

RECENT DEVELOPMENTS IN MACROECONOMICS
AND SOME IMPLICATIONS FOR POLICY

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Abstract

Dramatic changes have taken place in macroeconomics over the last decade or so; most of the consensus 1960s framework, referred to as Keynesian economics, has been rendered obsolete. In its place a new research program, one based on classical economic reasoning and referred to here as equilibrium macroeconomics, has emerged, with some rather different implications for policy. In spite of their obvious importance, these developments are not widely understood, and this essay attempts to put them into perspective. The state of macroeconomics in the 1960s is described and its downfall examined. The "Lucas critique" of economic policy evaluation is explained and its implications are evaluated. In light of recent theoretical advances, a detailed re-examination of inflation and unemployment is provided, and the debate over stable policy rules versus policy activism is updated. Since many of the implications of dynamic equilibrium economics contrast sharply with the conventional wisdom of the recent past, the conclusion is that economic policy will have to be analyzed differently in the future than it has been analyzed for many years.

I. Introduction

Dramatic changes have taken place in macroeconomics over the last decade or so; indeed, one might say a scientific revolution has occurred. As with most such revolutions, this one was precipitated by a crisis in the normal progress of the consensus paradigm, a paradigm we shall refer to as Keynesian economics.¹ That crisis, the stubborn resistance of inflation combined with economic stagnation ("stagflation") to prediction, explanation and cure using the conventional 1960s macroeconomic framework, rendered most of that framework obsolete. In its place a new research program, one based on classical economic reasoning and referred to here as equilibrium macroeconomics, has emerged, with some rather different implications for policy.

This essay is an attempt to put these developments into perspective. Section II describes the state of macroeconomics in the 1960s, and its downfall. Section III reviews some fundamental technical flaws in policy evaluation as practiced in that era, and analyzes the implications. A detailed re-examination of the phenomena of inflation and unemployment, in light of recent theoretical advances, is contained in Section IV. Section V updates the venerable debate between stable policy rules and policy activism. It is perhaps more evident than ever that economists are still some distance from completely understanding actual economic processes, and hence it would be foolhardy to assert that we can now unequivocally guide policy makers in their daily affairs. Nevertheless, theory can recommend certain classes of policies over others, as will be described below.

Before proceeding, one might ask: Had not Keynesian econ-

omics guided us to prosperity for long enough to suggest that its rejection on account of 'one bad decade' was premature? After all, the 1970s were special; overall postwar economic performance has been admirable.² Of course, it is impossible to know how much of this favorable performance was due to good policy and how much to good luck. Demographic changes, technological and institutional developments, and other factors independent of Keynesian policy contributed much; so did the obviously lucky effects of cheap energy and stable food prices in the 1950s and 60s.³ It is doubtful that a conclusive case could be made attributing either growth or stability to deliberate Keynesian policy. It is perhaps equally probable that well-intentioned interventions have enhanced stability at the expense of growth, or even that attempts to "fine tune" the economy have been destabilizing. Resolution of these issues (say, by empirical methods) seems unlikely today, and is not attempted here.

II. The Decline of the Keynesian Consensus

During the 1960s Keynesian economics reached the pinnacle of its success. But just as the Great Depression provided an anomaly many thought too severe for the existing classical theory to resolve, thereby providing the stimulus for the Keynesian revolution, events of the 1970s have convinced most that macroeconomics as it was understood in the 1960s is obsolete. Quite correctly, of course, early failures of the Keynesian paradigm did not lead to its practitioners abandoning ship. For example, Arthur Okun [1972] wrote:

I cannot explain why my forecast was particularly unsuccessful at that time any better than I can explain why it was unusually accurate at the start of 1967 and 1971. ... 'You can't win them all' is not a satisfactory explanation of anything, but it is a more accurate and less harmful lesson of the 1968 experience than others that have been advanced.⁴ (p. 28)

In the absence of the definitive economic model it is impossible to say that future successful theories will bear no resemblance to Keynesian economics. Furthermore, many of the recent advances have been due to economists working within the Keynesian tradition. However, unless the lessons of the past decade are lost, both the philosophy and the technical methods of macroeconomics will necessarily be fundamentally different from the 1960s.

To put things in perspective, it is important to understand the degree of acceptance of Keynesian orthodoxy prior to the 1970s. As Robert Solow characterized it:

... I think that most economists feel that short-run macroeconomic theory is pretty well in hand ... The basic outlines of the dominant theory have not changed in years. All that is left is the trivial job of filling in the empty boxes [the parameters to be estimated], and that will not take more than 50 years of concerted effort at a maximum.⁵

The model predicted structural relationships between the policy variables that controlled aggregate demand and the level of economic activity, as measured by output or employment, say. The principles behind the textbook "multipliers" were elementary and could readily be explained to the average citizen or politician: Expand demand (by increasing the deficit and/or printing money) and GNP will grow. Looking back on these "halcyon days," Lucas and Sargent [1979] reflect: "It seemed an economics as free of ideological difficulties as, say, applied chemistry or physics, promising a straightforward expansion in economic possibilities.

One might argue as to how this windfall should be distributed, but it seemed a simple lapse of logic to oppose the windfall itself." (p. 295).

To be sure, there were controversies before the 1970s; monetarists had never been completely swayed by the the Keynesian revolution. But the situation was different in kind from the breakdown in professional consensus the 1970s brought. Gordon's [1980] survey of postwar macroeconomics establishes 1973 as the benchmark prior to which the central controversies were: (1) the relative potency of fiscal versus monetary variables in the determination of aggregate demand, and (2) the case for policy stability versus activist fine tuning. The latter is more an issue than ever, as Section V explains; the first was, in retrospect, a technicality. As the well known analysis of Blinder and Solow [1973] indicates,

There is no controversy over government spending financed by printing money. Both sides agree it will be expansionary; but one group [Keynesians] likes to call it fiscal policy, while the other [monetarists] prefers to call it monetary policy. (p. 323, emphasis added)

Furthermore, "expansionary" means here that real output and employment will increase. In fact, Blinder and Solow, as did many Keynesian analysts, fix the price level exogenously ("purely for simplicity"). They claim that "there are no real difficulties in adding a production function and a labor market [a supply side] and allowing prices to be determined endogenously" (p. 324), but this is debatable. If ones adds a classical (market clearing) supply side -- clearly appropriate at least for long run analysis -- then every time their model suggests an increase

in GNP (presumably a desirable outcome), one should read higher prices (presumably not).⁴

In fact, it became all too clear during the 1970s that the excessive (virtually exclusive) concentration on the demand side of the economy was a serious shortcoming of mainstream macroeconomics, for at least two reasons. First, the considerable instability of the decade originated with (primarily energy and food) supply shocks. Keynesian models, which explain the business cycle as a volatile demand curve moving along a stable aggregate supply curve (or, a stable Phillips curve) could neither interpret these events nor prescribe an effective remedy. As leading Keynesian James Tobin [1980] puts it: "In the 1970s it became impossible to take for granted that fluctuations in output were demand driven;" furthermore, "It was not simply that our models, theoretical and econometric, now had to be applied to novel situations. Worse than that, the shocks of the 1970s required some fundamental rethinking and rebuilding," (pp. 26-28). The conventional wisdom of the 1960s that the business cycle could be stabilized simply by "leaning against the wind" with aggregate demand today seems naively optimistic, and somewhat outdated.

The second way in which Keynesian concentration on demand was misguided did not concern stabilization, but what we call growth; that is, permanently expanding the level of economic activity. Although economists have long known that the growth of equilibrium output is governed by the accretion of capital, labor, other resources, and technology (i.e., factors on the supply side), Keynesian economics had from its beginnings, in

Gordon's [1980] words, "an obsession with the possibility of underutilized resources and the doubt that the economy could remain along an equilibrium path," (p. 114). Since it was a major cause of the neglect for supply in Keynesian economics, it is worthwhile to consider this "obsession" with the economy being out of equilibrium in detail.

When Keynes began developing the ideas that went into The General Theory, his first task was relax the discipline imposed by the canons of classical economics,⁷ since with impeccable logic the implications which followed from classical postulates seemed irreconcilable with the Great Depression. A major stumbling block was "Say's Law:" "From the time of Say and Ricardo the classical economists have taught that supply creates its own demand," (Keynes [1936], p. 18). That is, everything produced will necessarily be demanded -- if not for consumption then, upon the coordination of savers and borrowers in the credit markets, for productive investment. Keynes, however, was able to describe a system failing to function quite this smoothly.⁸ As he saw it, if foresight is less than perfect and if nominal wages are slow to adjust, then the economy could, in the short run, end up in a state of involuntary unemployment (excess supply in the labor market). At the root of the problem would be insufficient aggregate demand (relative to the state of expectations), precipitated by an increase in thriftiness or a decline in investment, for example. It is precisely because demand is too low that prices are too low, and hence for the given nominal wage the real wage is too high, that involuntary unemployment exists and output falls below its equilibrium level. Say's law is invalidated.

Keynes also saw the obvious solution to the problem: expand aggregate demand. Prices will increase, real wages will fall, and employment and output will rise. Indeed, demand will create its own supply! Once these mechanics of the system are understood, "purely for simplicity" one may wish to abstract from the details of the labor market (and the troublesome question of why nominal wages should be downwardly rigid), or perhaps even hold the price level constant, and adopt the positive relation between demand and output as structural. This would be a mistake. For this impact on employment from a pure expansion of demand (combined with no policy which effects the supply side, such as a proportional income tax/subsidy) results only if the economy is out of equilibrium to begin with.

Even if one accepts without question the postulate of sticky nominal wages, in analyzing demand changes in economies that spend much of the time at (or near) equilibrium, or in terms of their long run effects, or for changes beyond the once-and-for-all shift required to restore market clearing, increasing demand simply does not augment output or employment. Some commentators (Evans [1980]) have recently dubbed the fallacy that demand creates its own supply "Keynes' Law," to emphasize that it is today as much an anachronism as Keynes convinced the profession Say's Law was half a century ago. To be fair, Keynes himself was well aware that expanding demand leads to no increase in output in economies that are near equilibrium.⁹ Still, the "salient proposition" underlying the Keynesian consensus was that the economy (or at least its "dominant sectors") are in "disequili-

brum most of the time."¹⁰

This position can be traced to the fact that the equilibrium concept traditionally carried two connotations: a system in equilibrium was associated with a system "at rest", and an equilibrium state was associated with an "optimal" state. To Keynes and his followers, these seemed incompatible with the marked cycles in actual economic activity, and unemployment in particular. Contemporary notions of stochastic equilibrium, however, are consistent with both fluctuations and positive rates of unemployment, and, by explicitly analyzing incomplete information, equilibrium theories also are able to capture observed transitory positive correlations in real and nominal variables.¹¹ This is important because these co-movements in output and the price level, which simple (static, complete information) classical models did not predict, also seemed for a long time incompatible with economic equilibrium.

These correlations are embodied in the Phillips curve, a cornerstone of Keynesian economics. Originally an unexplained negative correlation between inflation and unemployment (Phillips [1958]), the Phillips curve soon came to be understood as describing disequilibrium adjustment (Lipsey [1960]), and eventually as potentially providing a stable menu of policy options (Samuelson and Solow [1960], although they were more careful than many who later advocated policy based on this relationship). The idea was simple, if not all that palatable -- lower unemployment 'came with' higher inflation, and vice-versa. Take your pick! Actually, it was really not much of a novelty, for given last period's price level, higher inflation is equivalent to higher

current prices, and the relationship is essentially the same one expounded by Keynes. It therefore continues to be invalid, as explained above, in cases where the economy is near equilibrium and as more than a transitory relationship. Econometric models, however, simply by statistical extrapolation, predicted that permanent decreases in unemployment and increases in output could be achieved if and only if we were willing to bear the cost of higher inflation.¹² Since the benefits of the former seemed so obvious compared to the costs of the latter, it is not surprising that expansionary policies were advocated.

As early as 1967, however, Edmund Phelps and Milton Friedman had independently warned, purely on the basis of the observation that equilibrium behavior is invariant to the change in the units of measurement represented by sustained price increases, that no permanent change in economic activity would result from a permanent inflation.¹³ At best, they argued, there might be a transitory change in employment resulting from individuals misinterpreting an unexpected inflation as a change in relative prices. The following passage in Friedman [1968] contains two important and highly influential ideas, one right and one wrong (or, at least, misleading):

...there is always a temporary trade off between inflation and unemployment; there is no permanent trade off. The temporary trade off comes not from inflation per se, but from unanticipated inflation, which generally means from a rising rate of inflation. (p. 11)

The correct idea is that the temporary trade off comes from unexpected inflation. The incorrect idea is that unexpected inflation is equivalent to rising inflation. To argue that

unexpected price increases are the same as price increases over and above last period's increase is to say that, while agents could not be perpetually fooled by the velocity of the price level, they could be perpetually duped by its acceleration.¹⁴ This is tantamount to assuming rational economic man understands first derivatives but not second derivatives!

The application of less bizarre notions of rationality, whereby agents are assumed to formulate their predictions based on all of the relevant available information (including government policies), broke the fallacious connection between rising and unexpected inflation. Sargent and Wallace [1975,1976], in attempting to popularize the implications of the "rational expectations" hypothesis,¹⁵ demonstrated in a conventional model how the systematic rate of inflation is of no consequence for the behavior of the real variables when agents are aware of and understand the government's policy. Of course, it may be argued that people do not literally understand policy or its consequences. However, it is also true that if economists are to have any chance of forecasting the behavior of individuals under alternative policies, it is necessary to stick to policies that agents do understand (as Section III explains in detail). Thus, predictable policy, which is to be recommended for other reasons, eliminates potential employment gains from "confusing" people.

Furthermore, it was soon pointed out that even if policy actions could be taken so as to deliberately fool agents into misinterpreting inflation as relative price (wage) changes, it is difficult to imagine how this could be justified. As Santomero and Seater [1978] suggest:

This line of argument ignores ... the very reason for the policy potency. ... policy is effective only in as much as it causes people to make suboptimal decisions because of imperfect information. If the people who are supposedly to benefit from active policy prefer to avoid the consequences of the policy, it indeed seems that such policy must be suboptimal, at least in a democratic society where policy choices presumably are based on the preferences of the citizenry. (p. 530)

In Wright [1983a] there are examples of economies where the use of a "noisy" price policy leads to reductions in frictional unemployment, because when prices are generally up, the unemployed sometimes misinterpret high nominal wages to be high (above their reservation) real wages. However, there is a precise sense in which a more predictable price policy makes them better off -- the expected discounted value of their life time earnings (or utility) is greater -- even though aggregate unemployment may be higher. These provide formal examples of the view expressed by Santomero and Seater. Additionally, in these economies it is only unexpected price changes which have real effects, as Friedman suggested, but mistaken expectations are independent of whether prices are high, rising, or accelerating.

To summarize the points made here: A major building block of Keynesian macroeconomics, the nearly exclusive role of aggregate demand in the determination and control of output and employment, was fundamentally flawed in two respects. First, it became all too obvious during the 1970s that the aggregate fluctuations collectively known as the business cycle could not be tamed through demand management. Additional reasons, both practical and theoretical, why activist countercyclical policy more generally may be ill-advised are discussed in later sections. Second, the

prediction that permanent increases in economic activity would generally result from expanding demand are, simply, wrong. At best, temporary effects will result, but even in such cases there is reason to suspect that these may be undesirable.

Below we describe some policy implications of the equilibrium approach, explicitly not based on the manipulation of aggregate demand, and argue that they can contribute to both stability and to economic growth. If, in the meantime, it looks as though the lessons of the 1970s have been mainly negative, there is a sense in which this must be so. We have learned that the promises of the Keynesian consensus, unfortunately, were overly optimistic: the elimination of business cycles is not to be found in demand management, nor is growth found in deficit spending or easy monetary policy (there may or may not be other reasons for such policies). On the other hand, analyzing where we have gone wrong in the past should not be construed as totally pessimistic; it provides a strong dose of preventive medicine. When the economy is ailing, telling policy makers what not to do is a little like telling a man with a hangover he should not drink so much -- both would prefer a miracle cure. Yet in the long run the good advice proves more valuable; for if the lessons of the 1970s are not emphasized and do not become generally understood, it is possible that past mistakes will be repeated.

III. The Lucas Critique of Economic Policy Evaluation

Motivated by conflicts between economic theory and the predictions of econometric models incorporating Phillips curves, Robert Lucas wrote what has been called the most important econ-

omics paper of the 1970s: "Econometric Policy Evaluation: A Critique." The message, perhaps still not widely understood, will be reviewed here. To begin, note that it is not the short-term unconditional forecasting abilities of macroeconomic models which are being disputed; nor is it the relationship between the true and hypothesized structures of the economy in which policy experiments are to be analyzed. Rather, the critique is based on a divergence between the true structure of the economy before and after a policy change.¹⁶ The implication is that the class of macroeconomic models employed in the 1960s cannot be used to correctly predict the consequences of policy changes regardless of how well they fit past data and regardless of their performance in unconditional forecasting.

In the Lucas notation, at each point in time we describe the economy by a vector of state variables y_t (including, e.g., the capital stock), a vector of exogenous variables x_t (including policy variables like tax rates), and a vector of random shocks e_t . When Lucas wrote, the structure of macro models consisted of aggregate "decision rules" such as the consumption function and the labor demand schedule, along with certain technical relations such as production functions and laws of motion.¹⁷ The interaction of these relationships together with a description of the path of x_t and the distribution of e_t determines the stochastic behavior of the economy over time, which may be described fairly generally by the difference equation

$$y_{t+1} = f(y_t, x_t, e_t).$$

The function f is assumed to be constant over time but not di-

rectly known, and the job of the econometrician is to estimate f . In practice this is usually done by imposing additional restrictions (e.g., linearity) and estimating a vector of parameters θ (e.g., slope coefficients). Formally,

$$f(y_t, x_t, e_t) = F(y_t, x_t, e_t; \theta)$$

where the specification of F is based on a priori considerations.

According to the theory of economic policy underlying the macroeconomic tradition, given a reliable estimate of (F, θ) it is possible to make quantitative predictions about the future of the economy conditional on any path of x_t , subject only to the uncertainty induced by the shocks e_t . The forecast outcomes may then be compared according to some criteria. This is the basis on which macroeconomists presumed to be able to recommend one sequence of policy variables over another.¹⁰ However, as Lucas [1976a] pointed out, there is one absolutely critical assumption required for this procedure to be valid:

For such comparisons to have any meaning, it is essential that the structure (F, θ) not vary systematically with the choice of $\{x_t\}$.

Everything we know about dynamic economic theory indicates that this presumption is unjustified. (pp. 110-11, emphasis in original)

Why? It is important to be precise here. Economic theory takes behavior to be goal directed: operationally, it is assumed that agents seek to do the best they can subject to (their understandings of) the constraints they face. This is what the decision rules in the model are meant to capture. Yet it is an implication that changes in the x_t sequence -- which include changes in the future course of taxes, government purchases, minimum wage laws, etc. -- change the constraints over the indi-

vidual's life time and hence change his decision rules.

Even to obtain the decision rules underlying (F, θ) ... we have to attribute to individuals some view of the behavior of future values of variables of concern to them. This view, in conjunction with other factors, determines their optimal decision rules. To assume the stability of (F, θ) under alternative policy rules is thus to assume that agents' views about the behavior of shocks to the system are invariant under changes in the true behavior of these shocks. Without this extreme assumption, the kinds of policy simulations called for by the theory of economic policy are meaningless. (p. 111)

Consider an example. Towards the end of the 1960s inflation began to be perceived as a problem, and in a direct application of the procedures outlined above, a 10% temporary tax surcharge was imposed in the second half of 1968. Keynesian models implied that consumer demand would fall by the decline in disposable income times the structural parameter "the marginal propensity to consume." Econometric simulations predicted lower prices, but, as Robert Eisner [1971] summarizes the result:

The substantial positive magnitude usually attributed to the marginal propensity to consume out of current income is dependent on the long-run relation between current income and wealth. A change in individual income tax rates designated as countercyclical -- all the more so, one slated to expire in a year -- should have little effect on expected income and hence little effect on current consumption. Indeed, what should have been clear from economic theory ... was quickly confirmed after the fact by the sharp drop in personal saving in the latter half of 1968 and only a gradual and small reduction in the rate of growth of consumption. (p. 632)

Technically, it is possible to describe what happened as follows; write the consumption function as

$$C_t = \theta_1 D_t + \theta_2 X_t + e_{ct}$$

where C_t is current consumption, D_t is (the reduced form for) current disposable income -- a function of taxes, X_t is a vector

of other exogenous variables, e_{ct} is a random shock, and θ_1 , θ_2 are parameters conformable with D_t , X_t . As discussed above, the parameters, and in particular, the mpc θ_1 , were assumed to remain constant in the face of tax changes. Subject to random error, a unit change in D_t was supposed to result in a change in C_t of θ_1 . But with the tax surcharge -- a change in $\{x_t\}$ -- the parameter θ_1 itself changed, and thus the outcome was considerably different from that predicted. Furthermore, this was not due to bad luck, such as a large random influence, e_{ct} (recall Okun's comments reported at the beginning of Section II).

Another, more recent, example (adapted from Sargent [1980b]) concerns "supply side" tax policy. For the sake of argument, suppose that President Reagan is correct, and that over the relevant range more labor will be supplied with a tax schedule T_1 than with a schedule T_2 representing higher taxes. If the economy is currently under a T_2 regime, what will be the impact of switching tomorrow to a T_1 regime? The only answer economic theory can give to the question thus posed is, "who knows?". Decisions made by rational agents are not based solely on the contemporaneous values of variables impinging on their behavior -- they are based on the (perceived) entire time path $\{x_t\}$. Labor supply decisions are a function of the tax rates expected to prevail over the entire life cycle. If a tax cut is expected to be followed by a tax increase in the future, then in response to temporarily high take-home wages a large positive supply response might reasonably be expected. On the other hand, if the tax decrease is expected to be followed by a larger cut in the

near future, then after tax wages are temporarily low, and the opposite response should be expected.

Where does this leave us? First, there is a need to go beyond decision rules and attempt to estimate "deeper" parameters of economic models, those which we may expect to be invariant with respect to interesting policy changes.¹⁹ Decision rule parameters vary systematically with (many interesting) policy experiments; the best we can hope for is that parameters underlying the preference and technology (i.e., the microeconomic) structure of the economy will not.²⁰ Second, if we are to do meaningful policy evaluation it becomes necessary to rethink what we mean by policy. The problem "derive the decision rule of an agent facing an, as yet, unspecified policy sequence $\{x_t\}$ " is simply not well posed. To model, and therefore to predict, the decisions of economic agents we must attribute to them some view of the future. Assigning ad hoc expectations about the course of policy is a shot in the dark, and is precisely what led to mistakes in the past.

An alternative is to confine our analysis to $\{x_t\}$ sequences which the agents of the model are assumed to know. If actual policy is made in terms of well defined and generally understood commitments to future values of x_t , in terms of policy rules, if you will (see also Section V), then we can reasonably hope to use economic models to predict the outcomes of alternative rules. As Lucas summarizes the result:²¹

In short, it appears that policy makers, if they wish to forecast the response of citizens, must take the latter into their confidence. This conclusion, if ill-suited to current econometric practice, seems to

accord well with democratic decision making. (p. 126)

IV. Inflation and Unemployment

Any reasonable analysis of economic policy must build upon a solid understanding of the phenomena policy is trying to address. Here, some recent developments in the way economists think about inflation and unemployment are reviewed.

There is really not much professional disagreement today over the cause of inflation: Friedman's dictum, "inflation is always and everywhere a monetary phenomenon," is quite accurate as long as we are careful to include both money supply and money demand factors. The price level is the inverse of the value of money; as with other commodities, money's value decreases with its supply and increases with its demand. Inflation is the rate of change in money's value. Hence, inflation increases with the rate of growth in the money supply and with the rate of decline in money demand. Although it is not necessarily easy to produce consistent theoretical models of money supply and demand,²² once one accepts the fact that it is supplied and demanded this simple logic of the inflation process is inescapable.²³

Somewhat paradoxically, in spite of agreement as to the cause, there is continuing controversy over the proper cure for inflation. Old guard Keynesians contend that there are fundamental asymmetries in monetary forces (e.g. Tobin [1977], Lipsey [1981]). While easy money only fuels inflation's momentum, tight money is alleged to cause (mostly) reductions in employment.²⁴ "The spectre of collisions between [lower monetary growth] targets and the economy's inflationary momentum hangs over the

recovery. When and if they collide, everyone knows in his bones it is output and not prices which will give way." (Tobin [1977], p.466) A classical economist would disagree, on the basis of the rational expectations hypothesis: if lower monetary growth now and into the foreseeable future is adopted, announced, and understood, the transition to lower inflation could take place without disturbing real (employment) allocations, and thus with no disastrous real consequences.²⁵

It is important that the policy be announced and made credible, and that it be adhered to into the future. These are perhaps difficult conditions to satisfy in practice. However, at least one aspect of the rational expectations argument is beyond dispute: predictions of the decline in GNP that would accompany a reduction in inflation based on extrapolating past employment-inflation correlations are of no value. This is a straightforward application of the principles in Section III. A credible policy of permanently reducing monetary expansion would have an entirely different impact than either the random price movements or piecemeal policy approaches of the recent past.²⁶ It is perhaps worth emphasizing that it is not being claimed that an announcement alone will bring inflation to a halt, as some textbooks caricature the argument (e.g., Dornbusch and Fischer [1981], p. 568). Rather the opposite is the case: disinflation without recession can obtain if and only if there is monetary reform. In any event, in response to one influential observer's suggestion that each one point reduction in the basic inflation rate entails a ten percent loss in annual GNP, inferred by "inspect[ing] six

macroeconomic Phillips curves of recent vintage" (circa 1978), we echo Bennet McCallum's [1980] sentiments: "It is hard to believe that, today, anyone takes seriously the trade-off magnitudes described above."

The policy recommendation of many who remain committed to the "trade-off school" is incomes policy, or wage-price controls. That is, we should make inflation illegal. But there has to be more to it than this; why not at the same time pass legislation making unemployment (or sub-zero temperatures in Minnesota) illegal? Simply impose controls on quits and layoffs -- or better yet, on the numbers the BLS (and the weather bureau) are allowed to report. The point is, of course, that such policy is considerably misguided, aiming at symptoms and ignoring causes. Presumably, controls are supposed to reduce people's expectations of inflation, on the suspicion that expectations can be self-fulfilling. But Robert Barro [1981] is exactly right when he says that, "Expectations cannot be stabilized without stabilizing the variables -- in this case monetary growth and inflation -- to which the expectations pertain. The recurring failure of controls reflects their focus on symptoms rather than the underlying sources of inflation." The implication of economic theory is that controls are: (1) unworkable without monetary reform, and (2) redundant with monetary reform.

Let us turn to the "costs" of inflation.²⁷ Some are obvious and may be dispensed with quickly. First, if tax schedules (social security benefits, minimum wage laws, etc.) are written in nominal terms, price movements can cause unintended changes in legislation (see Feldstein [1981]). However this is a problem

with the tax code, which can be indexed, and obviously not with inflation per se. A related matter is the so-called "menu cost" of re-ticketing merchandise, adjusting vending machines and the like (see Fischer and Modiglianni [1978]). Intuitively, these seem trivial in the macroeconomy, but more importantly, the institutions effecting such costs are not invariant to changes in the inflationary environment. If 100% inflation prevailed one should expect to see an increased use of computer updated video catalogues, vending tokens (or vending credit cards), etc.

Similar remarks apply to the notorious transfers from debtors to creditors that result from (unexpected) inflation when intertemporal bargains are struck in nominal terms (see the discussion in Gramlich [1979]). Additionally, even when such exchanges are not indexed it is only unanticipated inflation which is relevant. More generally, any unpredictable variability in the absolute price level is to be avoided, ceteris paribus, because it complicates extracting the relevant information (relative prices) from nominal signals. But this says nothing to recommend 0 over 10 over 100 percent average inflation. Whether or not high average rates historically tend to be (statistically) associated with a high variance in inflation is not the issue; no economic principle implies that this must be so. So while everyone agrees that a high predictable inflation is preferable to a high unpredictable inflation, this does not mean a low predictable inflation is preferable to a high predictable one.

It is also interesting to examine some popular impressions about why inflation is unacceptable. From Canadian politician

Paul Hellyer [1981]:

On my way home one evening recently I noticed a boy about seven years old buying an ice-cream cone. It was just a single scoop -- not a double or triple like the ones I used to get for a nickel when I was a youngster -- and the price was fifty cents. ... I began to speculate as to how much that child might have to pay for a cone in later life ... should inflation continue at an annual rate of just over 10 percent. A quick calculation showed that ... as an old age pensioner the poor chap would have to pay \$256.00 for his single scoop. (p. 1)

He continues, "The figures boggle the mind." Evidently his mind is easily boggled; other than providing admittedly amusing exercises in arithmetic, such rhetoric is valueless. For big numbers are plainly not the cost of inflation. If the seven-year-old was receiving a dollar per week allowance as compared to the typical dime when Mr. Hellyer was a boy, he would be just as well off in terms of ice cream.

It may well be that the general public does not fully understand the implications of inflation. A recent study by Douglas Hibbs [1981] suggests this is indeed the case.

...the connection between rising wages and rising prices may not be well understood ... For example, between 1975:4 and 1976:4 nominal personal disposable income per person rose by about 7.5 percent, but prices increased by about 4.9 percent leaving a more modest 2.6 percent real gain. Perhaps some people maintained the mistaken idea that their standard of living could have risen by 7.5 percent, or nearly so, if it were not for the "evil" of inflation. (p. 9)

Confusion also exists between a rising absolute price level and independent hardships caused by situations such as the 1974 energy crisis, although "Had the real loss absorbed by the oil consuming nations taken place about a stable price level, the pain would not have been any less unpleasant, but inflation could not have been held responsible." (p. 10). It seems at least some

of the widespread aversion to inflation is misdirected.

Nevertheless, perfectly anticipated inflation is not without real consequences. The fact of the matter is, inflation is a tax. In any economy using fiat money the government is able (up to a point) to gain command over real resources directly by issuing new currency.²⁸ The twin impacts of this practice are higher prices and a transfer of resources from the private sector to the monetary authority. This is the sense in which inflation is a tax, and as such it certainly rationalizes public distaste for inflation. The point is that as a public finance device, monetary expansion should be analyzed like any other form of taxation. Relevant questions are of the form, how large should public spending be and how (monetary expansion, other taxation, borrowing) should it be paid for? It is easy to demonstrate that if the government had recourse to a "lump sum" revenue source, it would be preferable to all distorting taxation, including monetary expansion.²⁹ But for a variety of reasons, policy makers may not have access to lump sum, or certain other, taxes.³⁰

In such situations optimal policy typically involves spreading the distortions around, and to rule out any one tax, including inflation, is often welfare reducing. It is simply a fact of life that available taxes entail misallocations; sometimes these are just what the doctor ordered (the cigarette tax), usually they are not. The first order impact of a predictable increase in inflation is to increase the cost -- i.e., to lower the return -- to holding currency. In response, agents typically try to economize on their cash balances, resulting in a rise in "shoe

leather costs" as they make more "trips to the bank." Now these costs are likely to be small, but to therefore dismiss the impact of inflation as inconsequential is to ignore some general equilibrium effects. For although money may play many roles, one thing it must be in any monetary equilibrium is a store of value. When the return on one asset declines, investors generally alter their entire portfolio, and this will effect the complete spectrum of equilibrium interest rates and investments, and potentially consumption, labor supply, etc. decisions, too.³¹

This point needs to be stressed because it is sometimes suggested that inflation is a tax which can be avoided. All taxes can be avoided to a certain extent (to avoid paying income taxes, stop working) -- but the very act of avoidance is what causes misallocations. To quote Neil Wallace [1980]:

Of course, in general, fiat money issue is not a tax on all saving. It is a tax on saving in the form of money. But it is important to emphasize that the equilibrium rate of return distribution on the equilibrium portfolio does depend on the magnitude of the fiat money-financed deficit. ... the real rate of return distribution faced by individuals in equilibrium is less favorable the greater the fiat money-financed deficit. Many economists seem to ignore this aspect of inflation because of their unfounded attachment to Irving Fisher's theory of nominal interest rates. (According to this theory, (most?) real rates of return do not depend on the magnitude of anticipated inflation.) The attachment to Fisher's theory ... accounts for why [some] economists seem to have a hard time describing the distortions caused by anticipated inflation. The models under consideration here imply that the higher the fiat-money financed deficit, the less favorable the terms of trade -- in general, a distribution -- at which present income can be converted into future income. (p. 64)

This is the relevant cost of inflation in macroeconomics. It distorts (primarily) the return to, and hence the amount and composition of, saving and investment. At the same time, as a

revenue source, monetary expansion reduces the need for other distorting taxes, including the income tax. It is in this light that inflation should be cast. Questions about the resource cost of adjusting to inflation and the impacts of agents trying to escape its consequences must be considered in conjunction with the cost of operating the IRS and that incurred in other tax avoidance. The regressivity of inflation (clearly an important issue) must be analyzed keeping in mind the means various groups have of avoidance, and the trade off between efficiency and equity that confronts tax design generally. At this date these issues, and what the rate of inflation should be, are unresolved. If one thing is clear, it is that the time has past when serious economists can simply define rising prices to be a social problem and assert that any reduction in inflation is welfare improving.

Let us turn now to unemployment. The cost of unemployment traditionally appeared rather obvious to economists; however recent developments have made us think differently about the issue. As pointed out earlier, the very existence of unemployment seemed to Keynesian economists at odds with the concept of equilibrium, since static equilibrium models could explain only voluntary unemployment (as well as that resulting from minimum wage laws, unions, and other artificial barriers to full employment). The Keynesian solution was to drop the assumption of equilibrium. Yet the problem was never in thinking about unemployment as an equilibrium phenomenon, but as a static phenomenon. In a dynamic, changing world there will always be some people out of work (i.e., between jobs) in the healthiest of

economies. The essence of unemployment is that it is dynamic, and that finding a new job is uncertain and takes time. Modern equilibrium theories which attempt to model the economics of information, so-called "search theories," do capture these features of reality, in a way static disequilibrium (Keynesian) theories could never have.³²

Furthermore, these models predict that some frictional unemployment is desirable, because the time spent in job search is a productive investment, just as is time spent hunting for an apartment.³³ Clearly the fact that some people currently are looking for suitable accommodations, even while many units go unoccupied, does not constitute evidence that nominal rents are too high and downwardly inflexible. Neither does it imply that pumping up aggregate demand will reduce the time spent looking, although it might if unexpected price changes lead to agents misinterpreting the quoted rent and hence misallocating their search resources. On the other hand, it should be obvious that there is nothing immutable about the equilibrium level of either frictional unemployment (even though Friedman dubbed it the "natural rate"), or frictional apartment hunting.³⁴ Tax and other policies which affect decisions about what is an acceptable job or apartment, and informational policies which affect the time spent searching, are critical determinants of equilibrium.

It is also true that the optimality of the "natural rate" cannot be taken for granted (see Prescott [1975]). For example, an increase in unemployment compensation generally leads to more time spent searching, which will on average raise duration and hence reported unemployment. Although agents expect to be out of

work longer, they are clearly better off. Also, while less time is spent actually working, there can result a long-run social gain in the form of a superior matching of employees and firms. As Lucas [1978] notes, the relevant concept is scarcity:

Notice that as one traces out trade offs of this sort, the issue of slack or waste does not arise. Different policies result in different [intertemporal allocations] of real output, but output increases [at any date] are necessarily obtained at the expense of something else. Whether any particular level of unemployment compensation is too high or too low is a difficult issue in practice, but it is one that cannot be resolved simply by observing that other, unemployment reducing, compensation levels are feasible. (p. 246)

More research is needed here, but any conclusions are certain to be fundamentally different from 1960s macroeconomics. Keynesian economists defined unemployment (like inflation) to be a market failure and deemed any reduction in its rate welfare improving. Today, with advances in dynamic, stochastic theory, this simplistic approach is both unnecessary and unacceptable.³⁸

V. Rules and Discretion in Economic Policy

To provide an environment conducive to economic growth and to moderate fluctuations, the most important aspect of the economy is stability, in the sense of predictability. In order for economic agents to make rational allocation decisions, they must have a reliable view of current and future variables which impinge on their choices. Whether these variables have a high variance or are nearly constant is not the issue here, it is merely that individuals need dependable knowledge of their time paths. On this there can be little disagreement; on how to best achieve this goal is a debate with a long history. Keynesians, suspic-

ious of the inherent stability of capitalist economies, advocated endowing policy authorities with the discretionary powers to lean against the wind of economic conditions.

On the other hand is a tradition which argues that stability is best enhanced by minimizing these discretionary powers. Coincidentally the same year The General Theory appeared, Henry Simons [1936] wrote:

The liberal creed demands the organization of our economic life largely through individual participation in a game with definite rules. ... An enterprise system cannot function effectively in the face of extreme uncertainty as to the action of the monetary authorities or, for that matter, as to the monetary legislation. We must avoid a situation where every business venture becomes largely a speculation against the future of monetary policy. (p. 337-8)

Building on Simons' philosophy, Friedman [1948, 1960] proposed a policy framework in which spending, transfers, taxation and monetary expansion were set on the basis of their long-term costs and benefits, and as such, these variables were to be changed infrequently and only in response to genuine changes in public attitudes or opportunities. They intentionally would not be altered in direct response to cyclical conditions.

This framework was offered explicitly as a "second best" alternative: "It is not perhaps a proposal that one would consider at all optimal if our knowledge of the fundamental causes of cyclical fluctuations were considerably greater than I, for one, think it to be; it is a proposal that involves minimum reliance on uncertain and untested knowledge." (Friedman [1948], p.393). Further, as he acknowledged, it would not completely eliminate fluctuations. What it would do is to keep policy

from itself contributing disturbances. Friedman argued that due to our imprecise knowledge of the true economic structure, in addition to the "long and variable lags" in the way policy changes impact on the system, attempts at countercyclical fine tuning were as likely as not to be destabilizing.³⁶

At the time, arguments along these lines did not carry much weight. They were "viewed as 'destructive,' a willful attempt to make life difficult for one's colleagues who are only trying to improve the lot of mankind."³⁷ This is not surprising given the mandate legislated in the U.S. by the Employment Act of 1946, the then progressive nature of the Keynesian research program, and the positive reinforcement generated by favorable postwar economic performance. As Lucas [1980a] notes:

[Friedman's proposals] speak to the question: Under what rules of the game, remaining predictably in force over long periods, can we expect satisfactory economic performance? The economic manager responsible for advising on, say, the size of the coming year fiscal deficit is simply uninterested in this question: it seems to him merely an academic exercise, unrelated to the tasks he has taken it upon himself to perform. (pp. 251-2)

With the collapse of the 1960s consensus this question resurfaced, and significant advances in theory now suggest that as a first best solution to the policy design problem the use of discretionary activism will not generally provide the answer. Let us take the argument slowly. As Section III demonstrated, in order to rationally evaluate policy options, we must mean by a policy a specification of the policy variables at each date in each state of the economy; that is, a (possibly contingent) policy rule. It is critical that this rule be announced and adhered to into the foreseeable future if agents are to be able

to make sensible, and thus predictable, allocation decisions.

Kydland and Prescott [1977] and Prescott [1977] define a "consistent policy" to be one that at each point in time maximizes a social objective taking as given past actions and assuming that future policy will be made in a similar fashion. This is the type of policy that usually arises in dynamic optimal control theory, and seems to correspond well to what we mean by discretion. Yet even granting that there is a generally acceptable and fixed social objective, that we understand the way agents behave and respond to policy changes, and that we have precise information on the timing and magnitudes involved, the policy suggested by control theory (the consistent or discretionary policy) is typically suboptimal in economic applications. That is, performance according to the social objective function can be unambiguously improved by adherence to a fixed policy which does not feed back on current conditions (and thus is not "time consistent").

This fact is not only counter to Keynesian philosophy, but perhaps to our intuition, since it is at odds with results in control theory that arise in other, ostensibly similar, contexts such as guiding rockets. Yet in spite of the assumptions made in old-fangled econometric models, economic agents are fundamentally different from rockets in that they tend to act in their own self interest.³⁰ Since not only present, but also future policy actions impinge on opportunities, agents have strong incentives to forecast these actions. As long as current behavior reacts to expectations of future policies (as it does not in rockets, but

surely does in economic decision makers) then discretionary policy is suboptimal because, in Kydland and Prescott's [1977] words, "there is no mechanism to induce future policy makers to take into consideration the effect of their policy, via the expectations mechanism, upon current decisions of agents," (p. 627).

An example elucidates this principle.³⁹ It is sometimes argued that unexpected monetary expansion is equivalent to a lump sum tax on the holders of currency, since obviously the behavior of agents could not have been distorted by the anticipation of unanticipated policy. Hence, consistent (discretionary) policy makers should exploit this opportunity now, but to avoid future distortions they should promise to reduce inflationary revenue in the future. The problem with this approach is that eventually the future becomes the present. As Barro [1982] puts it:

Since people understand the attractions of ex post capital levies, they will attempt to forecast ex ante, the government's tendency to exploit such situations. So, in deciding to hold money or other nominal liabilities of the government, people will take into account the government's power to engineer ex post "surprises," which depreciate the real value of these claims. ... If the policy maker could commit himself in advance to resist the ex post benefits from surprise inflation, then the equilibrium rates of monetary growth and inflation are likely to be lower. Rules provide such commitments to varying degrees. In contrast, a purely discretionary regime has no scope for these types of restrictions on subsequent monetary behavior. (p. 2)

The very expectation of future inflation leads to a decline in the current demand for nominal assets, and hence to a decline in the value of these assets. As Section IV describes it, the result is higher current prices. Similar reactions occur to expectations that governments may attempt to exploit a wide

variety of discretionary opportunities. For instance, pure discretion (i.e., control theory) suggests defaulting on existing government bonds, with a promise not to default on new issues. Rational investors are unlikely to accept such a promise under a purely discretionary regime, of course, since when the new issue comes due exactly the same policy is again optimal. Obviously this makes it very difficult to float government debt without some commitment to resist this temptation, i.e. without forsaking discretion.

These principles are in fact quite general. They imply that we should adopt commitments to rules which eliminate discretionary authority not because policy makers are stupid or evil, but because it can lead to superior economic performance. On this view, the job of the economist is to analyze the operating characteristics of alternative rules, or of alternative institutional arrangements. In fact, it is probably the case in many contexts that the commitment to follow some stable rule is at least as important as the choice of the actual rule (see, e.g., Barro [1981]). A modern industrialized economy could function adequately with a predictable 2 percent monetary growth rate, or with a predictable 20 percent rate; it cannot function effectively when no one knows the future course of monetary policy. Commitment to some stable rules for both fiscal and monetary variables would not only contribute to economic growth by providing an environment conducive to rational investment and development, but would also help to eliminate fluctuations in economic activity by reducing forecast errors and the resulting misallocations.

VI. Conclusion

Clearly these implications of dynamic equilibrium reasoning contrast sharply with the macroeconomics of the 1960s. They do not imply, of course, that there is no role for policy. What is implied is that policy will have to be analyzed differently than it was in that era. For some intervention to receive our recommendation it becomes necessary to demonstrate explicitly how it is to be welfare improving. It is essential to take seriously the role of expectations, especially the feedback from policy to expectations to behavior. The issue of time-inconsistency will have to be faced squarely. Far from providing discouragement to any but the most stubbornly committed of the profession, these conclusions break exciting new grounds for genuine progress. It is tribute to the science of economics that, so soon after the theoretical upheavals and dismal practical performance of the 1960s and early 1970s, we have come so far in understanding our mistakes, and in putting the lessons of that experience to good use.

Footnotes

1. "Keynesian" economics is defined here in the narrow sense "to refer to the multiplier calculations which all of us understood Heller [1966] to be discussing and applying, together with the underlying if less precisely specified theory ..." (Lucas [1976b] p. 266).
2. This was Okun's [1980] view.
3. See Blinder [1981].
4. In Section III, some of the other explanations are discussed.
5. As quoted in Leijonhufvud [1968].
6. Note that we are not contending here that no policy will have any effects, only that pure demand policy will not effect employment (unless it crowds out private investment).
7. In his lectures, Sargent describes the canons of classical economics as:
 - (1) agents behave purposefully (optimization)
 - (2) equilibrium
 - (3) agents understand the environment they are assumed to be operating in.
8. Much of The General Theory is peripheral to this main contribution. Keynes' theories of consumption, investment, and liquidity preference do nothing (except in certain pathological circumstances like the "liquidity trap") to overturn the classical results, as Modigliani [1944] pointed out long ago.
9. Consider, e.g., "For whilst a deflation of effective demand below the level required for full employment will diminish output as well as prices, an inflation of it above this level will merely affect prices." (Keynes [1936], p.291).
10. Tobin [1981], p.36.
11. Kydland and Prescott [1980, 1982], Barro and King [1982], Long and Plosser [1983], and Wright [1983b] are recent examples of equilibrium business cycle modelling. Lucas [1972] is an early formal analysis of the real-nominal relationship in a general equilibrium context, based on noisy price signals.
12. As Lucas [1977] describes the situation, demand policy leading to 4% sustained inflation was forecast by the econometric models to lead to sustained unemployment of below 4%, about a full point lower than any long period average in U.S. history.
13. Actually, as Section IV describes in detail, expected inflation does have real consequences in a monetary economy, but these are not the effects econometric models were built around.

14. In fact, it became known as the "accelerationist hypothesis." Gordon [1980] gives the impression that the Friedman-Phelps ideas caught on quickly, but this is inaccurate; Tobin [1978], e.g., acknowledges that he had been "over-optimistic about the trade off and too skeptical of accelerationist writings."

15. "Expectations ... (or, more generally, the subjective probability distribution of outcomes) tend to be distributed, for the same information set, about the prediction of the theory (or the 'objective' probability distribution of outcomes)," Muth [1961].

16. Some people use "structural" to refer to "something which remains fixed when we undertake a policy change." (Sims [1980], p. 12). On this usage, what econometric models assumed to be structural was, in fact, not.

17. It is often asserted that there is a deeper (microeconomic) structure implicitly underlying these models. Bryant and Wallace [1980] argue that this assertion is invalid, and conclude that these macro models must "stand on their own."

18. Of course, the practice of economic policy is considerably more difficult than the theory. The model may ignore important features of the true structure, the latter can change of its own accord (e.g. due to demographic factors), some components of x_t may actually be quite uncontrollable, etc. (see also Section V).

19. Sims [1982] recently argued that some policies for which macroeconomic models are invariant may actually be interesting. However, it is clear that many policy experiments for which they are not invariant are also important to evaluate, and have been analyzed incorrectly (by wrongly assuming invariance) in the past.

20. See Sargent [1980a] or the introduction to Lucas and Sargent [1981] for some of the issues involved in this estimation.

21. Observe the appearance of the notion of "democracy" both here and in the quotation by Santomero and Seater.

22. This is because money demand does not follow directly from utility or profit maximization (fiat money is "intrinsically useless" by definition), and the provision of the money supply is restricted to government authorities.

23. One implication, stressed by Tobin [1972], is that a given state of market power in the hands of unions, firms, or oil cartels cannot be the source of continuing inflation.

24. It used to be that Keynesians believed that monetary policy worked well in cooling inflation, and was ineffectual in expanding demand; as the saying went, "you can pull on a string but not push on it." The stance has since turned 180 degrees.

25. Contemporary monetarists take an intermediate position on this issue (see Laidler [1981b], or Stein [1981]).

26. Sargent [1981] describes several historical episodes where truly astronomical inflations were halted relatively painlessly by monetary reform.

27. Some economists believe that it is their duty as "social engineers" to discover how to meet the public demand to end inflation, without even considering the impact of inflation on the economy (e.g. Lipsey [1981], footnote 28).

28. Others also recognize this seigniorage opportunity, which explains the universally strict laws against counterfeiting.

29. See Wallace [1980], pp. 62-64.

30. See, e.g. Atkinson and Stiglitz [1980]. Helpman and Sadka [1979] analyze inflation in this context.

31. Note the potential for a genuine, long-run inflation-employment trade-off arising in this context. To our knowledge, this possibility has not been analyzed carefully, and certainly merits further research.

32. See Sargent [1982] or Wright [1983a] for an introduction to this literature.

33. The apartment analogy was provided by Ed Prescott.

34. Some people are of the mistaken impression that equilibrium theory predicts policy has no effect generally, and therefore cannot influence the natural rate (e.g. Buiter [1980]). This seems to stem from Sargent and Wallace's [1975] example where the choice of a reactive monetary rule in a simple model is of no consequence for real GNP. As intelligent readers should surely realize, "It hardly follows that all policy is ineffective in all contexts," (Lucas and Sargent [1979], p.317).

35. Muench and Wallace [1974], Barro [1979] and Lucas [1980b] discuss this point.

36. Recall the difficulties involved in the practice (vis a vis the theory) of economic policy expressed in Section III. See also Laidler [1981a], (especially p. 19).

37. Lucas [1977], p. 217.

38. In practice, in order to get precise results, it is necessary to approximate goal-directed behavior in general by the limiting case of optimization.

39. Several other interesting examples are contained in the Kydland and Prescott references.

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