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The Phillips Curve

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"Indeed, whatever view we may take of the subject, we seem obliged to admit, that, although additional industry will be one effect of an extraordinary emission of paper, a rise in the cost of articles will be another. Probably no small part of that industry which is excited by new paper is produced through the very means of the enhancement of the cost of commodities.

"(1)f we assume the augmented paper to be brought back to its ordinary quantity, we must suppose industry to languish for a time, through the ill success that will appear to attend mercantile transactions."


Henry Thornton, and David Hume before him, understood that the initial effect of a change in the quantity of money was on output. Hume's analysis of the gold standard and Thornton's discussion of paper money leave no doubt that departures from steady state equilibrium output were neither ruled out of the analysis nor denied. By 1800, economists understood that the relation between money, prices and output did not imply constant velocity, constant real balances or ever-full employment.

Missing from these early analyses, and from later work as well, was a hypothesis about the distribution of the change in expenditure between prices and real output. Keynes did not add the missing hypothesis. Loose talk and conjectures, stimulated by Keynes' discussion of rigid money wages and liquidity traps, probably encouraged a significant step backward from the level of analysis reached by Thornton, Hume, Wicksell, Fisher and Keynes of the Treatise on Money. A widely accepted, proposition was that the price level rose only if output reached some point (range?) called full employment. Below
this point, real output varied; above, prices changed. The step from Keynes' downward rigidity of money wages to downward rigidity of money prices was easy. Rising prices and money wages were reconciled by crude notions of "cost push."

Phillips' contribution appeared to fill a gap [10]. He posited a non-linear relation between unemployment and wage changes and presented evidence suggesting that the relation had remained stable in the U.K. for a century. In a generous interpretation, any general index of prices can replace money wages and deviations from "full employment" output can replace unemployment.

The Phillips curve was absorbed quickly in econometric models, in policy discussions and in policy decisions. The notion of a stable and reliable "trade-off" between inflation and unemployment made the journey from professional literature to the counsels of policy and even the Councils of Economic Advisers more rapidly than most new ideas. Sociologists or historians of science may one day explain why economists and officials accepted the Phillips curve so readily. 1/ Economists are more often attracted by theories without evidence than by evidence lacking a clear relation to theory.

Whatever the initial reasons, the belief in a stable Phillips curve either encouraged or rationalized policy choices that led to a range of observations on inflation and unemployment not matched in the peacetime experience of the United States. The evidence does not seem consistent with a stable, reliable "trade-off" between prices and unemployment of the type proposed by Phillips. More complex relationships have been introduced to explain the data.

By the time of the conference, April 1973, a growing number of economists accepted as a long-run proposition, the hypothesis advanced by
Friedman [5], developed more fully by Phelps [9], and tested by Lucas [8] and Sargent [13] that became known as the "natural rate" hypothesis. Under this hypothesis, the actual rate of price change depends on the anticipated rate of price change. The hypothesis reminds economists that if all demand and supply equations are homogeneous of zero degree in prices and the value of real wealth, inflation cannot bring a permanent reduction in unemployment. Workers can be induced to enter and remain in the labor force at reduced real wages, if they underestimate the rate of price change and overestimate their real wage rate. Once inflation is anticipated, prices rise at the anticipated rate.

Acceptance of the natural rate hypothesis does not imply that there are no real gains from reducing unemployment by increasing inflation. If anticipations form slowly, there may be a short-run benefit from increasing output and employment and even long-run benefits. Long-run benefits arise if the social cost of unanticipated inflation is less than the social benefit of additional employment. Some economists make this argument.

The absence of a theory of labor market adjustment capable of predicting the relation between short-run changes in wages, prices, productivity and output is one explanation of the reason economists have difficulty interpreting the data produced by labor markets. This suggests that we do not have an explanation of the events that trace out a short-run Phillips curve. An alternative explanation is that there is a reliable short-run trade-off between unemployment and inflation. Some asymmetry leaves a net gain in welfare. The benefits from expansion are not entirely lost when anticipated and actual rates of price change are once again equal. A third alternative is that the short-run trade-off occurs at the start of an inflation if the inflation is unanticipated.
Once inflation is anticipated, there may no longer be a short- or long-run trade-off. If employers and workers learn that the mean rate of inflation is positive, behavior changes. With maximizing behavior both sides bargain for real wages by agreeing to changes in money wages that incorporate anticipated rates of inflation or by agreeing to cost of living adjustments. More generally, rational behavior in a world of price stability differs from rational behavior in a world of inflation or deflation.

Each of these explanations was advanced and discussed in the papers and comments. In later sections, we summarize the arguments on both sides, suggest an alternative explanation and discuss the relevance of the short-run Phillips curve for policy. Before turning to the arguments, we present some of the data used to generate empirical Phillips curves in the United States.

Inflation and Unemployment in the United States

Most of the empirical estimates of the trade-off between inflation and unemployment in the U.S. have been based on postwar data. Data for a longer period are shown in Chart 1 where the percentage rate of change of the consumer price index is plotted against the percentage unemployment rate for the years 1900 to 1973. These data show no sign of a simple relation or of a stable trade-off. Unemployment rates below 4% occur in about one-third of the years. Rates of price change in these years vary over a wide range. Unemployment rates are above 6% in twenty years, including the 12 years 1930-41. The range of rates of price change in these years runs from negative to positive values. Prices rose from 1933 to 1937 with unemployment rates above 14% but fell in
1938 and 1939 with the unemployment rate in the same range of values. We find prices falling in 1921 with unemployment near 12% but rising in 1941 although unemployment remained near 10%.

A more careful look at Chart 1 shows that the percentage of the labor force counted as unemployed fell in the range 10% to 14% once. If we separate out all years with unemployment of 14% or above, mainly the years of the 1930's depression, the remaining points cover a wide range of price changes. The same is true if we further restrict the samples to milder cycles in which the unemployment rate was below 8%. The bulk of the observations are distributed around a mean rate of unemployment between 4% and 5% with no consistent relation between inflation and unemployment apparent in the data.

Chart 1 repeats the point made in a similar chart produced by Samuelson and Solow. They noted that "a first look at the scatter is discouraging; there are points all over the place." [12, p. 188]. They went on, however, to exclude the points for 1933-41 and for the "early years of the first World War," presumably 1914 and 1915, when prices rose between 1 and 2% with unemployment rates between 8 and 10%. The remaining points fell in a scatter that encouraged them to make some "guesses" about the trade-off in the U.S. economy. When offering their guesses, Samuelson and Solow pointed out that the shape of the Phillips curve depends on the policies pursued and that the position of the curve depends on the response to past experience. [12, pp. 187, 193]. They were unable to predict the direction of shift following a period of sustained anti-inflation policy, however, and offered no conclusion about the long-run effects of expansive or contractive policies.
The difficulties of obtaining an explanation consistent with both pre- and post-war observations and the reliance on quarterly observations led many subsequent investigators to ignore all observations before 1946 or 1952. Fitted Phillips curves in the early sixties relied on a very narrow range of observations for rates of inflation. As Chart 2 shows, the annual rates of inflation for 1952 to 1965 are mainly between 1 and 2% and are associated with unemployment rates from 3 to 7%. A curve fitted to all points except 1956-58 is very steep, almost vertical. In the years 1956 to 1958, inflation was between 2 and 4%, so the addition of two or three annual observations made the postwar Phillips curve less than vertical. Reliance on these data produced the "pessimistic" Phillips curve of the early and middle 1960's. These curves seemed to imply that price stability required unemployment of 5 to 6% of the labor force in the U.S. with some estimates implying that price stability required unemployment to remain at 8%. Reuber [11] summarizes the estimates for the U.S., U.K. and Canada.

Inflation increased toward the end of the sixties. The new observations reduce the unemployment rate required for price stability, assuming a linear relation, but the assumption of a linear relation between unemployment and inflation becomes harder to maintain. Including observations for 1970-73, eliminates the evidence of a simple long-run relation. The points in chart 2 group themselves along three steep Phillips curves. One curve can be drawn for rates of inflation between 1 and 2%. A second includes rates of inflation between 2-1/2 and 4%. The third includes the four years in which rates of inflation exceed 4-1/2%. The points along the three imaginary lines are not randomly distributed in time. It is easy why the postwar data has encouraged many economists to accept some types of short-run Phillips curves and some version of the "natural rate" or expected inflation hypothesis.
The point of our exercise is not to reject the relation between expected and actual rates of inflation. The annual data make clear that evidence obtained solely from the data of the last twenty years are weak support for any proposition about short-run Phillips curves. The longer data series offer an opportunity to test many of the propositions in this volume.

The Conference Papers

Donald Gordon, Robert Hall and Robert Lucas were invited to present papers on the Phillips curve and related theoretical or empirical issues. Robert Gordon commented on each of the papers. David Pritchett commented on the papers by Gordon and Lucas and Edmund Phelps commented on the paper by Gordon.

Three themes appear frequently. The first is a permanent income theory applied to labor markets. The second recognizes that wages like any money price, can be multi-dimensional. Third, several papers hint that a distinction should be made between perceived, actual and anticipated wages, not between actual and anticipated wages alone. In this section, we present the three arguments, discuss the papers and comments and note some of the issues that remain open or unresolved.

Fluctuations of output are not easily reconciled with maximizing behavior in a world of certainty and costless information. Standard economic theory permits the timing of receipts and payments to differ but income and prices are known. There is neither a short-run nor a long-run Phillips curve. Output never changes, and prices are known with certainty or correctly anticipated. In such a world, there is no reason to expect a relation between measured rates of unemployment and rates of price change.
Suppose we introduce random shocks arising because governments act in an arbitrary way or businessmen suffer waves of unpredictable optimism and pessimism. The shocks are expected; their timing is unknown. Mean values are unaffected, and expected income or permanent income for each occupation adjusts to compensate for the costs (or gains). In industries that fluctuate more than the average -- homebuilding is an example -- wages per hour of work are above average. A construction worker's lifetime income, or his expected utility of income, may be equal to the income of a worker whose lifetime income stream is constant, whereas income per hour of work may be very different.

Let us call the analysis of wages that can be developed along these lines the permanent income theory of labor markets. The permanent income theory tells us nothing about extra compensation for variable streams. Tastes differ. Some workers may prefer to bunch their labor and their leisure while others prefer to work daily from 9 to 5. Economic theory does not explain the distribution of tastes for labor and leisure.

The permanent income theory implies that the relevant measure of unemployment excludes anticipated (leisure) idle time. The labor force is not "unemployed" on the weekend. Public school teachers are not "unemployed" during the summer or construction workers during the winter. It would not be surprising, under the permanent income theory, if quit rates rise with the length of time between layoffs. Once leisure time is less than anticipated, quit rates rise.

For the same reasons, workers with variable streams do not offer to reduce their wages unless periods of idleness last longer than anticipated. Consequently, wages appear to be rigid downward. Institutional details are not required to explain at least part of the observed wage rigidity and unemployment.
The most obvious problem with this approach is the failure to explain world unemployment in the '30's or British unemployment in the '20's. The 10% unemployed in Britain during the years prior to the depression and the 10% to 25% unemployment rates in the U.S. from 1933 to 1941 cannot be reconciled easily with the proposition that workers voluntarily chose leisure. These are not the only problems, however. The notion of permanent income requires a supplementary hypothesis to sharpen the definition of unemployment. The hypothesis should be able to explain whether workers must be paid a premium to compensate for more variable income streams.

A second theme is the meaning of the theoretical term "wages." The banking literature in particular has long made the point that the theoretical term "price" is more comprehensive than the term price as commonly used. The discussions of "credit rationing" cite several "terms and conditions" that supplement cash payments of interest, raising the cost to the borrower and the receipts of the lender. The prohibition of interest on deposits encouraged the use of services and other imperfect substitutes for cash payments but did not eliminate the practice of paying interest. Similarly, in labor markets wage negotiations often include seniority, pension rights, work rules and other terms and conditions of employment sometimes called "fringes."

Donald Gordon points out that workers and employers may agree to "job rationing." The workers offer to average their money wage payments in return for an agreement by employers to average their employment over time. In his comment, Robert Gordon notes that there are different types of employment "contracts." Some workers -- civil servants, college professors,
and other professionals -- enter into long-term contracts and are inclined to regard an employment contract as a durable asset. Migrant farm workers, day laborers, automobile salesmen are examples of workers whose contracts are short. Distinguishing between durable and non-durable assets may be useful in analyzing labor markets. Do wages respond to market conditions more slowly where employment contracts are, perhaps implicitly, long-term contracts?

A third theme can be found in several of the papers. Current money wages are distinguished from anticipated money wages and from real wages -- actual and anticipated. There are suggestions that a further distinction between actual, anticipated and perceived wages may eventually prove fruitful. Currently popular methods of computing anticipated prices and wages as exponentially weighted averages of past prices lend themselves to the interpretation that there is a lag in the adjustment of perceived prices. If all available information is exploited and maximizing behavior rules, current market prices reflect all available information. Individual decision makers do not acquire market information costlessly. When market conditions change frequently and by large amounts relative to the prevailing wage, more resources are devoted to acquiring information about current and future conditions. We return to this topic at a later point.

All of this discussion may beem remote from the empirical observation that in the aggregate, rates of price or wage change and unemployment rates are negatively related empirically. Donald Gordon argues that a micro-theory is required to move beyond the statements that can be squeezed from the observations and from empirical hypotheses. To him, the crucial observation
to be explained is the downward rigidity of money wages. He notes that the appeal to labor unions and similar institutional features as an explanation of wage rigidity does not even meet the low standards of post hoc, ergo propter hoc. Wage rigidity had been noted when unions were still regarded in common law as conspiracies to restrain trade.

Donald Gordon introduces implicit contracts and worker's risk aversion to explain why money wages are rigid downward. Costs of diversification are larger for human than for non-human assets, he argues. Workers enter into implicit (or explicit) contracts that permit them to average their wages over time. Employers offer some protection against unemployment or layoff in exchange.

One problem with an argument based on risk aversion in labor markets is that unemployment compensation and other forms of insurance are ignored. No one has argued that employers' money wage payments became less rigid once unemployment compensation spread. Moreover, if lack of diversification is the reason for accepting implicit contracts that stabilize employment, why do workers or their representatives buy "insurance" from the same firms that provide employment? Is there a market for supplementary unemployment insurance? Are diversified insurance companies ignoring an opportunity to compete with less diversified producers who are subject to fluctuating demand?

In his comment on the paper, Robert Gordon (1) argues that risk aversion is neither necessary nor sufficient to explain wage rigidity, (2) points to three inconsistencies between the new micro-economics of employment and the data generated by labor markets, and (3) introduces an alternative explanation of wage rigidity. His explanation building on recent work by Azariadis [1] and Baily [2] suggests that labor contracts differ between markets. The differences reflect differences in taxes and in the markets for the firm's product.
Edmund Phelps argues that the quasi contract theory of employment does not imply a short-run Phillips curve. Phelps makes explicit the role he assigns to information costs and the difference between actual and perceived wages. Implicit contracts do not imply wage or price rigidity, he argues, if information is costless. He finds the earlier search theory of Gordon and Hynes [6] a more satisfactory foundation on which to build.

Robert Hall's paper uses some recent work by Phelps [9] to estimate the gains from a policy of increasing employment by increasing inflation. In his model, the long-run Phillips curve is vertical. If there is a short-run trade-off between inflation and unemployment, there can be gains or losses of social welfare from unanticipated inflation and reduced unemployment.

Hall makes explicit the sources of increased social welfare. His various experiments show that much of the gain is attributable to the lag in formation of expectations and adjustment of employment, the improvement in the quality of the labor force in periods of excess demand for labor, and the discounting of future utility. The improvement in the quality of the labor force occurs because there is an asymmetry. Training and advancement accelerate in periods of excess demand and the gains are not eroded in recessions. Hall notes that if actual and anticipated rates of inflation adjust rapidly, the welfare gain is small.

Robert Gordon comments on the details of the model and particularly on the permanent productivity gains that come from upgrading. He concludes that Hall's conclusions are more applicable to unanticipated deflation (or a reduced rate of inflation) that increases unemployment. Much of the difference between the two comes from the assumption about the optimal rate of inflation and the speed with which inflation is anticipated. Gordon also notes that
like all taxes, inflation has incidence effects. The redistribution of income is one such effect. We would add that if the variance of prices increases, more resources are used to acquire information. In practice, there have been additional effects. These include the malallocation of resources and the loss of freedom that accompany controls and regulations introduced to alter the distribution of gains and losses.

Hall's simulations provide a sensitivity analysis that brings out welfare implications of the inflation-unemployment trade-off. However, Hall makes no provision for the social cost of misleading citizens. Is there no social cost to a policy of misleading citizens? Is it appropriate for government to trick the current generation to work more than they choose to work?

Many at the conference took issue with Hall on this point.

Hall's simulations are accurate only if the parameters of his model are constant. Robert Lucas' argument implies that the parameters of econometric models vary with the policies pursued. Simulations using fixed parameter values necessarily produce false and misleading results. The reason is that economic agents cannot be expected to ignore past experience. Once burned twice shy could be a sub-title for the paper.

Lucas' argument bears on the stability of the Phillips curve trade-off no more or less than the stability of the parameters of consumption, investment or money functions, as he notes. Some of the parameter "drift" found in re-estimation of econometric models can be attributed to the effects of past policies.

Lucas' paper is an important step in the analysis of expectations, in the theory of economic policy and in the relation of the two. He shows that a
case can be made for systematic revision of the parameters of econometric models. His analysis leads him to conclude, however, "that long-term policy evaluations with econometric models are meaningless." The reason is that long-term policy evaluations are obtained from simulations using fixed parameter values. The simulations deny that the behavior of economic agents, including their anticipations of the future, depend on the policies pursued. Economic theory implies the opposite. Lucas shows, in one example, that the initial response to an investment tax credit is very different from the response to be expected on subsequent trials.

Robert Gordon accepts Lucas' argument but finds his conclusion "pessimistic." He suggests means of making simulations more useful including a type of sensitivity analysis, over- and under-estimates of the effects of the policy change to bracket the proper value, and other, similar methods. Gordon notes that many of these procedures break down when there are wide confidence intervals on parameter estimates.

One of Gordon's many comments deserves brief mention. The usual interpretation is that (distributed) lags are measures of the adjustment of anticipations. Gordon recognizes costs of acquiring information and suggests that maximizing individuals or firms may take decisions in the absence of complete information. Lags in adjustment may not be the result of departure from rational expectations but the results of rational perceptions in the presence of costs of acquiring information. The underlying rationale for lags in adjustment and the implications of such lags differ from the usual current interpretations. Gordon does not develop the analysis of differences in perception based on relative costs of acquiring information.
The Phillips Curve as a Result of Differences in Speed of Adjustment

In the usual model of anticipations, there is a single, uniformly held anticipation of the future. Introducing costs of information (or differences in perception) opens the analysis to differences in anticipations of the future. This section sketches an analysis of the Phillips curve in which differences in perception or anticipation generate Phillips curves. The slope of the curve depends on the way in which different groups form anticipations (or perceptions). The stability of the short-run trade-off between inflation (or price changes) and output changes (or unemployment) depends on the stability of the process -- the same groups must be slow to adjust to each new deviation of anticipated from actual values. If relative speeds of adjustment change, the slope of the curve changes.

The model is a much abbreviated version of the framework we have presented in several papers, e.g. [3]. We are concerned here mainly with two relations, the amount of real expenditure on the output market by private purchasers and by government, \(d+g\), and the price-setting behavior of suppliers. Total output, \(y\), is equal to total expenditure in equilibrium. Dots are used to represent variables omitted from the present analysis.

\[
(1) \quad y = d(p, p^a, y \ldots) + g \\
\quad d_1 < 0; \quad d_2, d_3 > 0
\]

\[
(2) \quad p = p(y, \varphi, K \ldots) \quad p_1, p_2 > 0; \quad p_3 < 0
\]

Two anticipations (or perceptions) affect prices, \(p\), and output, \(y\). Producers' anticipations, \(\varphi\), and purchasers' anticipations, \(p^a\), form separately and at
different speeds in the presence of costs of information. The remaining variables are $g$, the real expenditure of the government and $K$, the stock of real capital. Both are taken as given. Corresponding to each $K$, there is an efficient level of equilibrium output, $y_o$, referred to as full employment output.

In the truncated system as in the larger system of which it is a part, the solution for current real output depends on $K$, $g$, $p^a$ and $\varphi$. The "reduced form" for output makes the response

$$y = \frac{d_1 p_3 K + d_2 p^a + d_1 p_2 \varphi + g}{1 - (d_1 p_1 + d_3)}$$

of current output to anticipations depend on the relative changes in $p^a$ and $\varphi$ and in the derivatives of eqs. (1) and (2). The response of $y$ to $p^a$ is positive and the response to $\varphi$ is negative. Consequently, when there are changes in anticipations, output remains invariant only if $d_2 p^a = -d_1 p_2 \varphi$. Differences in anticipations, or in the response to anticipations, induce changes in output, positive changes if purchasers' dominate during periods of rising anticipated price, negative changes if producers' anticipations dominate.

If we restrict the parameters by introducing the plausible hypothesis that output is unaffected by equal changes in $p^a$ and $\varphi$, $d_2 = -d_1 p_2$, the response of output (and the price level) to anticipations now depends entirely on differences in the adjustment of anticipations. The reduced form for $p$ shows that increases in both anticipations raise current $p$, as expected.

$$p = \frac{p_3 (1-d_3) K + p_1 d_2 p^a + p_2 (1-d_3) \varphi + p_1 g}{1 - (d_1 p_1 + d_3)}$$
FIGURE 1
Suppose that in the neighborhood of full employment output, but not elsewhere,
\[
\frac{d_1 p_3}{1 - (d_1 p_1 + d_3)} = \frac{dy}{dk} = \frac{y_0}{k}, \text{ so that}
\]
\[
y - y_0 = \frac{d_2 p^a + d_1 p_2 \phi + g}{1 - (d_1 p_1 + d_3)}
\]

The size and direction of the deviation from full employment equilibrium now depend on the relative change in anticipation of producers and consumers.

Let real government expenditure, \( g \), increase. The size and persistence of the deviation of output from full employment depends on the speed with which producers and purchasers form anticipations. If purchasers anticipations form more quickly, private expenditure increases in anticipation of rising prices, and there is additional expansion of output. The Keynesian "multiplier" is larger in this case than in the case of a large increase in \( \phi \) relative to \( p^a \). Indeed, a sufficiently large increase in \( \phi \) relative to \( p^a \) pushes output below \( y_0 \). The Keynesian "multiplier" may be less than unity and even negative.

Figure 1 brings out some of these points. Initially, the expenditure, or \( d+g \), curve and the price setting(s) function intersect at \( y_0, p_0 \). A change in \( g \) (or other expansive policy) increases output to \( y_1 \) and prices to \( p_1 \) at the intersection of the \( (d+g_1) \) and \( s_0 \) curve. If purchasers anticipations increase relative to producers' anticipations, prices rise and the deviation of output from \( y_0 \) may increase. In Figure 1, a relatively large
increase in $p^a$ and a relatively small increase in $\varphi$ moves the short-run equilibrium position to $p_2, y_1$. Prices rise but output remains fixed. In the opposite case, the system moves to a short-run equilibrium at $p_2, y_2$. Output is below "full employment" but prices rise.

It is clear from these few examples that with differences in anticipations instead of a single, uniform set of anticipations, the range of outcomes covers the entire space. This is the outcome most easily reconciled with the data in Chart 1. There does not appear to be a consistent relation between rates of unemployment and rates of price change in the United States during this century. The short-run response to a policy change cannot be predicted from Phillips curves estimated from past data.

Three implications follow. First, a constant short-run Phillips curve requires that producers always adjust more slowly than purchasers. If producers adjust more quickly than purchasers, a Phillips curve estimated from the data will show unemployment rising as prices rise. Second, the name "stagflation" has been given to the phenomenon. In our analysis, stagflation is a result of the dominance of producer over purchaser anticipation. If our analysis is correct, the occurrence of stagflation is evidence that the relative speeds of adjustment are not always the same. Third, the hypothesis does not assume that there is a "natural" rate of unemployment. The only requirement is that, in full adjustment, $p^a = \varphi$.

These implications, the data, the papers and the discussion at the conference make clear that a stable or reliable trade-off between unemployment and inflation is not at hand and may not be found. We do not have a verified explanation of the existence of the trade-off or of the reasons for instability. Instead, we have competing hypotheses. Some
imply a stable or reliable short-term trade-off. Others deny such a trade-off.

If there is no reliable short-run trade-off between inflation and unemployment, we are left without an accepted explanation of short-run unemployment and wage adjustment. The Phillips curve literature promised, for a time, to provide such an explanation and to provide a hypothesis relating prices and output at positions other than full employment output. Rejection of the relationship eliminates one of the main extensions of the Keynesian analysis in the postwar years. The conference papers and discussion suggests that skepticism has grown. The many attempts to trade-off left a heritage of worldwide inflation at rates of unemployment no lower than in the past. The attempts to provide a theory of the trade-off improved our analysis of labor markets without providing any successful theory of the trade-off.
Footnotes

*/ We are indebted to the National Science Foundation for support of our work.

1/ Keynes' [7] remarks on the time required for acceptance of new ideas are well-known. Common belief, reinforced by considerable propaganda, puts a generation between publication of the General Theory and the acceptance of counter-cyclical budget policy by the U.S. government. The cautious reader should see Stein [14]. The case against fixed exchange rates by Friedman [4] was not successful for many years and seems to be more of a triumph for events over policymakers than for economists over events. The case against mercantilism by A. Smith, though well-known and valid, has not persuaded modern governments.

2/ Interest rates, asset prices and wealth are among the variables omitted from the d-function. Money wage per efficiency unit is one main omission from the eq. (2).
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[14] Herbert Stein, The Fiscal Revolution in America