

Research Department  
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## Inflation/Unemployment Trade-offs

Will a business downturn remove inflationary pressures? Put somewhat differently, is there a trade-off between inflation and unemployment? Answers to these questions have changed drastically in recent years. During the 1960's, economists generally believed that inflation rates would fall when economic activity slowed down and the unemployment rate rose. In fact, most held that government officials could choose from a menu of inflation-unemployment combinations, and manipulate fiscal and monetary policies to achieve their choice. A higher unemployment rate could be traded for less inflation, or vice versa, according to what is known among economists as the Phillips curve.

The forecasting ability of the Phillips curve has deteriorated appreciably in the past decade. Indeed, since the late 1960's, we have repeatedly experienced both higher inflation and higher unemployment. And the concept of a stable Phillips curve has given way to the idea of a changing, transitory trade-off — what could be called an expectations-augmented Phillips curve. Also, since the early 1970's, a small but growing number of economists has advocated yet another model which incorporates the notion of rational expectations. This model suggests, somewhat surprisingly, that there is no stable (or even transitory) trade-off amenable to government stabilization policies.

### **The curve — and its failure**

In his seminal 1958 paper, A. W. Phillips pointed out that, for almost a century, a stable relationship had existed in the United Kingdom between a measure of inflation (the rate of wage change) and the unemployment rate. In this country, Paul Samuelson and Robert Solow (1960)

suggested that the Phillips curve could be used as a basis for economic policy, because an historical trade-off existed in the U.S. as well. Thus, policymakers could choose between alternative combinations of unemployment and inflation, as represented by points on the curve, at least as long as events such as wars or major crop failures did not cause the curve to shift its position.

If unemployment was considered too high, for example, a reduction in taxes or increase in Federal-government spending could stimulate aggregate demand and reduce the jobless rate — but at the cost of some increase in inflation. During most of the 1960's, Phillips-curve estimates for the United States indicated a permanent rate of inflation of 4 percent associated with a 4-percent "full employment" unemployment rate. Inflation could be reduced to about 2 percent a year, but that would necessitate 5-percent unemployment, while zero inflation would require about 7-percent unemployment.

Between the late 1960's and early 1970's, it became painfully evident that those trade-offs no longer applied. Contrary to Phillips-curve predictions, unemployment and inflation moved in the same rather than in the opposite direction. Between 1968 and 1971, unemployment increased from 3.6 percent to 5.9 percent, while inflation actually accelerated from 4.5 percent to 5.1 percent. The putative trade-off was often referred to in the popular press as the inflation-unemployment dilemma.

### **Natural-rate hypothesis**

In 1968, Milton Friedman and Edmund Phelps independently arrived at some new insights into the nature and meaning of

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the unemployment-inflation relationship. Their theory has since become known as the natural-rate hypothesis (NRH).

According to the NRH, people's market decisions are guided not by the money price of goods and services they want to buy or sell, but by their relative prices. For example, consumers decide upon quantities of beef to buy after considering beef's price relative to that of other foods which could substitute for beef. Again, an employer decides whether to hire or lay off workers after considering the money wage he must pay relative to the expected selling price of the product that labor produces. Labor, by the same token, evaluates a nominal-wage offer in terms of its purchasing power, that is, its real wage.

An across-the-board change in the prices of goods and services, which leaves relative prices unchanged, will not alter anyone's market decision to buy or sell. Consequently, mere changes in the inflation rate should not lead to variations in output or employment. A "natural rate" of unemployment, in Friedman's phrase, emerges when market demands and supplies are in balance. Hence, the stable association between inflation and unemployment is not reflected in the downward-sloping Phillips curve, but rather in a vertical line, where mere changes in the inflation rate will not alter market demands for goods and services nor the natural rate of unemployment (see chart).

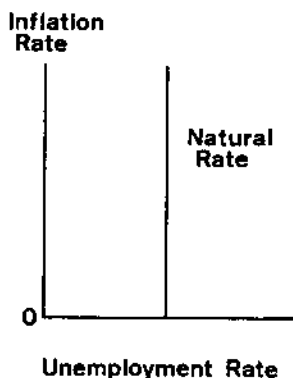
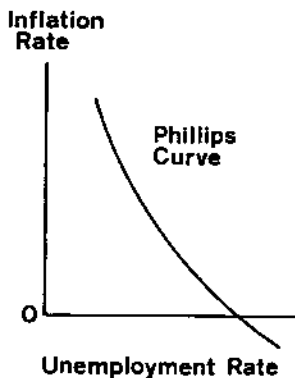
### **Expectations-augmented curve**

Now, at times we observe that inflation and unemployment move together, and sometimes in opposite directions as in the original Phillips-curve analysis. According

to the NRH, these transitory movements come about when people have less than perfect information about prices. Because of their limited information, people base their expectations largely on the observed past behavior of inflation, and only gradually adapt their expectations to actual prices as more information becomes available. During a time of rising inflation, people will evaluate their higher nominal income in terms of past prices, and erroneously anticipate that the purchasing power of their nominal income is increasing. This mistaken belief leads them to demand more goods and services, so that inflation for a time becomes associated with increasing output and lower unemployment.

However, this is only an initial reaction to inflation. For as people become aware of the widespread rise in prices and adapt their expectations to actual price changes, they revise downward the expected real purchasing power of their nominal incomes, and reduce the quantity of goods and services demanded. At this stage, we observe both higher prices and rising unemployment. This adjustment will continue until people accurately perceive the increase in inflation and the lack of change in relative prices, and hence in their real purchasing power. At that point, the unemployment rate will have run the full course — first falling as prices rise and then increasing back toward the initial natural rate. Significantly, under this "expectations adjustment" process, economic activity tends toward the same unemployment rate, but a higher inflation rate which is now "built into" people's expectations.

This same mechanism would work in the other direction. If the inflation rate declined, individuals would initially misperceive the decrease in their money income as a decrease in real purchasing power, and this would lead to less output



and higher unemployment. Subsequently, as the erroneous price perceptions are corrected, the unemployment rate would reverse direction and fall back toward the natural rate. But at the final point at which actual and expected prices are equal, the inflation rate will be lower.

The NRH approach suggests that the original Phillips' analysis, which considered changes only in money wages and unemployment, should be restated in terms of anticipated real-wage movements and unemployment. One common specification considers changes in money wages, or final product prices, relative to changes in expected inflation and unemployment. This formulation, known as the expectations-augmented Phillips curve, is widely used in econometric models and forecasting.

### Policy implications

The ideas incorporated in the natural-rate hypothesis and the expectations-augmented Phillips curve imply a profoundly altered role for government stabilization policies, compared to the government role of the 1960's. In the earlier period, many observers believed that a lower unemployment rate was economically feasible as long as a somewhat higher and stable inflation rate was tolerable. But analysis based upon the expectations-augmented Phillips curve suggests that stimulative aggregate-demand policies will lead only to a transitory reduction in unemployment and a permanent increase in inflation. In other words, policymakers may keep the unemployment rate below the natural rate only by continuously accepting a higher rate of inflation. For, as we noted above, after the initial increase in prices and decline in unemployment, people will correct their price expectations and unemployment will begin to rise back toward the natural rate. At that time, another inflationary increase will be necessary to reduce unemployment again.

The expectations-augmented Phillips curve also suggests that government economic policies which lower nominal demand may reduce the rate of inflation, but only at the cost of a transitory increase in unemployment and a corresponding loss of output, until price expectations adjust to the lower sustained rate of inflation. A major policy question concerns what employment path should be followed, since it is possible to reduce inflation more quickly with a more restrictive policy. According to a Brookings Institute study, several econometric models produce a consensus estimate of the natural rate of unemployment between 5.5 and 6.0 percent. If, then, policy measures hold the unemployment rate one point above the natural rate, inflation can be reduced on average by about 0.3 percentage points a year. Put somewhat differently, the inflation rate will be one percentage point lower if the unemployment rate remains between 6.5 and 7.0 percent for three years' time. The additional unemployment implies a loss of \$50 billion to \$60 billion a year in output in today's economy.

Some economists question these results — especially those who believe that the natural-rate hypothesis is not accurately captured in the expectations-augmented Phillips curve. Instead, they would suggest a "third generation" model to incorporate the notion of rational expectations — a viewpoint which will be covered in a subsequent article. Nevertheless, practically all economists would agree today that the road to lower inflation is bound to be an arduous one.

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