENCE	LAGS	PARTIAL AUTOCORRELATIONS												EST. STD ERROR FOR ROW
$(1-B)^0 (1-B^8)^0$	1-12	0.90	-0.07	-0.17	0.09	-0.15	0.11	-0.06	-0.01	0.10	-0.16	-0.10	-0.07	0.12

AUTOCORRELATION FUNCTION OF THE SERIES



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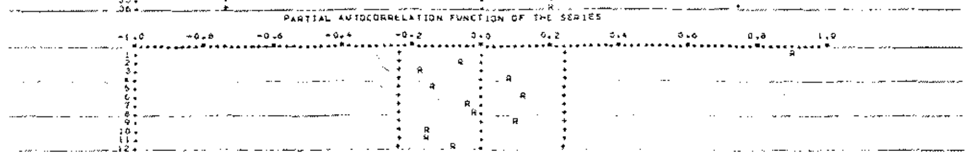


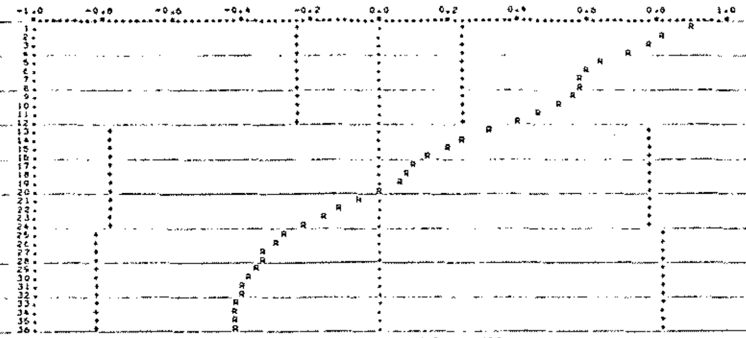
Figure 13

The Dollar/Franc: Deviations from PPP with Wholesale Price Index

DIFFERENCE	LAGS	AUTOCORRELATIONS												EST. STD ERROR FOR ROW
$(1-B)^{0}(1-B^{0})^{0}$	1-12	0.89	0.82	0.77	0.72	0.65	0.59	0.56	0.58	0.55	0.51	0.46	0.40	0.12
VAR = 0.513E-02	13-24	0.31	0.24	0.20	0.14	0.10	0.08	0.05	0.01	-0.05	-0.11	-0.16	-0.23	0.39
	25-36	-0.27	-0.30	-0.33	-0.35	-0.37	-0.38	-0.39	-0.40	-0.41	-0.42	-0.42	-0.42	0.41

DIFFERENCE	LAGS	PARTIAL AUTOCORRELATIONS												EST. STD ERROR FOR ROW
$(1-B)^{0}(1-B^{0})^{0}$	1-12	0.89	0.14	0.09	0.01	-0.12	-0.02	0.22	0.13	-0.00	-0.18	-0.19	-0.13	0.12

AUTOCORRELATION FUNCTION OF THE SERIES



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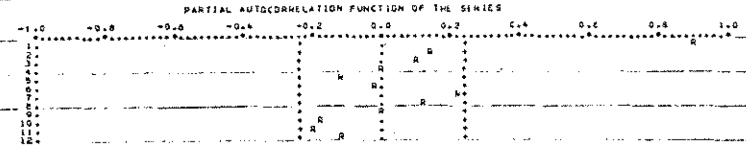
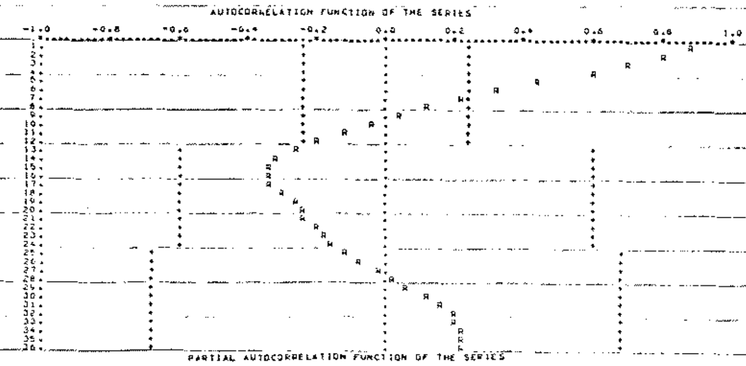


The Dollar/Franc: Deviations from PPP with Cost of Living Indices

DIFFERENCE	LAGS	AUTOCORRELATIONS												EST. STD ERROR FOR ROW
$(1-B)^{0}(1-B^{0})^{0}$	1-12	0.86	0.80	0.69	0.60	0.45	0.32	0.22	0.12	0.04	-0.04	-0.13	-0.20	0.12
VAR = 0.505E-02	13-24	-0.27	-0.31	-0.33	-0.35	-0.35	-0.31	-0.27	-0.25	-0.24	-0.21	-0.17	-0.15	0.30
	25-36	-0.11	-0.07	-0.03	0.03	0.07	0.12	0.16	0.19	0.20	0.22	0.22	0.23	0.34

DIFFERENCE	LAGS	PARTIAL AUTOCORRELATIONS												EST. STD ERROR FOR ROW
$(1-B)^{0}(1-B^{0})^{0}$	1-12	0.88	0.10	-0.13	-0.03	-0.31	-0.09	0.11	-0.02	0.02	-0.07	-0.22	-0.07	0.12

AUTOCORRELATION FUNCTION OF THE SERIES



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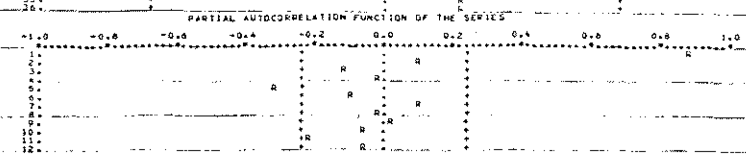
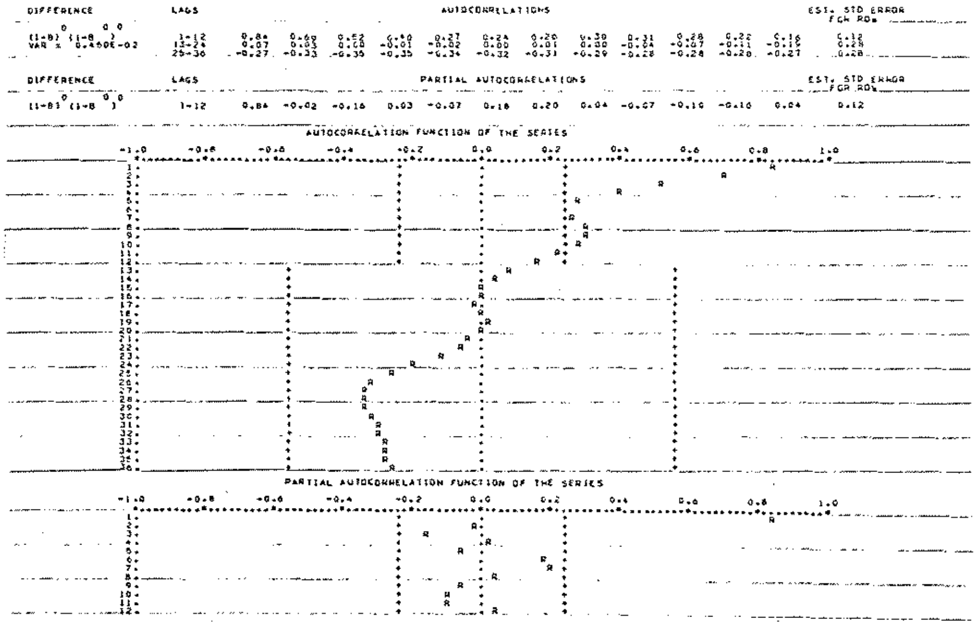
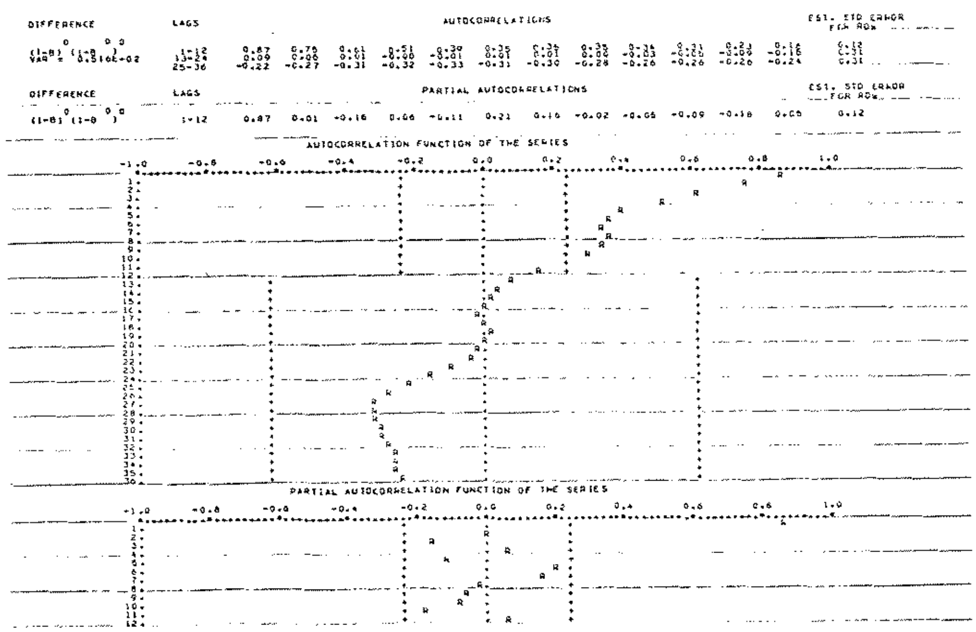


Figure 14

The Dollar/DM: Deviations from PPP with Wholesale Price Indices



The Dollar/DM: Deviations from PPP with Cost of Living Indices



exponential rate and, in all cases, the partial autocorrelation function shows a spike at the first lag. This pattern seems to indicate (as might have been expected on the basis of the time series properties of exchange rates and price indices) that the deviations from purchasing power parities follow a first order autoregressive process. It is noteworthy, however, that in all cases the value of the autoregression term is about 0.9, indicating the possibility that the series may not satisfy the stationarity requirement. To allow for this possibility, I have also examined the autocorrelation functions and the partial autocorrelation functions of $\Delta_t - \Delta_{t-1}$, i.e., of the first difference of the deviations from purchasing power parities. The results indicate that these differences are serially uncorrelated, thus implying that the deviations Δ_t follow a random walk process.[17] In view of this possibility, I conclude that the deviations from purchasing power parities seem to follow a first order autoregressive process but that the data do not provide sufficient evidence to reject the alternative hypothesis of a random walk. Finally, it may be noted that the main difference between accepting the AR(1) rather than the random walk hypothesis relates to the economic interpretation of the two alternative processes. The random walk process implies that deviations from purchasing power parities do not tend to diminish with the passage of time while the stable AR(1) process implies that there are mechanisms which operate to ensure that in the long-run purchasing power parities

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[17] If the deviations follow a random walk process, then they do not entail (ex ante) unexploited profit opportunities. For an analysis of equilibrium deviations from purchasing power parities, see Saidi (1977).

are satisfied. For the purpose of forecasting the near future, however, there is a very little difference between using the AR(1) process with an autoregressive coefficient of 0.9 and using the random walk process.

CONCLUDING REMARKS

In this paper I examined some aspects of the operation of flexible exchange rates. The analysis was based on the experience of the 1970s. The principle conclusions which may be drawn from the empirical work are:

(1) In spite of the extraordinary turbulence in the markets for foreign exchange, it seems that to a large extent the markets have operated efficiently. It should be noted, however, that in this context the concept of "efficiency" is somewhat narrow in that it only refers to the notion that the markets do not seem to entail unexploited profit opportunities. A broader perspective should deal with the social cost of volatility in terms of the interference with the efficiency of the price system in guiding resource allocation, as well as with the cost of alternative outlets for the disturbances that are currently reflected in the volatility of exchange rates.

(2) The high volatility of exchange rates (spot and forward) reflect an intrinsic characteristic of the relative price of monies and other assets. The price of gold and the price of stocks as well as exchange rates between national monies depend critically on expectations concerning future course of events, and adjust rapidly in response to new information. In this

perspective the exchange rate (in contrast with the relative price of national outputs) is being viewed as a financial variable.

(3) During inflationary periods variations in nominal rates of interest are dominated by changes in inflationary expectations; as a result, high nominal rates of interest are expected to be associated with high exchange rates (a depreciated currency). This relationship was demonstrated within the analytical framework of the monetary approach to the exchange rate, and was supported by the empirical work. In this context the key finding was the dependence of exchange rate changes on the changes in the rates of interest. This finding is in accord with the analytical prediction that current exchange rates already reflect current expectations about the future while changes in the current exchange rates primarily reflect changes in these expectations which, by definition, arise from new information.

(4) The experience of the 1970s does not support the predictions of the simple version of the purchasing power parity doctrine which relates the values of current prices to current exchange rates. The empirical work showed that deviations from purchasing power parities can be characterized by a first order autoregressive process.

One of the key analytical insights that is provided by the monetary (or the asset market) approach to the exchange rate is that exchange rates reflect not only current circumstances but also those circumstances which are expected to prevail in the future. This anticipatory feature of the exchange rate (which is emphasized by Mussa, 1979b) does not characterize (at least to such a degree) the prices of national outputs. As a result, during periods which are dominated by frequent changes in expectations about the future, one may expect to find frequent deviations from purchasing power parities when the latter are computed using current prices.[18]

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[18]This phenomenon was recognized by Gustav Cassel -- the most recognized proponent of the purchasing power parity doctrine. Since this paper was prepared for presentation on October 20, 1979 -- the date of Cassel's birthday (Cassel was born on October 20, 1866) it seems appropriate to conclude with the quote that reflects this key idea.

> The international valuation of the currency will, then generally show a tendency to anticipate events, so to speak, and become more an expression of the internal value that the currency is expected to possess in a few months, or perhaps in a year's time (Cassel, 1930, pp. 149-50).

DATA APPENDIX

1. Exchange Rates

   The spot exchange rates are end-of-month rates obtained from the IMF tape (May 1979 version, updated to July 1979 using the November 1979 issue of the International Financial Statistics) obtained from the International Monetary Fund. The forward exchange rates are end-of-month rates for one month maturity. The forward rates for the U.K. Pound and the DM for the period June 1973 - June 1978 are bid prices obtained from the International Money Market (IMM). For the period July 1978 - July 1979 they are sell prices obtained from the Wall Street Journal. The forward rates for the French Franc for the period June 1973-July 1974 are bid prices calculated from the Weekly Review publication of the Harris Bank which reports the spot rate and the forward premium; in each case the closest Friday to the end of the month was chosen. For the period August 1974 - June 1978 the rates are bid rates obtained from the IMM and for the period July 1978 - July 1979 they are sell prices obtained from the Wall Street Journal.

2. Prices

   The wholesale and cost of living price indices are period averages obtained from the IMF tape, lines 63 and 64, respectively.

3. Rates of Interest

   All interest rates are 1-month Eurocurrency rates obtained from the Weekly Review of the Harris Bank. In all cases the figures used correspond to the last Friday of each month.

4. Stock Markets

   The stock market indices correspond to the last trading day of the month. The sources are Capital International Perspective, Geneva, Switzerland, monthly issues.

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INTERNATIONAL STABILIZATION POLICY UNDER FLEXIBLE EXCHANGE RATES

H. Robert Heller

Being the only speaker at this conference to represent the business sector, I will focus my remarks on the effects of the flexible exchange rate system -- as it has operated throughout the seventies -- on the business sector. In particular, I will discuss three aspects of the topic: First of all, I will address myself to the question of whether the flexible exchange rate system and its actual operation in the years since 1971 have served the economy, and in particular, the business sector well. Second, I will offer my views as to what policy changes would improve the operation of the present system. Third, I will adopt a longer perspective and indicate what international monetary reforms might improve the operation of the system.

THE CONSEQUENCES OF FLEXIBLE EXCHANGE RATES

The operation of the flexible exchange rate system since 1971 has entailed a significant increase in costs to the business sector. In particular, there are adverse effects on international trade, international capital movements, and foreign investment. I will also argue that the increased costs to the private sector were not offset by a greater freedom for the policymakers to pursue more appropriate macroeconomic stabilization policies or other direct savings realized by the public sector.

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But I should like to make it clear at the outset that there are at present no viable alternatives to the flexible exchange rate system. As long as there are large differences in inflation rates among nations, a fixed exchange rate system will not be viable. What we perceive as the cost of flexible exchange rates is therefore truly the cost associated with high and differential inflation rates. Nevertheless, the flexible exchange rate system does little to make countries adopt non-inflationary policies. It is in that sense that the flexible exchange rate system has also been associated with fluctuating exchange rates and the costs thereof.

International Trade

The thesis has been advanced that flexible exchange rates discourage foreign trade. There are several reasons for expecting a dampening effect on foreign trade under a system of flexible exchange rates.

First of all, there is simply the increased uncertainty of exchange rate fluctuation that will have to be borne by one or the other party to trade transactions. It is important to note that we are not involved in a zero-sum game here. While in simple arithmetic terms one party's gain must be the other party's loss, the increased uncertainty will affect both parties to the transaction. As long as people are risk-averse, there will be a net loss because the welfare losses associated with a 50/50 chance of losing one million dollars are greater than the welfare gains of a 50/50 chance of winning one million dollars. That's the reason why we find few corporate presidents wagering last quarter's corporate earnings on a double or nothing bet on the outcome of this weekend's football game or at the roulette wheels in Las Vegas.

Second, while it is possible to engage in forward currency transactions to eliminate the foreign exchange risk, one should keep in mind that there is not only a brokerage cost associated with these transactions, but that there exist no organized forward markets for the vast majority of currencies -- especially those of the developing countries. The system therefore has an inherent bias against trade with the developing countries -- some of which have the widest exchange rate fluctuations due to their high inflation rates.

Third, there is the natural competitive instinct that makes the businessman think -- "maybe I should wait one more week before I cover in the forward market to obtain a better rate. Or worse yet, if I cover this week, and my competitor obtains a better forward rate next week, then I will lose the contract altogether." If the rate turns in a disadvantageous direction, the businessman may then not even bid on the contract.

Fourth, there are costs for the individual firm associated with the necessity to collect information on exchange rates, to ensure that proper accounting and legal procedures are followed, to maintain staff to call up the banks, make appropriate calculations, keep records, and perhaps even hire an economist or consulting firm to prepare a foreign exchange forecast.

All these costs are deadweight losses to the private sector as a whole, because we are playing a zero sum game where one firm's foreign exchange gains will be another firm's foreign exchange losses. Gone are the good old days when one merely had to outwit the central bank that could not make up its mind as to how much longer it should attempt to maintain an exchange rate that had long ago become unrealistic.

Instead, the private sector has to maintain all the required ancillary services just in an attempt to stay even and not to wind up on the losing side of the currency seesaw.

United States businessmen are particularly affected by the introduction of flexible exchange rate because most international trade used to be denominated in U.S. dollars. Now, only half of world trade is denominated in dollars and half in other currencies.

In particular, firms entering new markets often find that they have to adapt to local conditions if they wish to penetrate new markets. National pride of some of the newly developing countries may also play an important role in their insistence to utilize their own currency to an increasing extent.

While some empirical studies failed to find an effect of flexible exchange rate on the volume of international trade, I find this evidence hard to believe.

The simplest of all possible calculations show that foreign trade increased at an annual rate of 8.8 percent in real terms during 1963-73, while the rate of increase in 1973-75 amounted to only 4.3 percent per annum. That is, the rate of increase in the volume of international trade was cut in half under the flexible exchange rate system. While it is true that this does not imply that the flexible exchange rate system caused this decline -- and I will have to say more on that topic later -- it is certainly true that the flexible exchange rate system did not prevent the decline in the trade volume either.

Finally, I need not point out that the myth that flexible exchange rate would always balance our international trade is nothing but that -- a myth. People who drew the opposite conclusion from textbooks in international economics forgot to read the fine print: namely that it was assumed that there were no international capital movements. Only in such a world can perfect purchasing power parity hold and will imports automatically be balanced by exports of equal value.

In the real world, capital movements are very much with us, and they are not so much determined by actual international price differentials, but by the expectation of price level changes at some future date.

Capital Movements

This brings me to the second major point to be covered: the impact of flexible exchange rate on international capital movements.

First of all, it is clear by now that international capital movements have not served as the great stabilizer of exchange rates that they are supposed to be. According to theory, well-informed private speculators will act to stabilize the exchange rate, buying the currency when it is low and selling it when it is high. But who are these well-informed speculators? The actors with the greatest amount of expertise in the area, the large commercial banks, are highly reluctant to take open foreign exchange positions. They are trade-oriented, not speculation-oriented. Much more money is to be made by actively trading in the market, and earning a small spread on each transaction than by maintaining an open position and hoping for the best. The situation is not unlike the one of a grocery store owner, who makes his money buying and selling tomatoes, and not by hoping to make a killing in the market when the tomato crop in Mexico goes sour and the price skyrockets. U.S. Treasury data show that on average U.S. commercial banks were holding less than $100 million in open foreign exchange positions. This aggregate amount for all U.S. banks is not much larger than some of the individual transactions foreign exchange traders are called upon to execute.

This leaves private corporations and individuals as the potential market stabilizers. While corporations do take foreign exchange positions, they are typically designed to offset some commercial transactions rather than as a deliberate attempt to take an open position. The corporate treasurer who attempts to make a career out of realizing foreign exchange profits is a rare, and probably short-lived, breed. Instead, the typical corporate strategy can more properly be described as one of foreign exchange loss-avoidance rather than of foreign exchange speculation.

The final group -- private individuals -- is certainly increasingly active in the market. They are probably more active in the organized non-bank foreign exchange markets, such as the IMM (International Monetary Market, a division of the Chicago Mercantile Exchange) than in the commercial bank market. Prior to the Herstatt calamity, private speculators had access to the bank market largely through small banks. Since 1974 most major banks have reduced the foreign exchange lines made available to the smaller banks, thereby sharply limiting their access to the interbank market. Consequently, most individuals are active in the IMM and the New York exchanges. As a rough generalization, it may be said that these exchanges are equal to the transactions carried out by one major U.S. bank as far as its influence on the market is concerned.

Considering all this, it still remains true that a speculator is able to make profits more consistently by running with the markets rather than by taking a position and hoping for a turn-around in the market. To try to pinpoint market turn-arounds is exceedingly difficult as everyone who has tried his luck at it knows.

The upshot is that the herd instinct in foreign exchange markets is still very powerful and the well-informed speculating loner is the exception rather than the rule. Consequently, speculative activity may well accentuate rather than reduce exchange rate fluctuations.

Investment

The uncertainty surrounding the exchange value of the currencies has also taken its toll on the willingness of investors to engage in foreign direct investments and in long-term construction activity abroad.

Increasingly, foreign countries insist on denominating long-term construction contracts in their own currency, forcing the American businessman to shoulder the foreign exchange risk. Foreign direct investment and long-term construction projects that may take five or even ten years to complete are particularly affected by the exchange rate uncertainty because there are no organized forward markets in which such long-term exposures may be hedged. In addition, many of these projects are located in countries for whose currencies not even regular forward markets or capital markets exist, thereby making hedging an impossibility. Under such circumstances the only options open to the businessman are to assume the foreign exchange risk or to forget about the contract.

Foreign investment activity is also greatly complicated by changing currency values. What might be a profitable foreign operation at one exchange rate may rapidly become unprofitable as the foreign exchange rate changes. In addition, arbitrary accounting rules -- such as FASB 8 -- may have significant impact on a firm's profit and loss position regardless of the profitability of the underlying manufacturing activities. At best, the effects of exchange rate changes on the balance sheet make it much more difficult to evaluate the profitability of the investment. At worst, it leads to erroneous investment decisions and ultimately a retreat from international activities.

The Public Sector

The question arises whether the additional costs imposed upon the private sector of the economy are counterbalanced by benefits to the public sector of the economy. While this is a difficult question to answer, I believe that it must be answered in the negative.

Benefits may accrue to the economy by the creation of an economic environment that would bring about a greater freedom to pursue appropriate economic policies, foster higher growth, or lessen inflationary pressures. On all these counts the actual experience with flexible exchange rates has been discouraging. Of course, the ultimate proof of any of these propositions is impossible to attain. It would require a replay of history under a fixed exchange rate regime -- and that is clearly impossible.

Economic inference makes it also difficult to see why a floating exchange rate regime should be characterized by high growth and little inflation. The fundamental point is that the flexible exchange rate system does not lessen the balance of payments constraint -- it merely changes its nature.

It is difficult to decide whether a loss of foreign exchange reserves or a fall in the foreign exchange rate provides a more rigid policy constraint. But while the loss of foreign exchange reserves under a fixed exchange rate system provides not only a self-limiting constraint in that no country has either unlimited reserves or unlimited access to international credit, the loss of reserves eventually forces the adoption of a more restrictive monetary policy which will tend to bring the country in line with the global inflation rate.

Flexible exchange rates do not have such self-limiting properties, and it has instead been suggested that the depreciation of a currency may well lead to the development of vicious circles where currency depreciation brings about more inflation because of its immediate impact on the price of imported commodities. The rekindled inflationary forces in turn may force a further depreciation and so on.

While the statistical evidence on the validity of this theory is far from complete and doubtful, it stands to reason that a fixed exchange rate system operates as an equalizer of international inflation differentials, while a flexible exchange rate system tends to accentuate inflation differentials.

As far as the international businessman is concerned, it is clear which one constitutes the more attractive environment: given a choice between similar -- even if high -- inflation rates in all countries and an environment or widely divergent inflation rates, the businessman is likely to choose the former one.

However, it is questionable which one of the two alternatives is best for all people of the world.

For the central banker, floating rates do not seem to have brought a more relaxing lifestyle either. Gross foreign exchange market intervention on behalf of central banks amounted to a record of $72 billion dollars in the half year ending July 31, 1979. To put this number into proper perspective, let us remind ourselves that the total foreign exchange reserves of all countries in the world totalled the same amount in 1971, the last year of the fixed exchange rate system. Increasing, rather than less, official intervention has been the hallmark of the flexible exchange rate system in the seventies.

The International Monetary System

The exchange value of the dollar against the DM (deutsche mark) or SFR (Swiss franc) has been cut in half over the last decade. That such a precipitous decline in the value of the world's leading reserve currency cannot be without impact on the role of this currency in the world and on the international monetary system itself goes without saying.

A superficial glance at the percentage of official foreign exchange reserves held in the form of dollars shows that the market share of the dollar has remained virtually constant at 80 percent. However, these figures are -- in my opinion -- highly misleading. While high U.S. Treasury officials have argued that the dollar purchases on behalf of foreign central banks were proof of their confidence in the U.S. dollar, it is probably more appropriate to argue that these official dollar purchases were largely the result of intervention designed to stop an even further slide of the dollar. The foreign central banks were the reluctant victims of a declining dollar and not the exuberant investors they are made out to be.

In fact, foreign central banks of floating currency countries have reduced the share of dollars in their foreign exchange reserve portfolio from over 90 percent in 1970 to less than 75 percent in 1976. So have the central banks of countries other than the main industrialized countries, who acquired the dollars as a result of their intervention policy. In other words, those central bankers that were free to consider the dollar as a portfolio investment instead of an intervention currency did in fact switch away from the dollar.

The decline of the dollar in official foreign exchange portfolios was also masked to some extent by the even faster decline of the British pound in international significance. Central banks have switched out of pounds and purchased DM over the last decade, so that the position of the pound is now held by the mark. It stands to reason that central banks would have wanted to acquire DM anyhow, and had it not been for the fact that the pound was even weaker than the dollar, the switch out of dollars would certainly have been more pronounced.

In addition to the decline in the value of the U.S. dollar, there are other reasons that make it attractive for central banks to diversify their foreign exchange portfolios to an increasing extent. First of all, it is clear that a diversified currency portfolio increases its overall stability. Second, as exchange rates fluctuate it may be prudent to hold reserves in the currency of one's trading partners. Third, the same argument applies to the denomination of the currency in which the country's external debt is denominated. In that connection it is important to note the very rapid swing away from dollar-denominated international bond issues in recent years. In 1976 the value of dollar-denominated international bond issues was still three times as large as the value of DM bonds, but by 1978 the DM volume was equal to the dollar volume. Consequently, the need to make amortization and interest payments in marks will continue to increase in the future and with it the desirability of holding marks as liquid reserve assets.

We may therefore conclude that: one, the flexible exchange rate system has been associated with a significant increase in costs to the private sector; two, that it has not brought about a climate for the conduct of more effective stabilization policies; three, that it has not decreased the cost of intervention for central banks; and four, that it has fostered the decline of the dollar as the world's leading currency.

I will now consider several measures that might improve the effectiveness of stabilization policies under the flexible exchange rate system.

IMPROVING THE OPERATION OF THE FLEXIBLE EXCHANGE RATE SYSTEM

At the present time, there exists no viable alternative to the flexible exchange rate system. The main reason for this conclusion is simple: as long as differential inflation rates among countries prevail, it is not possible to impose or to achieve exchange rate stability. The framers of the new Article IV of the IMF (International Monetary Fund) Articles of Agreement were fully aware of this point: exchange rate stability cannot be achieved without internal stability in the relevant economies. To blame the flexible exchange rate system for the additional costs that have to be borne -- especially by the private sector -- would be to blame the messenger for the bad news.

Nevertheless, there are certain improvements in the operation of the flexible exchange rate system that can be made in order to enhance its effectiveness and to reduce the costs associated with it. These are the lessons we can learn from the experience gained during the seventies to enhance the operation of the international monetary system during the eighties.

It will be convenient to group the suggestions into two broad categories: those pertaining to improving U.S. monetary and exchange rate policy and those relevant for the international monetary system.

Possible U.S. Policy Improvements

It should be feasible to improve U.S. monetary and exchange rate policy with a view towards enhancing the stability of exchange rates.

The first set of suggested steps pertains to the conduct of U.S. monetary policy, and it is gratifying that the Federal Reserve has already announced the adoption of monetary targets and their supremacy over interest rate targets. The experience of having to chase the market interest rates higher and higher during the summer of 1979 while real interest rates remained negative and the money supply grew out of control was an important factor in influencing the October 1979 decision to use bank reserves instead of the Federal Funds rate as an immediate operating target.

Of course, both the Federal Reserve and the other market participants will have to gain experience and confidence in the operation of the new system to ensure its proper functioning. In that connection it is somewhat disconcerting to note that the introduction of the new system was not handled in a fashion designed to make its implementation as smooth as possible, but was conducted in an abrupt and disruptive fashion that resulted in the introduction of uncertainty, confusion over the intentions of the Federal Reserve, and thereby greater market instability -- the very symptoms that the Federal Reserve action should have helped to alleviate rather than to foster.

Nevertheless, the overall thrust of the new policy is good, and once the dust has settled the targeting on the monetary aggregates should prove to be a significantly better system than the interest-target approach used in the past.

The operation of the system could be further enhanced by the announcement of intermediate range monetary targets as guideposts for the Federal Reserve. Such three to five-year targets could be very helpful in signalling to the private sector the clear intention of the Federal Reserve to reduce monetary growth rates to non-inflationary levels and to provide a framework for orderly and sustained economic growth. Of course, such targets must be strictly adhered to, so that confidence in the policy statements of the authorities will be enhanced. To use the announcement of official targets to influence expectations without appropriate follow-through and implementation merely creates a climate in which all policy pronouncements will be doubted and will therefore become less and less effective.

In that connection it is also important to have a realistic monetary growth target supported by a coordinated fiscal strategy. To announce a reduced monetary growth target while the public sector borrowing requirements are expected to increase drastically might not constitute a credible policy package in that context. Monetary policy cannot work in isolation and must be seen as one ingredient in a coordinated policy package aimed at achieving economic stability.

The central bank can also play an important role in reducing erratic exchange rate fluctuations as the November 1978 policy actions showed. There is a significant difference between intervention to maintain an exchange rate that has become unrealistic, and intervention to turn around a market trend that has become disequilibrating. Central banks have now learned the lesson that there is little to be gained by trying to maintain an unrealistic exchange rate. Not only are the foreign exchange losses incurred staggering, but the domestic consequences of such ill-advised intervention are also disadvantageous. A central bank that sells its currency in foreign exchange markets to keep it from appreciating increases the monetary base by providing more of its own currency. This in turn increases inflationary pressures at a later date, thereby leading to domestic instability.

Similarly, a central bank that depends on unrealistically high exchange rates will soon find that the foreign exchange reserve losses are staggering and will be forced to permit a more drastic exchange rate realignment at a later date or to impose exchange controls with all undesirable consequences attached to such measures.

In contrast, central bank intervention to turn the foreign exchange market around and to end a trend that has clearly become destabilizing can be highly successful as the November 1978 U.S. policy measures showed. The essential ingredient to the success of such an intervention policy is the simultaneous adoption of domestic monetary policy measures that attack the root cause of the exchange rate movement. It will be recalled that from November 1978 until April 1979 there was virtually no monetary growth in the U.S. This was taken by the markets as a signal that the Federal Reserve was prepared to pursue a tight, anti-inflationary monetary policy and the dollar remained stable during that period. In April 1979 the money supply again began to grow at an excessive rate, driving up interest rates, increasing inflationary pressures, and bringing the dollar under renewed pressure, thereby necessitating the November 1979 policy actions.

Possible Improvements in the International Monetary System

It is my belief that the world economy could function quite well under a dollar standard, where the dollar is the dominant global unit of account, transaction currency, and store of value. An indispensable precondition for the functioning of such a system is the unquestioned stability of the dollar in terms of real purchasing power. Domestic inflation and the accompanying erosion of the currency's value in foreign exchange and international commodity markets will have the unavoidable consequences of reducing the dollar's international role. The British inflation and decline in the value of the pound resulted in the elimination of that currency from the reserve currency status that it once enjoyed. Continued double-digit inflation in the United States will undoubtedly bring about the demise of the dollar as a reserve currency as well.

It is up to the United States to get its own house in order if she wishes to preserve the international stature of the dollar. The benefits flowing to the international community as a result of such action would undoubtedly be great.

The most likely alternative to a dollar standard is at present the development of a multiple-currency reserve standard, where several currencies, in addition to the dollar, will serve an international role. However, it should be realized that such a multiple-currency standard is inherently unstable and is likely to lead ultimately to severe financial and economic disturbances. For the same reason that bimetallism proved to be unstable, it will be found that relatively small differences in national inflation rates among the different key currencies will lead to relatively large shifts in capital flows among these countries. Such capital flows will exacerbate balance of payments difficulties, as capital is likely to flow into a country that already enjoys a current account surplus. Consequently, exchange rate movements will be accentuated, official intervention will have to become even larger, or capital controls will have to be introduced. Ultimately, it is likely that capital controls cannot be avoided, and the very benefits of a liberal international financial order will be destroyed.

The only feasible realistic alternative to a multiple-currency system is at present a system based on the SDR (Special Drawing Rights). The recent decline of the dollar has consequently led to a renewed interest in the SDR as an international reserve asset. This turn of events is not without irony, because the SDR was born in 1968 out of fear that there might be a shortage of dollars when the U.S. balance of payments would return to surplus. Instead, the SDR is now likely to assume a larger role on the international economic scene because there is a perceived surplus of dollars. The renewed interest in a dollar/SDR substitution account is the natural outgrowth of these developments.

To move the SDR firmly to the center of the international monetary system would require at least three steps: to base the IMF exclusively on the SDR, to make the SDR usable -- that is transferable -- among private entities, and to make the SDR inflation-proof. Let me briefly elaborate on each one of these points.

Recently, the Economic Counsellor of the IMF, Mr. J. J. Polak, set forth a plan that would make the SDR the centerpiece of all IMF operations. This innovative and farsighted suggestion would significantly enhance the importance of the SDR and make it a more central asset in the international monetary system. In addition, such a move would also have the advantage of unifying many of the Fund operations that are now proliferated among an ever larger and more complex variety of "accounts" and "facilities."

Second, the SDR should be made transferable among private as well as public holders. When the SDR is freely traded in international financial markets its usefulness and liquidity will be greatly enhanced. The SDR is not likely to assume a significant role in world financial markets until it is also used widely for commercial transactions that create a need to effect payments in SDRs. But if SDRs are not freely transferable between private and official holders, it is unlikely that they will assume an important role as an international means of payment. Transferability of the SDR among private parties is therefore essential if the international monetary system is to be based firmly on the SDR.

Third, the SDR should be turned into a true global standard of value by rendering it inflation-proof. Traditionally, gold has fulfilled the role of an international standard of value but official actions and the recent speculative fever have deprived gold of its status as a stable measuring rod. Instead, it has become a highly speculative commodity.

As presently constituted, the SDR offers some protection against the risk inherent in differential inflation rates by providing the holder with a diversified currency basket. But it should be noted that the value of this currency basket in terms of real purchasing power deteriorates along with the weighted average of the inflation rates experienced by the sixteen countries represented in the SDR basket. A superior inflation hedge is always available to the investor -- be it a monetary authority or a private entity -- by not holding the currencies of high inflation countries. The SDR, as presently constituted, forces the investor to accept the depreciating currencies of the high inflation countries that do not enter the SDR interest rate calculations based on the five most important currencies only. Hence, the SDR as presently constituted is not a particularly attractive asset.

The inflation-proofing of the SDR would make it a truly superior international asset that could play an increasingly important role on the world financial scene by providing a universal unit of account, a monetary transaction medium, and a stable store of value. Such an inflation-proofing of the SDR could be accomplished by linking it to a price index of the sixteen countries making up the SDR basket. Of course, there are many operational problems to be considered, but these are not inherently more complex than those that had to be resolved when the SDR as currently constituted was created.

Of course, there remains a very disturbing thought: If all the individual countries are unwilling or unable to take the necessary steps to bring inflation under control, why should we assume that all these nations acting in concert through an institution would be any more willing or able to act in a manner that would expose their own shortcomings? Nevertheless, it may be possible to achieve an international consensus on the creation of such an asset because the alternative of continued international monetary disruption is associated with high costs for all.

The only other feasible alternative for the eighties is a rapid reduction in the U.S. inflation rate, such that the international role of the dollar will be preserved in the decades to come. Without a stable dollar that can serve as the anchor of the international monetary system there is not likely to be exchange rate stability. The elimination of inflation in the U.S. and in other countries will therefore be a precondition for the improvement of the operation of the international monetary system. Stability cannot be imposed by the international monetary system or found by manipulating the system. International monetary and exchange rate stability can be achieved only by first attaining domestic stability.

FLEXIBLE EXCHANGE RATES AND MONETARY POLICY: A DISCUSSION OF THE FRENKEL AND HELLER PAPERS

David Laidler

If a conference such as this one, dealing with United States' macro-stabilization policy, had been organized ten years ago it is unlikely that anyone would have suggested devoting an entire session to the operation of the international monetary system. If the suggestion had been made, it would certainly have been greeted with a loud "why?" The very fact that _this_ session is included in _this_ conference epitomizes the most important lesson of all that we have learned about domestic stabilization policy in the last decade--namely that it cannot sensibly be discussed without explicit reference to the international environment within which it is being implemented.

By this I do not simply mean that United States domestic policies have implications for the rest of the world that policymakers should be interested in, or that there are interesting debates about the organization of the international monetary system, the outcome of which will influence the ease with which American business can operate in international markets and which ought therefore to concern American policymakers, though both of these observations are surely true. Rather I mean that the way in which monetary policy impinges upon traditional

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domestic targets, employment, prices and the like, is intimately linked to the operation of the international monetary system.

Since neither of the papers that I am discussing has much to say explicitly about these domestic matters, and that is not to criticize either of them, because one can only say so much in one paper, I believe that it will be useful for me to use these discussant's comments to explore this area in the light of the arguments presented by Frenkel and Heller, rather than to provide a detailed critique of those arguments.

Both of the papers before us deal with the operation of a system of flexible exchange rates. That is only right and proper, given that this is the system (more or less) under which the world is currently operating. However, I believe that it would be wrong for anyone to conclude that the new importance of international factors for United States domestic policy stems from the adoption of a system of flexible exchange rates per se.

In the 1950s and 1960s, United States policymakers were able to operate "as if" the economy they were dealing with was closed, not because the Bretton Woods system was a fixed rate system, but because it was a dollar standard system. As we now know, with the benefit of hindsight, and as some--notably, for example, Robert Triffin (1961)--argued at the time, this did not mean that the United States could indefinitely operate its domestic policies while completely ignoring what in other countries used to be called "the balance of payments constraint." However it did mean that the "constraint" operated sufficiently slowly that, relative to the time horizon for which domestic stabilization policies are conceived, it seemed unimportant. It would only be if the world were to return to a dollar standard that this happy, for United States policymakers, state of affairs would be restored. However though I understand Robert Heller's nostalgia for such a system, I am much less sanguine than is he about the possibility of the restoration of a dollar standard.

The breakdown of the Bretton Woods system has forcefully reminded us that the amount of seignorage which a banker can extract from his clients depends upon their willingness to pay up. If he tries to extract too much, they will, not without difficulty to be sure, take their business elsewhere. At the risk of oversimplifying, under Bretton Woods, the banker, namely the United States, tried to extract too much seignorage. The current chaotic international monetary system is the result of the customers trying, as best they can, to find somewhere else to do their banking business. A dollar standard is not going to be restored unless it is clear to the rest of the world that the United States has mended its ways, and is not going to repeat its previous policies--either willfully or inadvertently. The <u>only</u> evidence that the past decade has produced to support this view is the recent announcement of monetary policy changes by Mr. Volcker. If that announcement is followed up with action, and past evidence suggests that this cannot be taken for granted, and if the new policies are adhered to long enough to erase the memories of fifteen years of instability, then the possibility of restoring a dollar standard might arise. However, I believe that we would be ill advised to hold our breath in anticipation of the event.

Now this is not to say that the world will inevitably remain on the present flexible exchange rate system into the indefinite future. The problems of operating under such a regime as Heller describes are real ones, although how much they are the result of the flexible exchange rate regime per se, and how much of the underlying monetary instability that forced the adoption of that regime in the first place, is a point that one might want to argue about. There is undoubtedly a demand for a stable monetary unit to serve as a means of exchange, unit of account, and store of value in international transactions, and markets have a way of evolving in order to meet such demands in a manner that verges on the inherently unpredictable. After all, the Bretton Woods system was not designed to put the world on the dollar standard, nor did or indeed could the United States in any way force this outcome; it arose as a result of the voluntary choices of a host of institutions and individuals and the evolution in question only appears inevitable with the benefit of hindsight.

In the current state of knowledge, economic theory enables us to say that, so long as domestic monetary policies remain uncoordinated and unstable, then the international monetary system will also be unstable, whatever its formal institutional framework, and that as such policies become stable and harmonized, then so will the international monetary system become stable and perhaps adopt a new reserve currency, or indeed currencies. It does not enable us to say anything positive about the form that such an evolution is likely to take. Nevertheless, given the array of inflation rates, monetary expansion rates and such at present ruling in various parts of the world, one is tempted to conclude that even the first step towards reestablishing some sort of unified world monetary system has yet to be taken. The European Monetary System is regarded by some as being the first stage in establishing an important regional base from which such a system might evolve; whether it is or not depends upon whether its members succeed in developing the means to coordinate their domestic policies so as to make them compatible with the maintenance of the System, and they show no signs of doing this.

Be that as it may, as a practical matter any discussion of United States' stabilization policies that is to be of current relevance should take a flexible exchange rate system as its background. Thus the theoretical and empirical material in Frenkel's paper, though it will look rather unfamiliar to many specialists in the analysis of domestic monetary policy, is of considerable relevance to their concerns. I will now turn to some of the issues involved.

It should go without saying that if one is going to discuss the way in which macro-stabilization policies are likely to work against the background of a flexible exchange rate regime, one ought to know something about the way in which the foreign exchange market itself operates. Frenkel deals with this matter from the point of view of what may be referred to as the "Asset Market Approach" to exchange rate theory, an approach which beyond doubt provides a simple and powerful method of analyzing the problem area. Nevertheless, anyone reading Heller's paper immediately after Frenkel's must wonder where many of the concerns he raises, particularly about the large amount of dollar-denominated assets held abroad, fit into Frenkel's analysis. I believe that the answer here is that, although the theoretical framework which underlies Frenkel's work can deal with these issues, the particular "monetary" version of the asset market approach which he explicitly sets out does so only implicitly, and in a way that his empirical evidence suggests is inadequate.

The basic monetary model of the exchange rate is simplicity itself. With national price levels tied to each other by purchasing power parity and a stable demand for real balances function in each country, domestic price levels, inflation, nominal interest rates and the exchange rate are simultaneously determined by the behavior of the "real" arguments in the demand functions in question, and by that of the supplies of nominal money in the two countries. What does this analysis tell us about the role in influencing the exchange rate of U.S. dollar-denominated assets left over from the period when the dollar was the reserve currency, and currently held abroad? This is a problem which many commentators, including Heller, believe to be of key importance. The monetary model tells us, I believe, that these assets have no special significance. They are interest-bearing assets, and, according to the monetary version of the more general asset market approach, the rate of return on them adjusts to compensate their holders for any anticipated change in their purchasing power over goods and over assets denominated in other currencies. Variations in that rate of return are taken account of in the model because the nominal interest rate they bear is an argument in the U.S. demand for money function.

The above reasoning hinges upon purchasing power parity always holding, but Frenkel's empirical evidence shows that at the very best it does so only on average over rather long time periods, and in a rough and ready fashion at that. This means that variations in the rate of interest on dollar-denominated assets cannot stimultaneously compensate for variations in their purchasing power over goods priced in U.S. dollars and goods priced in foreign currencies. This in turn means that, although some U.S. dollar-denominated assets may be perfect substitutes for those denominated in foreign currencies, others are not. That being the case, the currency in which they are denominated must be a relevant property of at least some classes of securities, and fluctuations in the supply and demand for such securities are likely to impinge upon the behavior of the exchange rate. The behavior of the dollar-deutsche mark exchange rate gives Frenkel more trouble than any other, and surely that is not an accident, given that mark-denominated assets have so often been the destination of funds realized by selling dollar-denominated securities.

There is another characteristic of the U.S. dollar's place in the international monetary system worth noting: it is the unit of account for many international transactions, not the least of which are those involving oil. That means that many international prices are going to be particularly sensitive to the conduct of U.S. domestic monetary policy, and that that policy still has a considerable power, for good or ill depending upon how it is used, over the international economy, a power which it would not have were prices in that economy to be set in other currencies. The frequent references in U.S. debates to oil price increases as being exogenous to domestic policy shows that it is not yet appreciated that oil prices in the world economy respond to U.S. domestic policy and that attempts to cushion their effect by domestic monetary expansion are not just useless but actively harmful.

To put all this in another way, if goods markets cleared as fast as asset markets, if we were always in long-run equilibrium where the concepts of the relative prices of national moneys and of national outputs were interchangeable, the above problems would not arise. However, asset markets do clear faster, and in the short run do dominate the behavior of the exchange rate, so that the distinctions upon which the asset market approach focuses are important. That surely is one implication of the evidence that Frenkel presents. This very fact however seems to me to imply that the asset market approach to exchange rate determination must be carried beyond a simple monetary formulation, as it is, for example, by Boyer (1978), to incorporate explicitly other aspects of portfolio behavior, and to incorporate other aspects of using a particular currency as a unit of account, before it can claim to provide us with a complete toolkit for dealing with foreign exchange rate problems, not least those which Heller raises. Nevertheless, if our toolkit is incomplete, it is still the best one that we have. As Frenkel's paper shows, the asset market approach to analyzing exchange rates is extremely useful, and its use does enable us to come to a clearer understanding of how to conduct domestic policy against a background of exchange rate flexibility.

One of the best established pieces of conventional wisdom in international monetary economics is that high interest rates are associated with a strong currency and low interest rates with a weak one, but one of the best established facts of the last few years is that the high interest rates in fact are associated with weak currencies, and vice versa. As Frenkel shows, the latter prediction is what follows from the asset market approach, and, as he also shows, that theory's predictions in this respect are confirmed by evidence, generated moreover by an experiment whose validity does not, as far as I can see, in any way hinge upon assuming that purchasing power parity holds. Though I can find nothing to disagree with in anything that Frenkel explicitly says about this matter, there are a few things that he didn't say that do seem to me to be of particular relevance to the theme of this conference.

The conventional wisdom about the relationship between interest rates and the strength or otherwise of a currency has its historical roots in the operation of the gold standard, and in particular in the role played by the central bank rediscount rate in the conduct of monetary policy under such a system, a role summarized in that well-known, but now sadly outdated, aphorism "Seven per cent will draw gold from the moon" (which I have been unable to track down to its original source). Under such a system the long-run time paths of money and prices in the international economy were given by the rate of change of the stock of gold. Though this rate of change was not always smooth and steady, because important new gold discoveries were from time to time made, on average it was. Given that, and given an unquestioned commitment of central banks to maintain the convertibility of domestic money into gold, the anticipated inflation rate was, by comparison with recent experience, not far short of being an exogenous constant. Moreover the principal aim of monetary policy was not to control income and employment but simply to maintain convertibility. In such a world, any increase in a central bank's discount rate represented an increase in the real cost of borrowing from the banking system, and hence led to a contraction (or at least a slowdown in the rate of expansion) of domestic credit. The monetary consequences of that in turn led to a balance of payments surplus and hence a "strong" currency.

The world of the last ten years has been very different than that which I have just described. With nothing to replace the gold standard's guarantee of long-run price predictability, inflationary expectations have become endogenous and volatile, and their movements dominate fluctuations in nominal interest rates. It is these factors which have led to the association of high interest rates and weak currencies. Both are the consequence of an adverse response of inflation expectations to undisciplined and expansionary monetary policies, as Frenkel has argued.

I believe that the forgoing considerations have two important implications for the conduct of domestic monetary policy in the United States, both now and in the future. First, though at long last an emphasis on controlling monetary aggregates is replacing an emphasis on interest rate targets in the conduct of policy, it would be foolish to believe that the battle here has been finally won. Rather it is still being fought. The advocates of controlling monetary aggregates have always based much of their case upon the difficulty of drawing inferences from a particular value of the interest rate about whether policy is "tight" or "easy," and will continue to do so. The forgoing analysis surely helps to bolster their case, for it shows that there is an important international dimension to the problems to which they have been pointing, a dimension that adds weight to the argument against using interest rates as a policy indicator.

The second implication worth pointing out is not of such immediate concern, but is surely just as important. The forgoing argument amounts to presenting a special case of the following general proposition: the way in which monetary policy impinges upon the domestic economy, and the way in which domestic monetary variables should be interpreted by the authorities depend critically upon the state of the international monetary system and the nature of the country's exchange rate regime. I believe that many of the United States' current policy difficulties have arisen from a failure of the authorities to appreciate the fact that these international factors are of prime rather than secondary importance in the design of policy. To put the matter in its simplest terms, it is not just the way in which United States policy affects the rest of the world that varies with the exchange rate regime and the conduct of policy in other countries; the way in which it affects the United States is also profoundly influenced by these matters. I will now turn to a more specific discussion of this point as it impinges upon the conduct of policy under the present regime.

There is no doubt about the nature of the current macro policy problem facing the United States: it is how to reduce the inflation rate without at the same time causing more of a real contraction than is absolutely necessary (however much that might be). It is also true that there is a wide consensus that getting the monetary expansion rate "under control" must play a key role in tackling this problem. Debates arise when it comes to the question of how to implement such a policy, of specifying what getting monetary expansion "under control" means in practice. At one extreme are those who follow the lead that (I am glad to learn from Neil Wallace) Sargent and Wallace (1975) never meant to give. They argue for a rapid, pre-announced, monetary slowdown which will, by way of a by now well-known "rational expectations" mechanism, impinge mainly upon prices and will affect output and employment only to the extent that the pre-announcement is not believed.

At the other extreme are those like Modigliani (1977) who believe that a monetary contraction can be fine tuned, while in the middle stand those who would support a gradualist contractionary policy of the type advocated at this conference by Allan Meltzer. To a foreign observer, the striking characteristic of this United States policy debate is the way in which the openness of the United States economy and the nature of the exchange rate regime are virtually ignored by all participants. Nevertheless, the theoretical and empirical results presented by Frenkel at this conference, not to mention a good deal of work on stabilization problems in open economies that has been carried on mainly outside the United States, is extremely relevant to these issues.

Two key questions underlie current debates about stabilization policy. The first concerns the speed with which the private sector of the economy can absorb information about policy and translate that information into price changes, and the second, analyzed by Lucas (1976), concerns the stability over time of the mechanisms whereby information is absorbed and acted upon and the independence or otherwise between those mechanisms and policy actions themselves. If one believes that information is absorbed and acted upon quickly, then rapid monetary contraction is an appropriate anti-inflation policy. If one believes that reactions here are slow, but that their time path in the future can be inferred reliably from past behavior then one will advocate fine tuning. A slow but unstable, and hence hard to predict, mechanism underpins the case for gradualism. (May I note here in passing that I believe Meltzer's analysis of the case for gradualism, which I largely accept, would be enhanced if he would lay more stress upon the unpredictability of the lag structure of his model in any particular instance, and less upon its drawn out and backward looking nature per se.)

Frenkel's empirical work shows that the foreign exchange market is efficient, in the sense that all available information, including information about policy, is translated quickly into movements of the exchange rate. The exchange rate is, therefore, a price that, other things equal (the qualification is important and I will return to it in a moment) adjusts rapidly to policy changes. A number of recent papers have analyzed versions of the aggregate demand-expectations augmented Phillips curve model, which underlies so much United States policy debate, extended explicitly to incorporate a foreign sector. Though such work is most highly developed for fixed exchange rate regimes--see, e.g., Laidler (1975), Jonson (1976), Jonson, Moses and Wymer (1976), Bilson (1978), Burton (1979)--some results are now available for a flexible rate regime. Thus Laidler (1977) shows, albeit in an extremely primitive model with zero capital mobility, that even where systematic errors are made about the domestic price level, perfect foresight about the exchange rate is sufficient to guarantee that domestic monetary policy impinges solely upon domestic prices and not at all on output. Burton (1979 and forthcoming), in a much more elaborate model that does incorporate capital mobility, a variety of stochastic shocks, and rational expectations, finds that the behavior of the exchange rate is a key source of information for agents and that the more rapidly information about it is available to them, the more direct is the linkage between domestic monetary policy and domestic prices.

One must be careful not to read too much in the way of policy implications from analytic exercises such as these. Nevertheless, the work that I have referred to does point to the conclusion that a flexible exchange rate, determined in an efficient market, imparts to an economy an extra degree of price flexibility that it does not have under a fixed rate. This in turn suggests that estimates of the output that might be lost in the United States while bringing inflation under control that have been generated from data on the fixed exchange rate period are likely to be exaggerated, even if there is nothing else wrong with the techniques used to derive them.

However, there is a very important qualification to be added to all this. The theoretical results to which I have alluded are premised on the price level, and implicitly the money market, in the rest of the world remaining undisturbed during the theoretical experiment from which they are derived. To put the matter in terms of Frenkel's framework, they apply to situations in which nothing happening abroad disturbs equilibrium in the market for foreign money, or foreign assets in general, so that all disturbances to the exchange rate originate in the behavior of the domestic money supply. Why this is an important qualification is easily seen by considering Frenkel's analysis and his empirical results. If a foreign monetary contraction begins at the same time as a domestic one, the analysis in question tells us that, given for the sake of simplicity that the relative sizes of these contractions are appropriate, nothing will happen to the exchange rate. In that case domestic money markets must be cleared by domestic output and price level fluctuations without help from a quickly adjusting foreign exchange market. Frenkel's results on purchasing power parity lend weight to the view that domestic prices adjust slowly to monetary disturbances. Thus there is every reason to suppose that in this case, and in the short run, which may nevertheless persist for a long time, much of the effect will be on output.

The implications of looking at Frenkel's empirical results on the efficiency of the foreign exchange market in the light of the macro-models I have cited in the preceding section may be summarized as follows: a single economy seeking to tackle an inflation problem against the background of an otherwise tranquil world economy will find that the existence of an efficient market for foreign exchange under a flexible rate enhances the flexibility of domestic prices. Such an economy will enjoy an easier transition to a lower inflation rate than one would expect from studying closed economy models. However, if that same economy is one among a number faced with a similar problem, then, even with a flexible exchange rate, the pressures of domestic deflation will, if other countries are simultaneously deflating, be concentrated on domestic output. In general, the extent to which this happens in any one country will vary with the conduct of policy abroad.

In the current state of knowledge, I do not believe we can say any more than this, but I would claim that even this much is important to know. Our consideration of the open economy aspect of stabilization policy has, after all, led us to argue that the lags with which information will become available, and hence a basis for action, will vary with the way in which policy is conducted not only at home but also abroad. The length and variability of such lags are, therefore, in any particular instance, going to be next to impossible for policymakers to predict. However such unpredictability is the very essence of the case for gradualism. The analysis we have been considering does, therefore, make an important contribution to the current U.S. policy debate.

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FLOATING EXCHANGE RATES IN THE 1970s: A DISCUSSION OF THE HELLER PAPER

Geoffrey E. Wood

The first section of Dr. Heller's paper consists of four assertions about the consequences for the world economy of the move to floating exchange rates. On the basis of these four assertions Dr. Heller proceeds to make recommendations first for the future conduct of U.S. economic policy, and second for the future shape of the international monetary system.

In these comments it will be argued first that his four assertions on the consequences of exchange rate flexibility are at the least misleading and, in some cases, not supported by any evidence at present available. It will then be shown that his policy recommendations for the future of the international monetary system are based on misunderstanding both the causes of exchange rate volatility and the reasons for international capital movements. The comments conclude with a summary of what appear to be the true lessons of the floating exchange rates experience of the 1970s.

DR. HELLER'S ASSERTIONS

Dr. Heller asserts that "the operation of the flexible exchange rate system since 1971 has entailed a significant increase in costs to

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the business sector." The trouble with that statement is that Dr. Heller does not make clear what comparison he is making when he says costs have increased. There has been a substantial increase in the dispersion of inflation rates in the O.E.C.D. (Organization for Economic Cooperation and Development) area in the 1970s as compared to the 1960s.[1] Had exchange rates remained pegged despite this change, they could only have been kept so by an increasing proliferation of exchange controls to restrict capital movements and of tariffs and quotas to restrict trade, and by increasing volatility of national monetary policies. It is impossible to believe that these developments would not have imposed costs on the business sector, and Dr. Heller certainly does not demonstrate that these costs would be less than the costs imposed by floating exchange rates.

Indeed, it should be pointed out that there is absolutely no evidence in support of Dr. Heller's view that floating exchange rates have inhibited international trade. This issue has been studied fairly extensively, and there is not one study which has found that floating rates have had any dampening effect whatsoever on world trade. But despite that, there may be some truth in this particular belief.

All studies so far undertaken have looked at the effect of the exchange rate regime on international trade as a whole. Recent

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[1]See Geoffrey E. Wood and Nancy Aamon Jianakoplos, "Worldwide Economic Expansion: Are Convoys or Locomotives the Answer?" Federal Reserve Bank of St. Louis Review, July 1978.

theoretical work by Ronald McKinnon,[2] supported by forthcoming empirical work by Stephen Carse, John Williamson and the present author,[3] suggest that this is not appropriate.

A substantial part of international trade is in primary or semi-manufactured goods. The prices of such goods are continually held close together across countries by arbitrage. Thus traders in such goods are not affected by exchange rate fluctuations provided that they hold inventories equal to their indebtedness arising from trade -- and the evidence is that to a first approximation they do. There is therefore no reason to expect trade in these goods to be in any way affected by exchange rate changes, whether or not these changes are anticipated. In contrast, manufactured goods do not have their prices quickly arbitraged into equality internationally.[4] Traders in such goods are therefore exposed to exchange risk. Tests for the effects of exchange rate fluctuations on trade should focus on these categories of goods, rather than on trade as a whole; looking at trade as a whole may have led to the concealing of the effect of exchange rate fluctuations on a sub-section of trade. (This hypothesis is currently being explored by the present author, but no results sufficiently reliable to report are at present available.)

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[2] Ronald McKinnon, Money in International Exchange, Oxford University Press, New York, 1979.

[3] Stephen Carse, John Williamson, and Geoffrey E. Wood, Financing Practices in U.K. Foreign Trade, Cambridge University Press, Cambridge, 1980.

[4] See e.g. John Williamson and Geoffrey E. Wood, "The British Inflation: Indigenous or Imported?", American Economic Review, September 1976.

So, despite the absence of confirming evidence, Dr. Heller may be correct in saying that trade has been inhibited by exchange rate fluctuations. But three points should be emphasized. First, he provides no evidence to support his assertion. Second, he should have compared what would have happened to trade under a fixed rate system defended against the consequences of divergent inflation rates by proliferating controls, with the effect of exchange rate fluctuations on trade. Third, even if he is correct that exchange rate fluctuations inhibit trade, it is far from clear that official exchange market intervention is thereby justified.

His second major assertion is that flexible exchange rates have "not brought about a climate for the conduct of more effective stabilization policies." The only possible response to that is to ask why on earth they should. Under a fixed exchange rate system, the burden of mistakes in stabilization policy by any country's government was in part borne by the foreign sector. Excess demand was in part met by foreign supply, while deficient home demand was in part offset by demand from overseas, so long as the demand and supply imbalances were at least partly due to monetary policy. (An example of this is the United Kingdom experience in the 1960s; see Williamson and Wood, op.cit.) Floating exchange rates, by eliminating flows across the foreign exchanges, close this safety valve; one should therefore expect (other things being equal) that the performance of stabilization policies should deteriorate rather than improve under floating rates.

But Dr. Heller did not write very precisely at this point; he does not say exactly what he means by the "climate for the conduct of more effective stabilization policies." He may mean not the actual achievement of such policies, but rather how policymakers have responded to divergences of the economy from its desired path. If that is what he means, then he is pretty clearly wrong. The U.K. is a good example. It was only after the collapse of sterling's foreign exchange value in 1975 that the U.K. government took any serious measures to end the gradually accelerating inflation of the previous twenty years. Why they so responded can only be conjectured; but the explanation may be that floating exchange rates bring home to the electorate the costs of inflationary policies rather more quickly than did fixed rates, and thus may influence their voting behavior at the next election.

Dr. Heller next claims that floating exchange rates have not "decreased the cost of [foreign exchange market] intervention to central banks." Dr. Heller is really very careless in his use of the word "cost." He never tells us what costs he has in mind in the present instance. It is certainly clear, however, that the amounts of intervention have been large, and it is on this issue rather than the undefined one raised by Dr. Heller that we next comment.

Why have exchange rates been so volatile? Where have the private stabilizing speculators been? Dr. Heller does not attempt to answer these questions. Fortunately, an answer has been provided by a large body of previous work. Exchange rate volatility is, in large part, the consequence of volatile national monetary policies. This has been true not just in the 1970s; it was also true in the 1920s. The conclusions of a recently published paper by my colleague Roy Batchelor summarize the evidence very well.

> Stable inflation rates are all that is required to keep the trend in exchange rates steady.... efficient exchange markets should keep fluctuations around the trend within the same margins as in the 1920s. What is necessary for exchange rate stability is that monetary expansion be predictable...[5]

The reason for this is admirably expressed in the quotation from Gustav Cassel with which Jacob Frenkel concludes the paper he presented at this conference.

> The international valuation of a currency will, then, generally show a tendency to anticipate movements, so to speak, and become more an expression of the internal value that the currency is expected to possess in a few months, or perhaps in a year's time.[6]

The more volatile is a nation's monetary policy, the more frequently will the expected future internal value of its currency change, and so the more frequently will its exchange rate change. The primary source of exchange rate volatility is therefore volatility in national monetary policies. Understanding that is central to drawing the correct lessons for future policy of the exchange rate experience of the 1970s.

Understanding that also helps explain the absence of private stabilizing speculation; because of the volatility of national monetary policies, speculators have had very little basis on which to form expectations of future exchange rates.

In this context, it is worth pointing out that (as Jacob Frenkel shows) exchange rates have been no more volatile than prices in other

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[5] Roy Batchelor, "Must Floating Exchange Rates be Unstable?" Annual Monetary Review, Centre for Banking and International Finance, The City University, London, England.

[6] Gustav Cassel, Money and Foreign Exchanges after 1919, pp. 149-150, Macmillan, London, 1930.

asset markets, thus emphasizing the common cause of such volatility. Further, it must be stressed that D. Heller's belief that "speculative activity may well accentuate rather than reduce exchange rate fluctuations" is totally contradicted by evidence that there are no traces of speculative "runs" in the foreign exchange markets.[7]

His last assertion is that floating exchange rates have "fostered the decline of the dollar as the world's leading currency." By this he means that floating exchange rates have led to a fall in the proportion of dollar-denominated assets in the portfolios of individuals and central banks. He is clearly right. Portfolio diversification was to be expected as a consequence of the move to floating rates, and it has indeed happened. But so what? Why is that undesirable? Nowhere does Dr. Heller answer these questions.

U.S. POLICY RECOMMENDATIONS

Turning first to his recommendations for the future conduct of U.S. policy, these are manifestly sensible -- they comprise recommending the announcement of intermediate monetary ranges targeted by base control so as to ensure hitting them. The empirical and theoretical work on the causes of exchange rate volatility, which was referred to earlier, clearly indicates that such a policy would make exchange rates much less erratic in their movements, and such a policy would also help stabilize the U.S. economy as a whole.

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[7]See for example Donald S. Kemp, "The U.S. Dollar in International Markets, mid-1970 to mid-1976," Federal Reserve Bank of St. Louis Review, August 1976.

INTERNATIONAL POLICY RECOMMENDATIONS

Dr. Heller does not advise a return to pegged exchange rates; he recognizes that so long as national inflation rates are as diverse as they currently are such a move would not be sustainable. He does, however, encourage official intervention in the foreign exchange markets.

There are, as Dr. Heller recognizes, costs to such intervention--in particular, there may very well be an impact on domestic monetary policy. Since steady and predictable money growth is the foundation of reasonably stable exchange rates, there are considerable risks that central bank foreign exchange intervention would buy only short term stability. And what are the benefits of exchange rate stability achieved by official intervention in the foreign exchange markets? What can justify official intervention?

Central banks do not in general have any better knowledge than does the private sector of the future course of economic variables. There can be occasions when they do have such knowledge -- because they know their own intentions but have not published them, or because they are privy to the otherwise undisclosed intentions of a foreign central bank. In that case, intervention to prevent a temporary market fluctuation may be justified but such intervention is inferior to making public the confidential knowledge on which it is based. Making the central bank's intentions public would help stabilize not just the foreign exchange market but, to differing degrees, every other market. Publicity, therefore, clearly dominates intervention.

A second defense of occasional intervention may exist if it is found that fluctuating exchange rates do, indeed, inhibit certain categories of trade. If stable national monetary policies are being pursued, there may still appear to be a case for intervention. The case would be that some of the benefits from exchange rate stabilization accrue not as profits to speculators on the foreign exchanges, but to traders in goods. There would, in other words, be a divergence between the private and social benefits of stabilizing speculation, with the social benefits outweighing the private ones, thus appearing to justify intervention. But here, too, exchange intervention is second best. As has emerged from the literature on protection, a direct subsidy paid to the affected sector is the most efficient means of assisting a sector of an economy.[8] In the present case, intervening in the exchange markets would mean that all traders in international money markets, not only those in goods affected by fluctuating exchange rates, were being assisted. Here, too, then, while exchange market intervention may conceivably be justified -- although the evidence which may justify it is not yet in -- again the policy is a second best one.

Two further possibilities remain. An exchange rate may be changing very rapidly -- sterling in the three months to July 1979 is an example. This was imposing very rapid adjustment costs on industries already required to respond to a substantial change in the pattern of comparative advantage. If the authorities in such a case can slow the adjustment without loss of monetary control, then there are benefits from their doing so. But the situations when they can do

[8]See J. Bhagwati and V. K. Ramaswami, "Domestic Distortions, Tariffs, and the Theory of the Optimum Subsidy," Journal of Political Economy, February 1963, and Geoffrey E. Wood, "Senile Industry Protection," Southern Economic Journal, January 1975.

so are manifestly rare. The U.K. was able to do so in that episode because a large part of the inflow seemed to have resulted from a desire to buy just the kind of securities the U. K. government would have had to sell to sterilize the inflow, but the experience of Germany in the 1960s and 1970s shows that such episodes are unusual. This case, then, does constitute a modest defense of occasional intervention -- but the circumstances are very special. (And there will still be a welfare cost to the nation if the rate of return earned on international reserves falls short of the rate paid on foreign-owned national debt.)

The fourth, and last, defense is when there is an increased demand on the part of non-residents to hold the money of some country -- not, it should be stressed, assets denominated in that currency, but the currency itself, including of course bank deposits. This does not invariably constitute a reason for supplying the currency; it may, rather, often be an opportunity for reducing the inflation rate. If, however, inflation is at its desired rate, then the increased demand for currency must be met by an increased supply, and the simplest way to be sure of supplying the correct amount is to operate on the foreign exchange market. But this is a very special case indeed.

Summarizing then, the case for official intervention in the foreign exchanges is very weak. Recognizing that there can be substantial fluctuations of exchange rates about their equilibrium values does not imply that these fluctuations should be corrected by official intervention.

Dr. Heller is also concerned about the appropriate reserve asset for the international monetary system. He believes that the currently evolving reserve asset system is inherently unstable, and that it should be replaced by a single asset system, the asset being either the U.S. dollar or a somewhat modified SDR (Special Drawing Rights).

It is convenient to deal first with his endorsement of a dollar standard. The weakness of such a system was first diagnosed by Robert Triffin.[9] His diagnosis can be summarized very briefly as follows. The reserve asset, the dollar, can be supplied only by the reserve centre, the United States, running continual deficits in its balance of payments -- but that progressively undermines confidence in the reserve asset which is being thus supplied. Such a system is internally inconsistent. Dr. Heller provides us with no reasons for thinking Triffin to be wrong -- indeed, nowhere does he refer to Triffin so his advocacy of a return to a dollar standard cannot be taken seriously.

The defect with his endorsement of an SDR-based system is that under one set of circumstances the scheme is unnecessary, while under the alternative circumstances it will not work. An international monetary system with all major currencies serving as reserve assets is not, despite his belief to the contrary, inherently unstable. Such a system will not be continually destabilized by capital flows responding to inflation differentials -- so long as these differentials are reasonably stable and predictable. And when these differentials are not stable and predictable, there will be sudden and large movements of

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[9] Robert Triffin, Gold and the Dollar Crisis, Yale University Press, New Haven, 1960.

funds from currency to currency whatever the official reserve asset of the system may be.

Tinkering with the reserve asset of the international monetary system cannot substitute for stable domestic monetary policies.

CONCLUSIONS

The lessons for the conduct of international monetary policy which have been provided by the experience of the 1970s can be stated very briefly. Exchange rates will be volatile so long as national monetary policies are volatile. It is not clear what harm this exchange rate volatility does, although the underlying monetary instability does cause considerable harm as Alan Meltzer's paper shows. In any event, the case for exchange market intervention to reduce this volatility is very circumscribed indeed.

Nor can any case be made for trying to prevent portfolio diversification into a range of reserve assets. A multiple asset system will be stable if national monetary policies are stable, and if national monetary policies are unstable then any international monetary system will inevitably be unstable also.

The lesson of the 1970s experience of floating rates, as of every earlier floating exchange rate episode, is that the international monetary system will only be as stable as the set of national monetary systems which it links.

MONETARY POLICY ISSUES FOR THE 1980s

Lawrence K. Roos

As one of the sponsors of this conference, it is a special pleasure to welcome all of you to the Federal Reserve Bank of St. Louis. It is a privilege, as well, to have the opportunity of joining you in pondering how we might learn from past experience in planning monetary policy for the future.

In the time allotted me, I would like to share with you some impressions of past policymaking that I, in my four years as president of the Federal Reserve Bank of St. Louis have gained, and to explore with you what I believe we might look forward to in the years ahead.

Looking back in the 1970s, I would be less than candid if I did not admit to some deep feelings of frustration with the way in which monetary policy has been conducted, as well as to a failure to understand how policies which produced such adverse consequences managed to persist for so extended a period. Perhaps the best way to express my feelings is to focus on a few fundamental concepts which have come to dominate my own understanding of the impact of monetary policy on the economy.

First, and foremost, is the concept that inflation is fundamentally a monetary phenomenon. This is an extraordinarily appealing notion to me, if for no other reason than its generality and sheer

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simplicity. As Beryl Sprinkel recently noted: "It doesn't take a genius to know that if you pump more and more money into the system, you get inflation." Now, I suppose that if Beryl is correct that it truly does not take a genius to understand this, then there is still hope that this concept will come to be widely accepted. Unfortunately, the time lag necessary for acceptance of this appears to exceed, by a considerable margin, the time lags with which changes in money affect prices.

Because the full impact of changes in the rate of growth of money on the inflation rate occurs over a considerable period of time (estimated variously from three to six years), it is important that monetary policymakers, as well as the general public, clearly understand that the "core" inflation rate, or "underlying" inflation rate, or "basic" inflation rate (to mention just a few of the terms that have been attached to it) is determined by the long-term trend rate of growth in money after adjustments for changes in money demand.

In fact, because long-term changes in velocity have, roughly, had equal and offsetting impacts to that for changes in output, the core inflation rate is essentially equal to the trend growth in money. Because the trend rate of growth of money has approximated seven percent, the current "monetary-induced" rate of inflation is about seven percent. To put it somewhat differently, had there been no oil shocks or other exogenous non-monetary induced impacts on prices, we would nevertheless be currently faced with an inflation rate of about seven percent due solely to the growth in money that has emerged from past monetary policy decisions.

A careful understanding of the difference between the actual inflation rate and the monetary-induced or core rate of inflation is crucial for the proper conduct of monetary policy. Only the monetary-induced rate of inflation should concern monetary policymakers; it is the only component of inflation that they can influence. Exogenous shocks such as those caused by higher energy prices or crop failures will always contribute to the current measured inflation rate, but their impact is transitory. Attention paid to these exogenous influences on prices must never divert monetary policymakers from focusing their actions toward controlling, and reducing, the monetary-induced rate of inflation.

A second key concept that has guided my understanding of the impact of monetary policy is that abrupt and substantial changes in the growth of money, if sufficiently prolonged, have dramatic and usually unfortunate consequences for the economy. Unusually rapid growth in money, if sustained for several quarters, while having some positive effects on employment and output for a short time, will ultimately and inevitably increase the monetary-induced rate of inflation. Similarly, unusually slow growth in money, if sustained for several quarters, will result in reduced growth in output and employment -- perhaps, even a recession, and ultimately reduce the monetary-induced rate of inflation.

Careful understanding of the short-run consequences of sharp fluctuations in the growth of money is crucial for the proper conduct of monetary policy. To avoid undesirable results such as recession or an over-heating of the economy, monetary policymakers must avoid policy actions that result in sudden or capricious changes in the growth of money. They should, instead, conduct policy in such a way that changes in the growth of money are systematic and gradual.

A third concept that has guided my understanding is that the growth of money can best be controlled, not by focusing on the behavior of interest rates, but by controlling the growth of the monetary base. Since the Federal Reserve controls the largest component of the monetary base -- Federal Reserve credit -- growth of the monetary base is directly and completely in the hands of the Federal Reserve. Similarly, there is considerable evidence that the multiplier linking the monetary base to the money stock is sufficiently stable and predictable to assure a reasonably close relationship between growth of the base and growth of money over all but the shortest-term period. Consequently, the lesson for policymakers is that, if control of the growth of money is to be a crucial part of monetary policy, desired money growth rates should be linked directly in the policy process to the growth of the monetary base.

Finally, a fourth concept which has enabled me to understand the impact of monetary policy on the economy is that economic markets, especially the financial and foreign exchange markets, are reasonably rational and efficient. Thus, increased rates of money growth tend to produce higher interest rates and to lower the value of the dollar on international exchange markets as soon as the financial market participants, who seem to be well aware of the association between money growth and inflation, come to expect increased future inflation rates. It follows that, while so-called "tighter" monetary policy may immediately produce higher interest rates, the same result occurs with "looser" monetary policy in the longer time span. Interest rate movements per se are unreliable guides to policy. This is especially true when we consider that interest rates, which represent the price of credit, are also affected by a host of non-monetary influences.

Now, none of the above concepts is especially complex and certainly none is likely to be either new or controversial to most of you. However, they do provide an analytical framework for assessing the likely results of monetary policy actions. It is this basis of analysis that has led to my frustration in viewing what has happened over the past four years. No one, who believes as I do that the most significant component of inflation is monetary, could have failed to have been concerned with growth in money that accelerated from five percent over the period from I/73 to III/76 to eight percent from III/76 to III/78, guaranteeing a significant increase in the core rate of inflation. No one, who believes as I do that drastic changes in the growth of money produce undesirable economic consequences, could have failed to be concerned when the money stock, having grown at the rate of eight percent for two years, suddenly dropped to a less than two percent growth for the period from September 1978 to May 1979, virtually assuring a major economic slowdown. And, certainly, no one, who believes as I do that financial markets are rational and efficient, could fail to be disturbed by the current expressions of concern with alleged "tightness" of monetary policy, as judged by the "high" levels of nominal interest rates. Money growth at rates approaching 10 percent and an inflation rate of close to 10 percent are certainly not reflections of tightness. Certainly the financial and foreign exchange market participants have not been fooled; witness the behavior of interest rates and the value of the dollar over the last few months.

But my frustration is not confined only to the unfortunate consequences of past monetary policy actions. It also lies with the monetary policymaking process itself that produced the results we have observed throughout the 1970s. Time and time again, I have observed the achievement of the Federal Reserve's interest rate target while money growth was permitted to wander at will outside its "desired" target ranges. As I noted in an earlier discussion in London last June, the monthly "betting odds" during the past four and a half years have been only about one in two that M1 would remain inside its target range. Moreover, there is little doubt that the conduct of monetary policy, by focusing on stabilization of interest rates, has produced a procyclical pattern in the growth in money. That pattern has tended to exacerbate the impact of cyclical movements and exogenous shocks on the economy.

But, again, none of this is especially new to you. Many of you have contributed over the past decade to studies critical of both the monetary policymaking process and policy consequences. I, too, have been convinced, both by the economic arguments to which I have been exposed, and by a first-hand view of the disappointing results of the policies pursued, that only a major change in the formulation of monetary policy -- away from concentrating on stabilization of interest rates and towards focusing on the monetary base -- would enhance the prospects of successfully achieving the results we desire from monetary policy.

The announcement by Chairman Volcker on Saturday, October 7, that the Federal Reserve is changing its procedures of monetary policymaking to place more emphasis on controlling growth of the reserve aggregates while permitting interest rates to fluctuate freely, represents a gaint step in correcting past mistakes. There is no doubt in my mind that if this new approach is effectively implemented in the upcoming months and years, we can achieve control over the growth of money and, consequently, control over the "basic" rate of inflation. Similarly, we can avoid the adverse real sector impacts that have resulted from unintended drastic short-run fluctuations in the growth of money around its longer-run trend rate of growth. Finally, once the financial market participants are convinced that we have indeed seized control over the growth of money and intend to bring about the gradual reduction in money growth necessary to reduce the core inflation rate, I believe that we will see an end to the surges in interest rates and declines in the value of the dollar which have proved so troubling in the past.

Thus, as you may have inferred from my comments, I am enthusiastic and encouraged about the change in the policymaking process that has occurred. However, my euphoria is restrained by a realization that several problems still remain if this change in policy is to produce the hoped-for results. To assure maximum effect from the Fed's new policy the following steps must be taken:

1) Instead of placing sole emphasis on controlling the growth of non-borrowed reserves, policymakers should focus also on growth in the monetary base and total reserves. There are just too many slips twixt growth in non-borrowed reserves and growth in money.
2) Policy emphasis must be firmly and fundamentally redirected from concern about movements in the Federal funds rate to concentration on growth in the monetary base and, hence, the money stock. The substance of policy must go

beyond merely widening the permissible range of movements in the Federal funds rate. For, if widened Fed funds rate constraints remain even remotely binding, monetary control cannot succeed.

3) The new method must be given adequate time to prove itself. The success of the new monetary control procedure cannot be reasonably evaluated by observing money stock behavior over a short time span. Not even the most ardent academic advocate of base targeting asserts that precise money control is possible over a period of six months or less. At the very least, a one year testing period is necessary for any comparison between previous methods and the current one. Moreover, no one should expect inflation to dissipate in a matter of months. Inflation has been generated over a period of 15 years and cannot be eliminated overnight. It would be tragic if this new approach to policymaking were to be tried and abandoned after a short time because of false expectations.

4) Finally, and perhaps most importantly in the short run, the procedures for implementation of the new policy, the rules of the game, must be clearly enunciated to the public. As we have observed during the first week after announcement of the new approach, the lack of clearly articulated rules produced a near panic in financial markets. There is no reason to shroud policy in secrecy and to keep markets guessing. While surprises might have

had some value in policies directed toward money market stabilization, surprises are counterproductive when monetary aggregates become the target.

Above all, the attention of policymakers must be focused on the longer-run impacts of policy. Unfortunately, as Arthur Burns noted in his Per Jacobsson Lecture, the "anguish of central banking" has often come from the short-term political pressures on monetary authorities -- pressures to which, for-bad-and-for-worse, the monetary authorities have all too often succumbed.

What is needed more than ever before is a steady hand on the tiller of monetary policy. Not only will the Fed's new policy be subjected to critical analysis by those who traditionally have doubted the feasibility of monetary control; the very credibility of this country's central bank is at stake. I trust that we will have the wisdom to implement our policy effectively, the openmindedness to judge our progress fairly and the courage to resist whatever pressures might arise to retreat from the historic step we have taken.