The (non) disappearing Phillips Curve: why it matters

Gavyn Davies, *Financial Times*, 22/10/2017

The existence, and recent disappearance, of the Phillips Curve is the hottest topic among macro investors and policy makers at the moment. In the latest Peterson Institute conference in Washington, a stellar cast of macroeconomists debated a central question: has the relationship between inflation and unemployment broken down, and if so what does this mean for interest rate policy? Recent experience of lowflation in the US is central to this question, but it has also reared its head in the Eurozone, Japan and many other countries.

Lawrence Summers, in typically incisive fashion, put his finger on the crux of the matter. He asked the economic panel to imagine being transported 5 years into the future, and then being asked to assess the debates of 2017. With the benefit of hindsight, would economists conclude that the Phillips Curve (PC) had been thrown off course for a period, only to re-assert itself later? Or would they conclude that the whole PC framework had broken down by 2017, and had been replaced by a brand new inflation mechanism. And, if so, what would be the new paradigm?

The answers given by the panel to Summers' question were sharply divided:

• Olivier Blanchard gave the answer to be expected from someone who still firmly believes in the New Keynesian framework that underpins monetary policy throughout the world. He thinks that the Phillips Curve still exists, though it can be hard to pin down. This certainly also reflects Janet Yellen's view.

• Lael Brainard, a dovish Fed Governor, seemed to have doubts about the slope of the PC and suggested that inflation is generated by a process somewhat unconnected to unemployment. She and Neel Kashkari are two FOMC members who have been arguing that the underlying inflation rate may have fallen this year, presumably for structural reasons. The markets also seem sympathetic to this view.

• Mario Draghi (disappointingly) refused to grapple with the question, saying that, either way, he remained dovish!

• Larry Summers himself seemed sceptical about the reliability of the PC, pointing to recent real world examples, including Japan, where it may have broken down. But he was not quite ready to jettison it altogether.

In this blog, I want to comment on two aspects of the debate.

• First, I want to cast doubt on whether we should expect to observe the PC in actual data, even if it exists somewhere in the underlying model that actually describes the behaviour of the economy. The fact that it may not show up on a casual inspection of the data does not mean that it does not exist.

• Second, I want to argue that the existence of the PC is essential for conduct of modern monetary policy. Without the PC, the whole complicated paraphanalia that underpins central bank policy suddenly looks very shaky. For this reason, the PC will not be abandoned lightly by policy makers.

1. Why We May Not Observe the Phillips Curve in Macro Data

There is a great deal of casual commentary about the PC that relies on a simple proposition: if it exists in the economy, rather than just in our macro models, we should be able to observe it in the actual data for unemployment and (wage or price)

inflation. These variables, on this simple analysis, should be negatively correlated on a graph showing how the two series have behaved in the past. In many countries and many time periods, the PC has indeed been visible. However, in the US, the negative correlation seems to have become much less steep in recent years. Here is a typical graph, showing that since 2010, the PC has been very flat:

U.S.: Average wage growth has been unusually slow since 2010
Phillips curve defined as relationship between unemployment rate
and average hourly earnings growth (1998-2017)
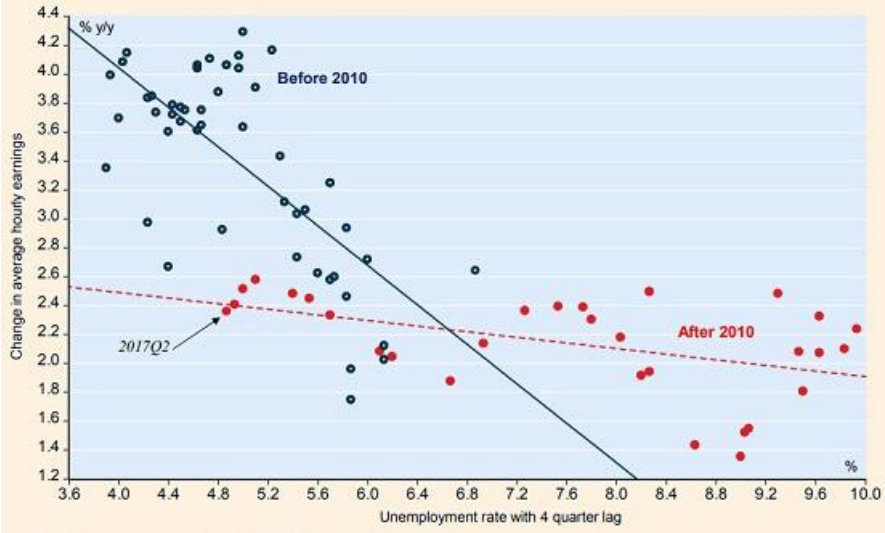
NBF Economics and Strategy (data via BLS and Atlanta Fed)

However, these simple graphs can be very misleading. Each point on the graph is determined by complex shifts in many underlying variables, including inflation expectations, the natural rate of unemployment and import prices. The actual correlation between unemployment and inflation that emerges over any given period depends on how these different variables behave relative to each other. In simple terms, the behaviour of inflation can be driven by these other variables, which can swamp the impact of unemployment for a time.

There are two ways of seeing that this might be the case. In Appendix I, consider the standard equation for the PC, taken from a recent paper by Olivier Blanchard. Note that price inflation is indeed determined in part by the unemployment gap, but it is also driven by inflation expectations, the history of inflation, import prices, and a random shock variable. Any of these other variables might be acting to reduce inflation, more than offsetting the tendency for falling unemployment to raise inflation. If so, the observed "Phillips Curve" will be flat or upward sloping, even though falling unemployment, taken in isolation, would increase inflation.

The second way of seeing this is the case is from the graphs in Appendix 2. I will leave that one to the geeks!

2. Why It Matters

If the "observed" PC can in fact appear to slope in any direction, depending on the circumstances, why does it matter? Basically, because it is the bedrock of all the New Keynesian (NK) models that underpin monetary policy in all of the major central banks today. Remove the PC, and the central bankers are floundering.

Stripped of complications, the NK model can be reduced to three basic equations. The first is the PC itself, as shown in Appendix 1. The second is an equation that determines aggregate demand, known as the IS curve.

This has a negative relationship between demand and real interest rates. The third is an equation that determines the setting of interest rates, known as the Taylor Rule. This says that interest rates should be increased when inflation is above target, or unemployment is below target. This framework assumes that wages and prices are not completely flexible, but respond over time to signals from excess supply and demand in the market economy.

The 3 equation NK model, and more sophisticated versions of it, produce a determinate solution for interest rates, inflation and unemployment. The model is well understood in theory, and has been widely tested in practice. It is the basis for central bank thinking and public communications about policy.

However, if we take away a crucial feature of the PC, by assuming that unemployment has no effect on inflation within the relevant range, we enter very uncomfortable new territory. My Fulcrum colleagues Juan Antolin-Diaz, Thomas Drechsel and Ivan Petrella have been working on the theory. If the coefficient on unemployment is literally zero - admittedly an extreme case - then inflation is wholly determined by inflation expectations. Since inflation is disconnected from the real side of the economy, self-fulfilling beliefs are likely to become a key driver for inflation. Therefore the inflation rate becomes hard to predict.

Furthermore, the central bank has no direct way of influencing inflation, other than via rather empty public communications. Real interest rates are set at the equilibrium real rate, so that unemployment remains as close as possible to the natural rate, and nominal interest rates simply add expected inflation to r^*. The central bank would not follow a Taylor Rule of the traditional variety. The FOMC would in fact target unemployment, and passively accept the consequences for interest rates by adding expected inflation to r^*.

It is obviously very hard to believe that real life central bankers will accept these rather drastic consequences, and therefore hard to see them being willing to abandon the PC altogether. In the absence of any type of developed alternative, officials like Janet Yellen will fight tooth and nail to avoid ditching the PC. Instead, they will continue to argue that the PC will reappear at low unemployment rates, and may be non linear, suggesting that inflation could suddenly rise sharply if unemployment is allowed to drop too far.

This still leaves policy in an uncomfortable place for as long as the PC seems to be absent in real world data. But next week I will argue that there is, in fact, considerable empirical evidence suggesting that the PC is not defunct, it is just in hiding.

Appendix 1
The Phillips Curve in Modern Macro Models

Since the estimation of the US Phillips curve by Paul Samuelson and Robert Solow, macroeconomists have learned, often painfully, that while low unemployment creates inflation pressure, the form of the relation can change and has changed over time. To examine its evolution, we estimated the following specification in Blanchard, Cerutti, and Summers (2015):

$$\pi_t = \theta_t(u_t - u_t^*) + \lambda_t \pi_t^e + (1-\lambda_t)\pi^*_{t-1} + \mu_t \pi_{mt} + \varepsilon_t \qquad (1)$$

$$\pi_t^e = \alpha_t + \beta_t \pi^*_{t-1} + \eta_t \qquad (2)$$

where π_t is headline consumer price inflation (defined as quarterly inflation, annualized), u_t is the unemployment rate, u_t^* is the natural rate, π_t^e is long-term inflation expectations, π^*_{t-1} is the average of the last four quarterly inflation rates, π_{mt} is import price inflation relative to headline inflation, and the parameters λ_t, θ_t, μ_t, β_t, α_t, and the natural rate u_t^* follow constrained random walks.

Source: Olivier Blanchard, Peterson Policy Brief, 16-1

Appendix 2

The following graphs show how the "Phillips Curve" that manifests itself in published economic data may appear to exhibit a positive relationship between unemployment and inflation, or no relationship at all, even when the underlying short run PC in the model actually has a negative relationship, as suggested in the standard model.

1) Standard Expectations Augmented Phillips Curve
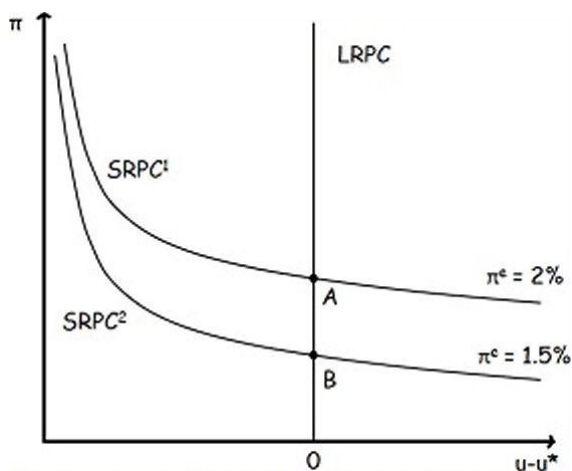
2) What Happens When Unemployment Falls By 1 Percentage Point
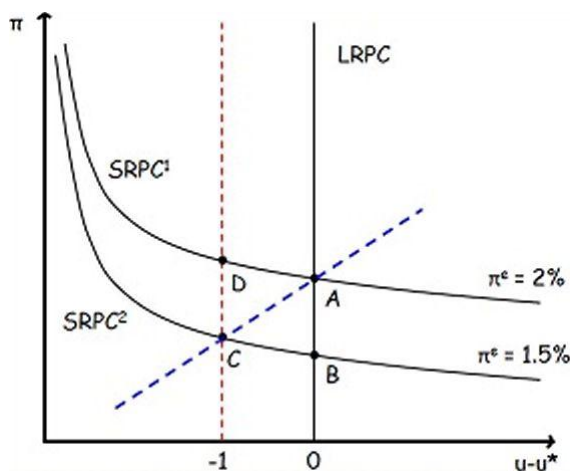
Note LRPC = Long Run Phillips Curve. SRPC = Short Run Phillips Curve, π = Price Inflation, π* = Expected Price Inflation, u = Unemployment Rate, u* = Natural Unemployment Rate Source: Fulcrum Asset Management.

In Graph 1, we show the usual short run PCs that are downward sloping: higher unemployment, relative to the natural rate, reduces the inflation rate, for any given level of expected inflation. In the long run, unemployment tends towards its natural rate (so u-u*=0), and the inflation rate is determined by expected inflation, which in turn is set by the central bank's target. If we observe inflation and u in the long term, we see u as constant, and inflation moving with expected inflation. The PC is not observed.

In Graph 2, we start from point A, and then assume that two separate shocks occur. Unemployment is reduced by 1 percentage point compared to the natural rate as demand expands, and at the same time expected inflation drops to 1.5 per cent because of lower oil prices. The economy moves from A to C, where unemployment and inflation are both lower than at point A. Casual observation of the data suggests that there is a positive relationship between unemployment and inflation, when the real relationship is negative. This may be similar to what has happened in the US and other advanced economies in recent years.

Therefore, we should be careful to avoid making firm conclusions about the existence or disappearance of the PC from the observed behaviour of unemployment and inflation.