

Comments and Discussion

Robert E. Hall: Mainstream economists are united in the view that inflation is bad. Only a radical fringe questions this orthodoxy. In this paper, Stanley Fischer examines one of the central arguments against inflation: by distorting relative prices, inflation interferes with efficient resource allocation. Part of the argument rests on evidence that episodes of higher inflation have also had greater variability of relative prices.

One of the paper's important advances over earlier literature in this area is its recognition that inflation is an outcome of economic processes, not an exogenous causal influence. Fischer's first contribution is to sort out what one might mean in saying that greater variability of relative prices is a cost of inflation. He gives us a list, which I will summarize, though not in his order, as a way of organizing some of my remarks.

First, misperceived disturbances cause inappropriate relative prices and misallocation of resources. The misperceptions hypothesis has no implications for inflation itself—misperceived monetary shifts in either direction are costly. Minimization of these costs does not involve ending inflation, but rather publishing all available monetary data at 4 pm every Friday. Because ending inflation would probably create some misperceptions, a better policy is to stabilize inflation at its current rate, according to the misperceptions view.

Second, changes in macro policy change the rate of inflation and relative prices at the same time. The shifts in relative prices are simply the efficient operation of the economy and are not in any sense a cost of inflation.

Third, because costs of changing prices vary by product, higher overall rates of inflation may bring more dispersion in relative prices. Although this type of dispersion does carry inefficiency with it, it is hard

to believe that the costs amount to anything at rates of inflation below 20 percent a year. Many tricks are available to merchants to minimize the costs of changing prices. For example, at the Harvard Coop, the prices of records are marked as A, B, C, A sign at the checkout counter translates these into dollar prices.

Fourth, supply shocks influence both overall prices and relative prices. Again, the movements in relative prices are the efficient working of the system and are not a cost of inflation. In postwar U.S. history, supply shifts appear to be the dominant cause of the association between inflation and variability in relative prices.

Fifth, Phillips curves in individual markets are curves, not lines. A steeper Phillips curve means a market is working better. With higher average inflation, the typical market is at a steeper point on its Phillips curve and so is functioning more efficiently. Inflation is good, not bad, because it helps achieve desirable shifts in relative prices.

Sixth, monetary policy may be more expansionary when events occur that shift relative prices. Once again, inflation cannot be said to cause misallocation of resources.

After giving the reader this useful list, Fischer plunges into empirical work, but it is worth pausing and asking whether anything is left of the idea that increased variability of relative prices is a cost of inflation according to any of these views. Only the misperceptions hypothesis squarely associates distorted relative prices with costs of inflation. But it has two interpretations, neither of which supports any benefits from decreased inflation: (1) all the Federal Reserve has to do is announce everything it knows about the money stock to bring misperceptions to an irreducible minimum or (2) prediction errors matter for some reason, and we need to keep the money stock on its previously expected track. The first says we can do whatever we like with the money stock and the price level, as long as we are open about it. The second suggests we should maintain inflation at about its current level. Thus Fischer has disposed of the last item in his list offering any hope of supporting a connection between efficient allocation of resources and inflation.

Fischer continues rather than wrapping the paper up at this point because there are interesting scientific questions to settle, even if the conclusions about policy are foregone.

The simple history of inflation and relative price variability conveys the basic message of the paper: the two are correlated, and wars and

food-energy shocks are the source of the correlation. The closest thing there is to a pure experiment in sustained inflation without these sources was the period from 1965 to 1972, when variability was at extraordinarily low levels. Fischer's extensive examination of the relation between inflation, relative price variability, and other macro variables pins the point down fairly conclusively. Changes in relative prices have not been a universal partner of inflation, but have come from global weather and the activities of the oil cartel.

Toward the end of the paper Fischer asks a question he might logically have asked much earlier: even supposing that inflation brought distortions in relative prices, what are the ensuing welfare costs? His results strongly confirm James Tobin's famous remark that it takes a thousand Harberger triangles to fill one Okun gap. If the benefits of ending inflation are measured by the tiny number found by Fischer, and if the Phillips curve literature is anywhere near the mark on the cost of ending inflation, then tolerating inflation is clearly the preferable alternative.

I see two principal conclusions from the paper with respect to macro policy. First, the motivation for ending inflation cannot be elimination of excess variability of relative prices. Variability has indeed been higher in times of inflation, but for good microeconomic reasons. Second, all the findings suggest that anti-inflation policy—at least monetary restriction and high interest rates—has adverse effects on real output. There is no hint of any magical policy giving price stability without an intervening recession.

In view of these two conclusions, it seems to me that policy should aim to phase out inflation slowly, at perhaps 1 percent a year. Rapid disinflation threatens all the other accomplishments of current economic policy—improved incentives, rapid real growth, and a trimmed government.

John B. Taylor: Stanley Fischer's paper is an important contribution to the growing literature on the relation between inflation and relative price variability. His systematic survey of the theoretical arguments is successful in giving order to a confusing array of theories that have been put forth to explain the correlation. His extensive empirical investigation shows that the simple bivariate correlation between inflation and relative price variability diminishes significantly in an appropriate multivariate setting in which intermediating effects can be controlled.

The most striking of Fischer's empirical findings—as well as the most convincing, in my view—is that the relation between inflation and relative price variability since the mid-1950s is dominated by the energy and food supply disturbances that simultaneously affected both variables. The most direct evidence in support of this view is provided in figure 2 of his paper. The correlation between the level of inflation and relative price variability, so evident in this figure, largely disappears when energy and food prices are omitted from the index. Further support for the view can be found in the regression and autoregression results, but the figures are most convincing because they provide the information that the main movements in the variables occurred at the same time as well-documented supply shocks (that is, shifts in energy and food supply curves). This timing is not evident in the regression or autoregression statistics. It is very difficult to look at these figures without becoming convinced that the large supply shifts in energy and food in the 1970s were at least the initial force behind the nearly simultaneous movements in inflation and relative price variability that occurred.

A second result of the empirical investigation emphasized by Fischer is that monetary shocks are correlated with relative price variability and therefore have some role to play in explaining the relation, after one has accounted for supply factors. However, the role of monetary shocks is minor compared to the role played by supply shocks, and fiscal policy shocks are even less important. These policy shock results are based entirely on the autoregression statistics provided by the autoregressive time-series methodology employed by Fischer in his analysis. Since policy variables are being used in this analysis, one might suppose that the results have policy implications. In my view, such a supposition would be entirely incorrect.

Although the vector autoregressive methodology has the advantage of not being dependent on particular economic theories, it has the disadvantage of not permitting one to draw any policy implications, unless some structural interpretations are made. The difficulty comes in giving policy interpretations to the autoregressive statistics. At best, these results can be interpreted as estimates of the effect of monetary policy shocks—unanticipated and temporary deviations from the monetary policy process such as might be caused, for example, by a mistake in estimating the money supply. But even the interpretation of the results in terms of policy shocks or disturbances requires a structural interpreta-

tion, for in general these shocks are combinations of shocks to all relations in the economic system. Moreover, the methodology cannot evaluate the effect of a change in the systematic part of monetary policy. This disadvantage seems particularly troublesome for the analysis of the relation between inflation and relative price variability in the 1970s, in which one is interested in whether different policies (say, less accommodative policies) would have altered the behavior of these variables. Fischer deals with this problem at the end of his paper by reporting the results from an intriguing international comparison of Germany, Japan, and the United States. He finds that relative price shocks pass through the economic system with comparatively little impact on inflation in Germany. According to his analysis, Germany appears to have followed a less accommodative monetary policy than the United States. In other words, systematic monetary policy defined in terms of the degree of accommodation seems to have a major effect on the relation between relative price variability and inflation. In my view, these policy implications are correct. However, even with these international data, it should be emphasized that Fischer must give a structural interpretation to the vector autoregressive results in order to derive these policy implications: he must assume that the money equations in the vector autoregressive systems can be interpreted as structural monetary policy functions. Without such a structural interpretation, the system responses cannot be attributed to "nonaccommodative" German monetary policy.

It is useful to introduce some traditional econometric terminology in order to be more precise about the difficulties in interpreting vector autoregression statistics. Fischer's autoregressive equation system in which each of the six (or eight) variables are regressed on the lagged values of all variables in the system can be interpreted as a reduced form of a structural, simultaneous equation econometric model. The essential characteristic of the structural model in this context is the presence of current values of more than one variable in each equation. The reduced-form autoregression is the solution of this simultaneous system in which only one current period variable appears in each equation. The structural econometric model would not have unexplained exogenous variables, but it would have lagged variables, just as the autoregression does. Policy instruments, for example, frequently treated as exogenous in econometric models, would be explained by policy functions that would be part of the structural system and would show how policy variables react to current

and lagged values of other variables in the system. The money-supply equation, for example, might show a monetary response to the current level of GNP and the current level of inflation to capture the monetary authority's typical actions. If policy reacted slowly, it would be necessary to have lagged values of these variables in the equation. Because both the structural econometric model and its reduced form both have lagged variables, the autoregressive terminology really applies to both. We have a structural autoregression versus a reduced-form autoregression.

In moving from a structural autoregression to the reduced-form autoregression, two important transformations take place that make interpretation of the latter difficult. First, the coefficient of the lagged dependent variables in the structural autoregression get scrambled: the coefficients of each lagged variable in the reduced-form autoregression become functions of many of the structural form parameters. For example, the coefficients of lagged GNP and lagged inflation in the money-supply equation are no longer pure policy response coefficients. To identify these coefficients one needs to take some stand on the form of the structural model. Without this, the policy response coefficients remain hidden in the reduced-form autoregression, and it is impossible to interpret the impact of a more responsive or less responsive policy.

The second important transformation is that of the disturbances to the relations. The disturbances of a structural autoregressive model can be interpreted as shifts in the structural relations. For example, such a disturbance would represent a shift in the supply curve rather than a movement along it. These disturbances can be correlated between the different relations of the structural model without changing this interpretation. Shifts in supply and demand curves could be correlated. In moving to the reduced-form autoregression, however, these structural disturbances become mixed together so that the disturbances to each reduced-form equation are combinations of disturbances from all the structural equations. This is why it is impossible to interpret the estimated disturbances to the reduced-form relation as supply shocks or monetary policy shocks, without imposing some specific structure on the model. This structure is necessary whether or not the reduced-form disturbances are correlated.

This mixing together of disturbances also has implications for the impulse response function estimates discussed by Fischer and used for inferences about the relative importance of monetary and other shocks. Without a structural interpretation, it is arbitrary how one untangles

the reduced-form disturbances in calculating these response functions. Fischer indicates that it would be possible to calculate the impulse responses to each individual reduced-form disturbance and argues that this is not unlike what is done in simple regression analysis. In my view, there is some appeal to this approach, for then the impulse response function is a simple transformation of the reduced-form autoregressive coefficients. Instead, however, Fischer uses the ordering procedures suggested by Christopher Sims. Because the ordering procedure is arbitrary, Fischer experiments with some alternative ordering schemes. The results are reported in table 9 of the paper and do show some sensitivity to the form of ordering used. It should be clear from this discussion, however, that even experimenting with all alternative ordering combinations of the type reported in table 9 would not exhaust all the possible ways to untangle the reduced-form disturbances.

Much of my discussion has focused on the autoregressive methodology used by Fischer because many of his conclusions are based on this methodology. The questions I have raised about the methodology mainly relate to the need to use some structural economic theory or other auxiliary information if the results of the vector autoregressive methods are to have substantive economic implications. In an important way Fischer's paper shows how such implications can be drawn out of the autoregression statistics. By using structural interpretations to assess the relative degree of monetary accommodation in Germany, Japan, and the United States, he is able to draw a policy implication about the impact of monetary policy in reducing the relation between inflation and relative price variability.

General Discussion

Lawrence Summers and Robin Marris observed that Fischer does not consider some types of relative price changes that are likely to be important to allocation and distribution. Summers stated that the real interest rate is one of the economy's most fundamental prices since it determines the rate at which present consumption can be traded off for future consumption. Because of the high correlation between inflation and the variability of inflation through time, the real interest rate is also likely to be variable during periods of high inflation. The variability of real interest

rates could in turn affect relative prices of durable goods—which are capital assets—in comparison to nondurable goods. Furthermore, the variability of the real interest rate would be expected to affect the volatility of exchange rates, thus altering the relative prices of goods that are internationally traded and those that are not. Fischer acknowledged that inflation might induce uncertainty about real interest rates but pointed out that relative price effects on durable goods should be captured in his price series. Marris pointed out that two other kinds of prices that may be of special importance have been excluded from consideration—the prices of different types of labor and different forms of wealth. If high inflation were associated with great uncertainty about these relative prices, then individuals would suffer considerable anxiety regarding the future of their own real incomes with a consequent decline in real welfare. With respect to the larger message of the paper, Marris mentioned that in his own cross-country research the relation between inflation and growth, if it exists, is extremely tenuous, with a slight suggestion of a negative relation between the two.

There was extensive discussion of how to interpret some of the statistical results. Christopher Sims pointed out that the evidence from the vector autoregressions regarding the impact of money innovations on price variability is ambiguous. Money innovations could appear “causal” even if the money stock were itself passive but very closely connected to other financial variables, such as interest rates, that were themselves causal or forward looking. Similarly, he argued that relative price variability itself might appear causal when it is not, simply because of the forward-looking behavior of the prices of durable and storable commodities whose prices are set in auction markets. He agreed with Fischer’s caution in drawing policy conclusions from his results. George Perry observed that it is equally difficult to draw policy inferences from the results briefly reported for Germany and Japan. Fischer interprets their experience with OPEC-2 as evidence that a nonaccommodative policy can avoid inflation. However, the importance of government-industry-labor-bank cooperation, or even coercion, is never explored, although many observers give these relations, working in tandem with macroeconomic policies, much of the credit for controlling inflation in both countries. In Fischer’s vector autoregressions any contribution from such policies would be credited to other variables such as the money stock. Furthermore, Perry observed that there are substantial shortfalls of output below trend in both coun-

tries, but these are not discussed as they are in Fischer's analysis for the United States.

Stephen Goldfeld questioned whether monetary and fiscal policy could be properly characterized by the variables Fischer used. The normalized full employment surplus is an imperfect measure of fiscal policy and the money supply is an endogenous variable rather than a Federal Reserve target for much of the period being studied. Thus variations in the money supply cannot be identified as innovations in monetary policy.

James Tobin reported findings from the doctoral dissertation of David Stockton, which generally confirm Fischer's results, even though based on ninety-one components of the producer price index rather than the smaller number of relative prices examined by Fischer. Tobin interpreted Stockton's dissertation to show that relative price variability arising from micro shocks, like food and energy, have been much more important than the variability arising from macro policy shocks over the postwar period. The correspondence of Stockton's and Fischer's results, despite different data and methodologies, gave Tobin greater confidence in their results.

Much discussion centered on the broader implications of Fischer's results. Alan Blinder questioned how much one could learn from the type of vector autoregressions used in the paper. In accounting for GNP fluctuations, for example, the estimates only reveal the impacts of variables after taking account of changes in GNP that could be predicted by several lagged values of GNP itself. The underlying relation that causes GNP to be so well predicted by its own past values is not clarified. Robert Gordon disagreed with this interpretation. He reasoned that the high dependence of GNP on its own past values shows that fluctuations arise mainly from the multiplier-accelerator process, rather than coming mainly from decisions made in the Federal Reserve. Indeed, the results show the money supply has a very limited effect on GNP and inflation once inertia and the impact of energy and food shocks are accounted for.

Sims disagreed with the comment of Robert Hall that the welfare costs of misperception can be dismissed without serious empirical investigation. Sims argued that the frequent publication of money supply or price data does not, by itself, eliminate the possibility that misperceptions are an important source of welfare loss. Invisible barriers to rapid information flow or obstacles to rapid revisions in nominal contracts are usually characterized, in a stylized way, as information delays. These deserve to be taken seriously. Sims did agree that the results in the paper showing the

large impacts of the oil and food price shocks in recent periods are difficult to reconcile with the view that attributes inflation mainly to monetary policy. Furthermore, he found it hard to reconcile the fact that the connection between relative price variability and inflation has a very different detailed structure in different historical periods with the view that the connection reflects monetary shocks working through frictions, delays, and misperceptions.