# Tobin's Modified Phillips Curve

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Modified version of Phillip's curve emerged as a result of policy trade-off put forward by Phillip's curve. Before dealing with the modified version let's have a brief discussion on the original version (Phillip's Curve)
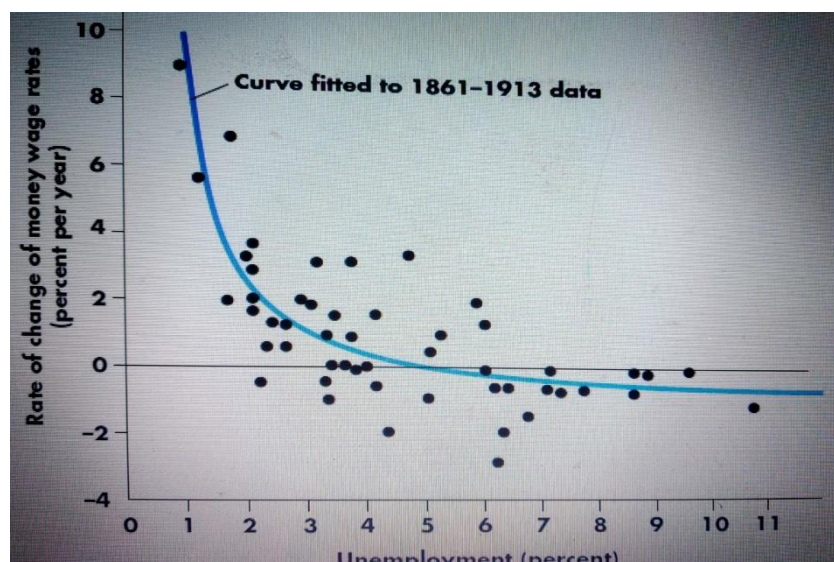
## Phillips Curve

The concept of Phillips curve was given by A.W.Phillips in 1958. He published a comprehensive study of wage behaviour in the United Kingdom for the years 1861-1957. The main findings as summarised from his article "The relation between Unemployment and Rate of Changes in Money Wages in the United Kingdom, 1861-1957" states:

*The Phillips curve is an inverse relationship between the rate of unemployment and the rate of increase in money wages. The higher the rate of unemployment, the lower the rate of wage inflation. In other words, there is a trade-off between wage inflation and unemployment.*

The Phillips curve shows that the rate of wage inflation decreases with the unemployment rate. Letting $W_t$ be the wage this period, and $W_{t+1}$ the wage next period, the rate of wage inflation, $g_w$, is defined as
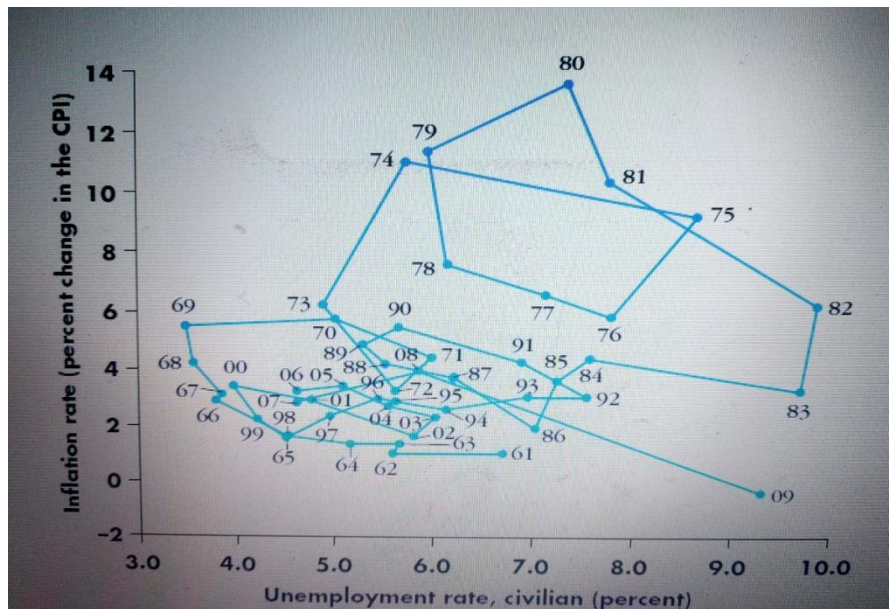
$$g_w = \frac{W_{t+1} - W_t}{W_t}$$

If u$^*$ represents the natural rate of unemployment, Phillips curve can also be written as

$$g_w = - \in (u - u^*)$$

where $\in$ measures the responsiveness of wages to unemployment. This equation states that wages are falling when the unemployment rate exceeds the natural rate, that is, when $u > u *$, and rising when unemployment is below the natural rate. The difference between unemployment and the natural rate, $u - u *$, is called the *unemployment gap.*

## Modified Phillips Curve

The simple Phillips curve relationship fell apart after the 1960s, both in Britain and in the United States. Following figure shows the behaviour of inflation and unemployment in the United States over the period since 1960. The data for the 1970s and 1980s do not fit the simple Phillips curve story.



The possible explanation of the divergence between the two graphs is the concept of expected or anticipated inflation. When workers and firms bargain over wages, they are concerned with the real value of the wage, so both sides are more or less willing to adjust the level of the nominal wage for any inflation expected over the contract period. Unemployment depends not on the level of inflation but, rather, on the excess of inflation over what was expected.

For example: let us assume that employer of Company X announces a 3 percent increase in wages. 3 percent increase appears to be a nice increase. Further let us assume that inflation has been running at 10 percent and is expected to continue at this rate. If cost of living rises at 10 percent while nominal wages increase only by 3 percent, the standard of living of the employees of Company X is actually going to fall, by about 7 percent (10 percent − 3 percent).

In other words, we can say that we are more concerned about wage increases *in excess* of expected inflation. We can rewrite the original wage-inflation Phillips curve equation, to show that it is the excess of wage inflation over expected inflation that matters as follows:

$$g_w - \pi^e = -\in (u - u^*)$$

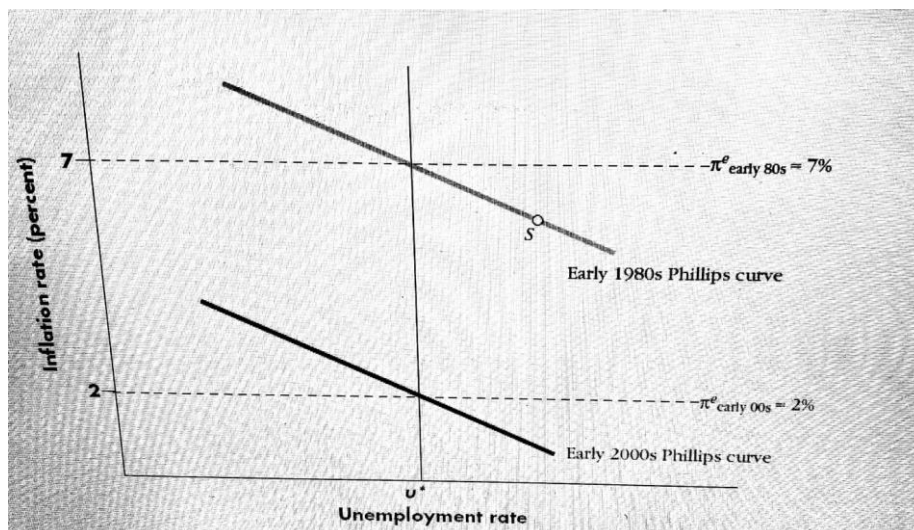where $\pi^e$ is the level of expected price inflation

Maintaining the assumption of a constant real wage, actual inflation $\Pi$, will equal wage inflation. Thus, the equation for the modern version of the Phillips curve/modified Phillips Curve/, the (inflation-) expectations-augmented Phillips curve, is

$$\pi = \pi^e - \in (u - u^*)$$

Two critical properties can be noted from modified version of Phillips Curve:

• Expected inflation is passed one for one into actual inflation.
• Unemployment is at the natural rate when actual inflation equals expected inflation.

We have now an additional factor determining the height of the short-run Phillips curve (and the corresponding short-run aggregate supply curve). Instead of intersecting the natural rate of unemployment at zero, the modern/modified Phillips curve intersects the natural rate at the level of expected inflation. Following figure shows the Phillips curves for the early 1980s and early 2000s. Firms and workers adjust their expectations of inflation in light of the recent history of inflation.

The curves have two properties:
First, the curves have the same short-run tradeoff between unemployment and inflation; that is to say, the slopes are equal.

Second, in the early oughts full employment was compatible with roughly 2 percent annual inflation; in the early 1980s full employment was compatible with roughly 7 percent inflation.

The height of the short-run Phillips curve, the level of expected inflation, $\Pi^e$, moves up and down over time in response to the changing expectations of firms and workers.
The role of expected inflation in moving the Phillips curve adds another automatic adjustment mechanism to the aggregate supply side of the economy. When high aggregate demand moves the economy up and to the left along the short-run Phillips curve, inflation results. If the inflation persists, people come to expect inflation in the future
($\Pi^e$ rises) and the short-run Phillips curve moves up.