

this issue or of the evidence that has led to the revision of the hypothesis. I shall be able only to skim the surface in the hope of conveying the flavor of that work and that evidence and of indicating the major items requiring further investigation.

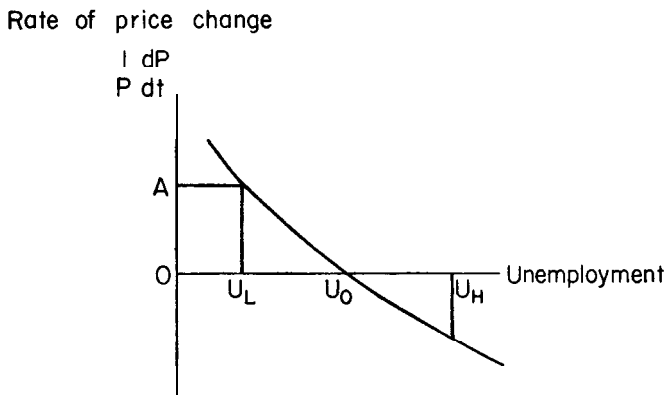
Professional controversy about the relation between inflation and unemployment has been intertwined with controversy about the relative role of monetary, fiscal, and other factors in influencing aggregate demand. One issue deals with how a change in aggregate nominal demand, however produced, works itself out through changes in employment and price levels; the other, with the factors accounting for the changes in aggregate nominal demand.

The two issues are closely related. The effects of a change in aggregate nominal demand on employment and price levels may not be independent of the source of the change, and conversely the effect of monetary, fiscal, or other forces on aggregate nominal demand may depend on how employment and price levels react. A full analysis will clearly have to treat the two issues jointly. Yet there is a considerable measure of independence between them. To a first approximation, the effects on employment and price levels may depend only on the magnitude of the change in aggregate nominal demand, not on its source. On both issues, professional opinion today is very different than it was just after World War II because experience contradicted tentatively accepted hypotheses. Either issue could therefore serve to illustrate my main thesis. I have chosen to deal with only one in order to keep this lecture within reasonable bounds. I have chosen to make that one the relation between inflation and unemployment, because recent experience leaves me less satisfied with the adequacy of my earlier work on that issue than with the adequacy of my earlier work on the forces producing changes in aggregate nominal demand.

2. STAGE 1: NEGATIVELY SLOPING PHILLIPS CURVE

Professional analysis of the relation between inflation and unemployment has gone through two stages since the end of World War II and is now entering a third. The first stage was the acceptance of a hypothesis associated with the

Figure 1. Simple Phillips Curve



Rate of inflation

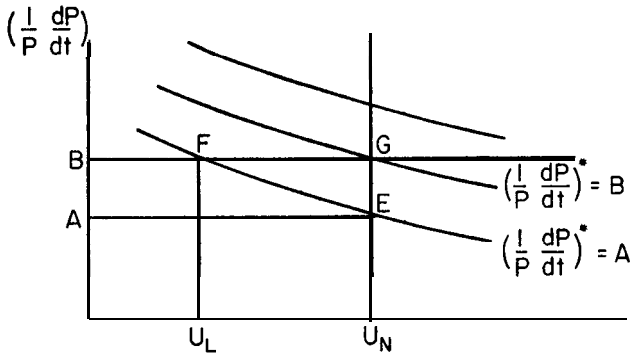


Figure 2. Expectations-adjusted Phillips Curve

produce. As a result, a rise in nominal wages may be perceived by workers as a rise in real wages and hence call forth an increased supply, at the same time that it is perceived by employers as a fall in real wages and hence calls forth an increased offer of jobs. Expressed in terms of the average of perceived future prices, real wages are lower; in terms of the perceived future average price, real wages are higher.

But this situation is temporary: let the higher rate of growth of aggregate nominal demand and of prices continue, and perceptions will adjust to reality. When they do, the initial effect will disappear, and then even be reversed for a time as workers and employers find themselves locked into inappropriate contracts. Ultimately, employment will be back at the level that prevailed before the assumed unanticipated acceleration in aggregate nominal demand.

This alternative hypothesis is depicted in Figure 2. Each negatively sloping curve is a Phillips curve like that in Figure 1 except that it is for a particular anticipated or perceived rate of inflation, defined as the perceived average rate of price change, *not* the average of perceived rates of individual price change (the order of the curves would be reversed for the second concept). Start from point E and let the rate of inflation for whatever reason move from A to B and stay there. Unemployment would initially decline to U_L , at point F, moving along the curve defined for an anticipated rate of inflation $(\frac{1}{P} \frac{dP}{dt})^*$ of A. As anticipations adjusted, the short-run curve would move upward, ultimately to the curve defined for an anticipated inflation rate of B. Concurrently unemployment would move gradually over from F to G. [For a fuller discussion, see (5).]

This analysis is, of course, oversimplified. It supposes a single unanticipated change, whereas, of course, there is a continuing stream of unanticipated changes; it does not deal explicitly with lags, or with overshooting; or with the process of formation of anticipations. But it does highlight the key points: what matters is not inflation per se, but unanticipated inflation; there is no stable trade-off between inflation and unemployment; there is a "natural rate

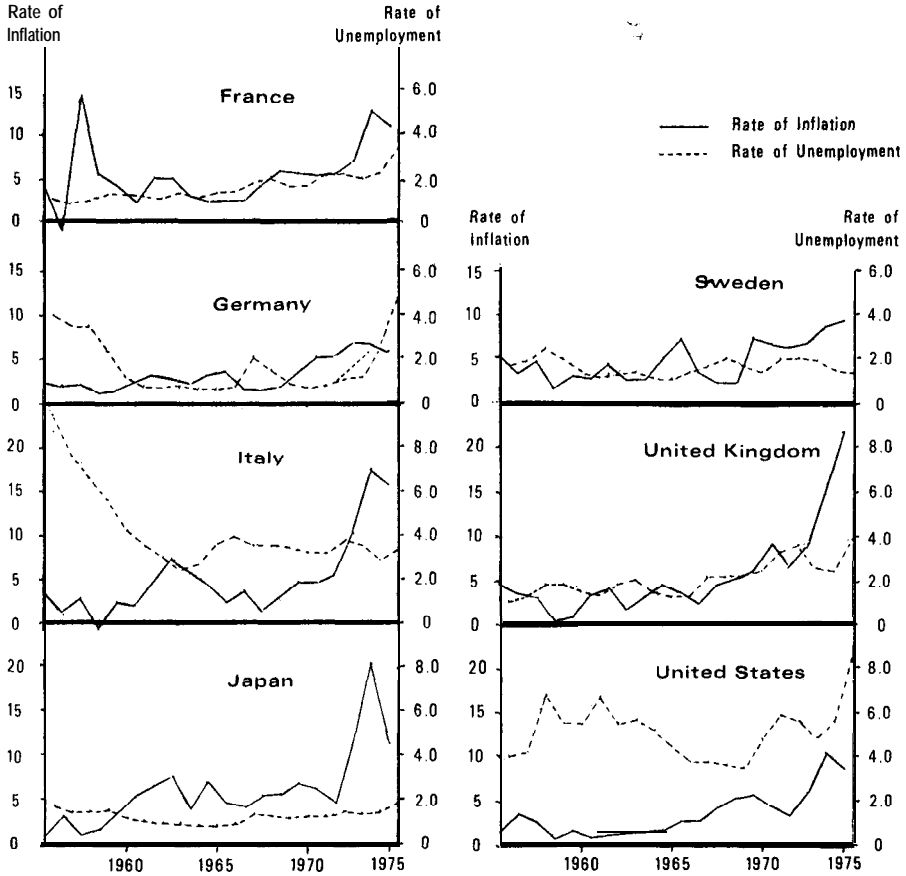


Figure 4. Inflation and unemployment in seven countries, annually, 1956 to 1975

tionately the amount of evidence. In particular, the oil crisis hit all seven countries at the same time. Whatever effect the crisis had on the rate of inflation, it directly disrupted the productive process and tended to increase unemployment. Any such increases can hardly be attributed to the acceleration of inflation that accompanied them; at most the two could be regarded as at least partly the common result of a third influence [Gordon (7)].

Both the quinquennial and annual data show that the oil crisis cannot wholly explain the phenomenon described so graphically by Mr. Callaghan. Already before the quadrupling of oil prices in 1973, most countries show a clearly marked association of rising inflation and rising unemployment. But this too may reflect independent forces rather than the influence of inflation on unemployment. For example, the same forces that have been raising the natural rate of unemployment in the U.S. may have been operating in other countries and may account for their rising trend of unemployment, independently of the consequences of inflation.

Despite these qualifications, the data strongly suggest that, at least in some countries, of which Britain, Canada, and Italy may be the best examples, rising inflation and rising unemployment have been mutually reinforcing,

the higher rate, so that relative price adjustments are the same with a 20 percent inflation as with a zero inflation; third, really a variant of the second point, that there are no obstacles to indexing of contracts.

Ultimately, if inflation at an average rate of 20 percent per year were to prevail for many decades, these requirements could come fairly close to being met, which is why I am inclined to retain the long-long-run vertical Phillips curve. But when a country initially moves to higher rates of inflation, these requirements will be systematically departed from. And such a transitional period may well extend over decades.

Consider, in particular, the U.S. and the U.K. For two centuries before World War II for the U.K., and a century and a half for the U.S., prices varied about a roughly constant level, showing substantial increases in time of war, then postwar declines to roughly prewar levels. The concept of a "normal" price level was deeply imbedded in the financial and other institutions of the two countries and in the habits and attitudes of their citizens.

In the immediate post-World War II period, prior experience was widely expected to recur. The fact was postwar inflation superimposed on wartime inflation; yet the expectation in both the U.S. and the U.K. was deflation. It took a long time for the fear of postwar deflation to dissipate-if it still has-and still longer before expectations started to adjust to the fundamental change in the monetary system. That adjustment is still far from complete [Klein (16)].

Indeed, we do not know what a complete adjustment will consist of. We cannot know now whether the industrialized countries will return to the pre-World War II pattern of a long-term stable price level, or will move toward the Latin American pattern of chronically high inflation rates-with every now and then an acute outbreak of super- or hyperinflation, as occurred recently in Chile and Argentina [Harberger (11)]--or will undergo more radical economic and political change leading to a still different resolution of the present ambiguous situation.

This uncertainty-or more precisely, the circumstances producing this uncertainty-leads to systematic departures from the conditions required for a vertical Phillips curve.

The most fundamental departure is that a high inflation rate is not likely to be steady during the transition decades. Rather, the higher the rate, the more variable it is likely to be. That has been empirically true of differences among countries in the past several decades [Jaffe and Kleiman (14); Logue and Willett (17)]. It is also highly plausible on theoretical grounds-both about actual inflation and, even more clearly, the anticipations of economic agents with respect to inflation. Governments have not produced high inflation as a deliberate announced policy but as a consequence of other policies-in particular, policies of full employment and welfare state policies raising government spending. They all proclaim their adherence to the goal of stable prices. They do so in response to their constituents, who may welcome many of the side effects of inflation, but are still wedded to the concept of stable money. A burst of inflation produces strong pressure to counter it. Policy goes from one

direction to the other, encouraging wide variation in the actual and anticipated rate of inflation. And, of course, in such an environment, no one has single-valued anticipations. Everyone recognizes that there is great uncertainty about what actual inflation will turn out to be over any specific future interval [Jaffe and Kleiman (14); Meiselman (20)].

The tendency for inflation that is high on the average to be highly variable is reinforced by the effect of inflation on the political cohesiveness of a country in which institutional arrangements and financial contracts have been adjusted to a long-term "normal" price level. Some groups gain (e.g., home owners) ; others lose (e.g., owners of savings accounts and fixed interest securities), "Prudent" behavior becomes in fact reckless, and "reckless" behavior in fact prudent. The society is polarized; one group is set against another. Political unrest increases. The capacity of any government to govern is reduced at the same time that the pressure for strong action grows.

An increased variability of actual or anticipated inflation may raise the natural rate of unemployment in two rather different ways.

First, increased volatility shortens the optimum length of unindexed commitments and renders indexing more advantageous [Gray (1 O)]. But it takes time for actual practice to adjust. In the meantime, prior arrangements introduce rigidities that reduce the effectiveness of markets. An additional element of uncertainty is, as it were, added to every market arrangement. In addition, indexing is, even at best, an imperfect substitute for stability of the inflation rate. Price indexes are imperfect; they are available only with a lag, and generally are applied to contract terms only with a further lag.

These developments clearly lower economic efficiency. It is less clear what their effect is on recorded unemployment. High average inventories of all kinds is one way to meet increased rigidity and uncertainty. But that may mean labor-hoarding by enterprises and low unemployment or a larger force of workers between jobs and so high unemployment. Shorter commitments may mean more rapid adjustment of employment to changed conditions and so low unemployment, or the delay in adjusting the length of commitments may lead to less satisfactory adjustment and so high unemployment. Clearly, much additional research is necessary in this area to clarify the relative importance of the various effects. About all one can say now is that the slow adjustment of commitments and the imperfections of indexing may contribute to the recorded increase in unemployment.

A second related effect of increased volatility of inflation is to render market prices a less efficient system for coordinating economic activity. A fundamental function of a price system, as Hayek (13) emphasized so brilliantly, is to transmit compactly, efficiently, and at low cost the information that economic agents need in order to decide what to produce and how to produce it, or how to employ owned resources. The relevant information is about *relative* prices—of one product relative to another, of the services of one factor of production relative to another, of products relative to factor services, of prices now relative to prices in the future. But the information in practice is transmitted in the form of absolute prices—prices in dollars or pounds or kronor. If the

price level is on the average stable or changing at a steady rate, it is relatively easy to extract the signal about relative prices from the observed absolute prices. The more volatile the rate of general inflation, the harder it becomes to extract the signal about relative prices from the absolute prices: the broadcast about relative prices is as it were being jammed by the noise coming from the inflation broadcast [Lucas (18), (19); Harberger (11)]. At the extreme, the system of absolute prices becomes nearly useless, and economic agents resort either to an alternative currency, or to barter, with disastrous effects on productivity.

Again, the effect on economic efficiency is clear, on unemployment less so. But, again, it seems plausible that the average level of unemployment would be raised by the increased amount of noise in market signals, at least during the period when institutional arrangements are not yet adapted to the new situation.

These effects of increased volatility of inflation would occur even if prices were legally free to adjust-if, in that sense, the inflation were open. In practice, the distorting effects of uncertainty, rigidity of voluntary long-term contracts, and the contamination of price signals will almost certainly be reinforced by legal restrictions on price change. In the modern world, governments are themselves producers of services sold on the market: from postal services to a wide range of other items. Other prices are regulated by government, and require government approval for change : from air fares to taxicab fares to charges for electricity. In these cases, governments cannot avoid being involved in the price-fixing process. In addition, the social and political forces unleashed by volatile inflation rates will lead governments to try to repress inflation in still other areas: by explicit price and wage control, or by pressuring private businesses or unions "voluntarily" to exercise "restraint", or by speculating in foreign exchange in order to alter the exchange rate.

The details will vary from time to time and from country to country, but the general result is the same: reduction in the capacity of the price system to guide economic activity; distortions in relative prices because of the introduction of greater friction, as it were, in all markets; and, very likely, a higher recorded rate of unemployment [(5)].

The forces I have just described may render the political and economic system dynamically unstable and produce hyperinflation and radical political change-as in many defeated countries after World War I, or in Chile and Argentina more recently. At the other extreme, before any such catastrophe occurs, policies may be adopted that will achieve a relatively low and stable rate of inflation and lead to the dismantling of many of the interferences with the price system. That would re-establish the preconditions for the straightforward natural-rate hypothesis and enable that hypothesis to be used to predict the course of the transition.

An intermediate possibility is that the system will reach stability at a fairly constant though high average rate of inflation. In that case, unemployment should also settle down to a fairly constant level decidedly lower than during the transition. As the preceding discussion emphasizes, *increasing* volatility and *increasing* government intervention with the price system are the major

factors that seem likely to raise unemployment, not *high* volatility or a *high* level of intervention.

Ways of coping with both volatility and intervention will develop: through indexing and similar arrangements for coping with volatility of inflation; through the development of indirect ways of altering prices and wages for avoiding government controls.

Under these circumstances, the long-run Phillips curve would again be vertical, and we would be back at the natural-rate hypothesis, though perhaps for a different range of inflation rates than that for which it was first suggested.

Because the phenomenon to be explained is the coexistence of high inflation and high unemployment, I have stressed the effect of institutional changes produced by a transition from a monetary system in which there was a "normal" price level to a monetary system consistent with long periods of high, and possibly highly variable, inflation. It should be noted that once these institutional changes were made, and economic agents had adjusted their practices and anticipations to them, a reversal to the earlier monetary framework or even the adoption in the new monetary framework of a successful policy of low inflation would in its turn require new adjustments, and these might have many of the same adverse transitional effects on the level of employment. There would appear to be an intermediate-run negatively sloped Phillips curve instead of the positively sloped one I have tried to rationalize.

5. CONCLUSION

One consequence of the Keynesian revolution of the 1930's was the acceptance of a rigid absolute wage level, and a nearly rigid absolute price level, as a starting point for analyzing short-term economic change. It came to be taken for granted that these were essentially institutional data and were so regarded by economic agents, so that changes in aggregate nominal demand would be reflected almost entirely in output and hardly at all in prices. The age-old confusion between absolute prices and relative prices gained a new lease on life.

In this intellectual atmosphere it was understandable that economists would analyze the relation between unemployment and *nominal* rather than *real* wages and would implicitly regard changes in anticipated *nominal* wages as equal to changes in anticipated real wages. Moreover, the empirical evidence that initially suggested a stable relation between the level of unemployment and the rate of change of nominal wages was drawn from a period when, despite sharp short-period fluctuations in prices, there was a relatively stable long-run price level and when the expectation of continued stability was widely shared. Hence these data flashed no warning signals about the special character of the assumptions.

The hypothesis that there is a stable relation between the level of unemployment and the rate of inflation was adopted by the economics profession with alacrity. It filled a gap in Keynes' theoretical structure. It seemed to be the "one equation" that Keynes himself had said "we are . . . short" (15). In

addition, it seemed to provide a reliable tool for economic policy, enabling the economist to inform the policy maker about the alternatives available to him.

As in any science, so long as experience seemed to be consistent with the reigning hypothesis, it continued to be accepted, although as always, a few dissenters questioned its validity.

But as the '50's turned into the '60's, and the '60's into the '70's, it became increasingly difficult to accept the hypothesis in its simple form. It seemed to take larger and larger doses of inflation to keep down the level of unemployment. Stagflation reared its ugly head.

Many attempts were made to patch up the hypothesis by allowing for special factors such as the strength of trade unions. But experience stubbornly refused to conform to the patched up version.

A more radical revision was required. It took the form of stressing the importance of surprises-of differences between actual and anticipated magnitudes. It restored the primacy of the distinction between "real" and "nominal" magnitudes. There is a "natural rate of unemployment" at any time determined by real factors. This natural rate will tend to be attained when expectations are on the average realized. The same real situation is consistent with any absolute level of prices or of price change, provided allowance is made for the effect of price change on the real cost of holding money balances. In this respect, money is neutral. On the other hand, unanticipated changes in aggregate nominal demand and in inflation will cause systematic errors of perception on the part of employers and employees alike that will initially lead unemployment to deviate in the opposite direction from its natural rate. In this respect, money is not neutral. However, such deviations are transitory, though it may take a long chronological time before they are reversed and finally eliminated as anticipations adjust.

The natural-rate hypothesis contains the original Phillips curve hypothesis as a special case and rationalizes a far broader range of experience, in particular the phenomenon of stagflation. It has by now been widely though not universally accepted.

However, the natural-rate hypothesis in its present form has not proved rich enough to explain a more recent development-a move from stagflation to slumpflation. In recent years, higher inflation has often been accompanied by higher unemployment-not lower unemployment, as the simple Phillips curve would suggest, nor the same unemployment, as the natural-rate hypothesis would suggest.

This recent association of higher inflation with higher unemployment may reflect the common impact of such events as the oil crisis, or independent forces that have imparted a common upward trend to inflation and unemployment.

However, a major factor in some countries and a contributing factor in others may be that they are in a transitional period-this time to be measured by quinquennia or decades not years. The public has not adapted its attitudes or its institutions to a new monetary environment. Inflation tends not only to be higher but also increasingly volatile and to be accompanied by widening government intervention into the setting of prices. The growing volatility of

inflation and the growing departure of relative prices from the values that market forces alone would set combine to render the economic system less efficient, to introduce frictions in all markets, and, very likely, to raise the recorded rate of unemployment.

On this analysis, the present situation cannot last. It will either degenerate into hyperinflation and radical change; or institutions will adjust to a situation of chronic inflation; or governments will adopt policies that will produce a low rate of inflation and less government intervention into the fixing of prices.

I have told a perfectly standard story of how scientific theories are revised. Yet it is a story that has far-reaching importance.

Government policy about inflation and unemployment has been at the center of 'political controversy. Ideological war has raged over these matters. Yet the drastic change that has occurred in economic theory has not been a result of ideological warfare. It has not resulted from divergent political beliefs or aims. It has responded almost entirely to the force of events: brute experience proved far more potent than the strongest of political or ideological preferences.

The importance for humanity of a correct understanding of positive economic science is vividly brought out by a statement made nearly two hundred years ago by Pierre S. du Pont, a Deputy from Nemours to the French National Assembly, speaking, appropriately enough, on a proposal to issue additional assignats--the fiat money of the French Revolution :

"Gentlemen, it is a disagreeable custom to which one is too easily led by the harshness of the discussions, to assume evil intentions. It is necessary to be gracious as to intentions; one should believe them good, and apparently they are; but we do not have to be gracious at all to inconsistent logic or to absurd reasoning. Bad logicians have committed more involuntary crimes than bad men have done intentionally" (25 September 1790).

ACKNOWLEDGMENTS

I am much indebted for helpful comments on the first draft of this paper to Gary Becker, Karl Brunner, Phillip Cagan, Robert Gordon, Arnold Harberger, Harry G. Johnson, S. Y. Lee, James Lothian, Robert E. Lucas, David Meiselman, Allan Meltzer, Jose Scheinkman, Theodore W. Schultz, Anna J. Schwartz, Larry Sjaastad, George J. Stigler, Sven-Ivan Sundqvist, and participants in the Money and Banking Workshop of the University of Chicago.

I am deeply indebted also to my wife, Rose Director Friedman, who took part in every stage of the preparation of the paper, and to my secretarial assistant, Gloria Valentine, for performance above and beyond the call of duty.

REFERENCES

- (1) Friedman, Milton, "The Methodology of Positive Economics." *Essays in Positive Economics* (Chicago: University of Chicago Press, 1953).
- (2) --, "What Price Guideposts?" In G. P. Shultz and R. Z. Aliber, eds.. *Guidelines: Informal Contracts anti the Market Place* (Chicago: University of Chicago Press, 1966), pp. 17 -39 and 55-61.
- (3) --, "An Inflationary Recession," *Newsweek*. October 17. 1966.
- (4) --, "The Role of Monetary Policy," *American Economic Review* 58 (March 1968): I-17.
- (5) --, *Price Theory* (Chicago: Aldine Publishing Co.. 1976), ch. 12.
- (6) --, *Inflation: Causes and Consequences* (Bombay: Asia Publishing House, 1963). reprinted in *Dollars and Deficits* (Englewood Cliffs. N. J.: Prentice-Hall, 1968), pp. 21--71.
- (7) Gordon, Robert J., "Alternative Responses of Policy to External Supply Shocks." *Brookings Papers on Economic Activity*, no. 1 (1975), pp. 183-206.
- (8) --, "The Demand and Supply of Inflation," *Journal of Law and Economics* 18 (December 1975) : 807-836.
- (9) --. "Recent Developments in the Theory of Inflation and Unemployment." *Journal of Monetary Economics* 2 (1976:) 185-219.
- (10) Gray, Jo Anna, "Essays on Wage Indexation." Unpublished Ph.D. dissertation. University of Chicago. 1976.
- (11) Harberger, Arnold C., "Inflation," *The Great Ideas Today*. 1976 (Chicago: Encyclopaedia Britannica, Inc., 1976). pp. 95--106.
- (12) --, "The Inflation Problem in Latin America," a report prepared for the Buenos Aires (March 1966) meeting of the Inter-American Committee of the Alliance for Progress, published in Spanish as "El problema de la inflación en América Latina." in Centro de Estudios Monetarios Latinoamericanos. *Boletín Mensual*, June 1966. pp. 253-269. Reprinted in Economic Development Institute. *Trabajos sobre desarrollo económico* Washington, D. C.: IBRD. 1967).
- (13) Hayek, F. A.. "The Use of Knowledge in Society." *American Economic Review* 35 (September 1945): 519--530.
- (14) Jaffe, Dwight and Kleiman, Ephraim. "The Welfare Implications of Uneven Inflation." Seminar paper no. 50, Institute for International Economic Studies. University of Stockholm, November 1975.
- (15) Keynes, J. M., *General Theory of Employment, Interest. and Money* (London: Macmillan, 1936), p. 276.
- (16) Klein, Benjamin, "Our New Monetary Standard: The Measurement and Effects of Price Uncertainty, 1880-1973," *Economic Inquiry*. December 1975. pp. 461-483.
- (17) Logue, Dennis E. and Willett. Thomas D., "A Note on the Relation between the Rate and Variability of Inflation," *Economica*. May 1976, pp. 151-158.
- (18) Lucas, Robert E., "Some International Evidence on Output-Inflation Tradeoffs." *American Economic Review* 63 (June 1973) : 326-334.
- (19) ---, "An Equilibrium Model of the Business Cycle." *Journal of Political Economy* 83 (December 1975): 1113--1144.
- (20) Meiselman, David, "Capital Formation. Monetary and Financial Adjustments." *Proceedings 27th National Conference of Tax Foundation*. 1976, pp. 9-15.
- (21) Muth, John, "Rational Expectations and the Theory of Price Movements," *Econometrica* 29 (July 1961): 315-333.
- (22) Phelps, E. S., "Phillips Curve, Expectations of Inflation and Optimal Unemployment Over Time," *Economica* (N. S.) 34 (August 1967): 254-281.
- (23) --, "Money Wage Dynamics and Labor Market Equilibrium." In E. S. Phelps, ed., *Microeconomic Foundations of Employment and Inflation Theory* (New York: Norton. 1970).

- (24) Phillips, A. W.. "The Relationship between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957," *Economica*, November 1958, pp. 283-299.
- (25) Sjaastad, Larry A., "Monetary Policy and Suppressed Inflation in Latin America." In R. Z. Aliber, ed., *National Monetary Policies and the International Financial System* (Chicago: University of Chicago Press, 1974), pp. 127-138.