

HAVE MACROECONOMIC RULES OF THE GAME CHANGED? SOME CLUES FROM THE PHILLIPS CURVE

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Key Points

- Policy makers and analysts have not given up relying on the notion of a trade-off between inflation and economic activity, also called the Phillips curve.
- If policy relies on the relationship between inflation and economic slack, there is considerable latitude in interpreting the behaviour of the Phillips curve.
- The Phillips curve should be used to highlight the difficulties of conducting monetary policy in a low-inflation and low-economic-growth environment.
- The challenges in relying on the Phillips curve should also prompt more effort to better measure inflation pressure and the response of expectations.

An Enduring Idea

Students of macroeconomics will have heard about the central role played by the so-called Phillips curve in both theoretical and empirical analyses for almost 70 years. In 1958, A. W. Phillips reported an inverse relationship between changes in wages and the unemployment rate (Phillips 1958). The progeny of his thinking led to a revolution both in policy making and in the development of theoretical links between the real and nominal macroeconomic variables. Names such as Samuelson, Solow, Phelps, Friedman, Lucas and Sargent became associated with refinements and enhancements of the core finding reported by Phillips. Indeed, all of these economists went on to become Nobel laureates in economics, although not exclusively because of their contributions to the analysis of what has since been called the Phillips curve.¹

Indeed, the concept is so influential that it spawned several different versions of the trade-off used to guide policy makers as a menu for the choices they face when deciding whether the gains from lower inflation are offset by the economic costs of higher unemployment. Initially, expectations of individuals or firms were ignored. This briefly gave policy makers the impression that they could simply select an inflation-unemployment combination and implement the necessary policy mix to achieve the desired outcome. Once a role for expectations was incorporated, debate centred on how forward-looking individuals are. The more forward-looking, the less likely it was that policy makers would be able to “exploit” the trade-off because, unless wages rose in purchasing-power terms, the gains from lower unemployment would, at best, be temporary once workers realized that the higher inflation, at unchanged wages, actually drives real wages down. Indeed, the pendulum swung all the way to the conclusion — reached by the 1970s and early 1980s — that the Phillips curve was illusory and there was no trade-off policy makers could exploit.

The pendulum began to swing back as several forces combined and took hold. The widespread acceptance of low and stable inflation, the desirability of an independent central bank insulated from the political pressure to inflate, and an increasingly passive fiscal policy, created an environment that focused on a

¹ Irving Fisher (1973) actually reported a relationship between inflation and unemployment rates in 1926. Also worth adding is Richard G. Lipsey's (1960) important contribution.



Phillips curve that revived the existence of a trade-off, but one that could only be exploited in the short to medium term. A consensus developed, in the form of the New Keynesian Phillips curve (NKPC) (Woodford 2003), which supported the notion that the trade-off between inflation and unemployment did not exist in the “long run.”²

The NKPC survived many critics, even before the global financial crisis (GFC) of 2007–2009 raised considerable doubts about the underpinnings of macroeconomic analysis more generally. Yet, the Phillips curve continues to survive as a central element of the way central banks think about the impact of their policies on output and employment and the prospect for monetary policy to assist the global economy to a semblance of normality. Indeed, if the recent evidence of Olivier Blanchard (2016), and Olivier Blanchard, Eugenio Cerutti and Lawrence Summers (2015) is taken seriously, the venerable Phillips curve may still be alive, but not so well. In particular, their findings suggest that policy makers are placing insufficient emphasis on output developments.³

Janet Yellen (2015), chair of the US Federal Reserve’s Federal Open Market Committee (FOMC), in extensive remarks delivered last year, summarized her views as follows: “economic slack...cause[s] core inflation to deviate from a longer-run trend that is ultimately determined by longer-run expectations.”⁴ She adds later: “The Phillips-curve approach to forecasting inflation has a long history in economics, and it usefully informed monetary policy decision-making around the globe” (Yellen 2015). Also in 2015, Mark Carney, governor of the Bank of England, in remarks delivered at the Jackson Hole Conference held annually by the Federal Reserve Bank of Kansas, devoted considerable attention to studies of the Phillips curve relationship, in order to argue that the slope of the Phillips curve may have changed because of globalization.⁵ Mario Draghi, president of the European Central Bank, in a 2015 speech delivered at the euro zone’s equivalent of the Jackson Hole Symposium, also focused on the Phillips curve relationship but reported that the slope for the euro zone

changed in a different direction — becoming steeper over time.⁶ Indeed, post-crisis, much of the attention of central banks has been focused on how the Phillips curve relationship has shifted or changed direction. Further, in his last speech as senior deputy governor of the Bank of Canada, Tiff Macklem (2014) remarked that “explaining the current level of core inflation with the Phillips curve is not easy.”

This policy brief explores in more detail the enduring importance of the Phillips curve relationship and the challenges central bankers face in convincing the public that following this line of thought promotes best practice. The brief concludes with some recommendations concerning the usefulness of the Phillips curve as a paradigm for communicating monetary policy actions.

Will the Real Phillips Curve Please Stand Up?

A *New York Times* article late in 2015 asked: “How much faith should be placed in a line on a graph first drawn by a New Zealand economist nearly six decades ago, based on data on wages and employment in Britain dating to the 1860s?” (Irwin 2015). Indeed, contradicting Yellen’s speech referred to above, the same article offers the following assessment of the Phillips curve: “It doesn’t work. Or at least, it hasn’t worked very well in the last few decades in the United States. And it has proved particularly problematic to try to use that historical relationship to predict where inflation is going” (*ibid.*).

Since the United States has been the source of both the GFC and concern over when and how fast a return to “normal” conditions can take place, the focus of this policy brief will centre on US evidence although, of course, in a world where business cycles are more synchronous than ever and inflation is low in much of the world, the lessons learned are likely to be broadly applicable outside the United States. In addition, the period since Alan Greenspan became Fed chair will be examined, since this likely corresponds with the period when the Great Moderation was underway. Central to the debate, at least in terms of the empirical usefulness of the Phillips curve for policy analysis, are four issues. They are (not in order of importance): how to measure inflation; how to measure economic slack; the changing nature of the relationship; and the assumptions made about how price expectations are formed.

Figure 1 plots five different measures of inflation. Most individuals are familiar with the Consumer Price Index (CPI) since it is widely reported and the inflation mandate of many central banks is defined in these terms. Nevertheless, central

2 Milton Friedman (1977), in his Nobel lecture, also pointed out that higher inflation could lead to more volatile inflation. As a result, the long-run trade-off could well be positive (i.e., higher inflation is associated with higher unemployment rates).

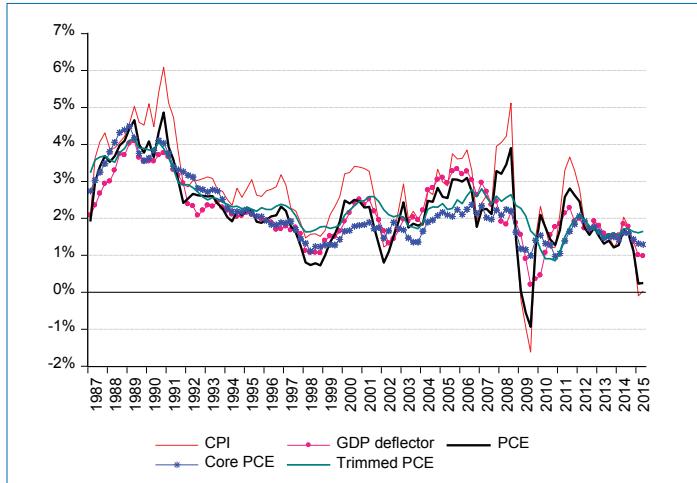
3 Blanchard (2016) suggests that the GFC did not change the slope of the Phillips curve while Blanchard, Cerutti and Summers (2015) suggest that inflation expectations have become relatively more important over time. However, inflation expectations can vary considerably and other formulations of the Phillips curve have been proposed.

4 There is no precise definition of the “long run” but Yellen, in the January 16, 2009 FOMC transcripts, is quoted as saying that the time horizon is longer than six years. See, for example, Klein (2015).

5 “Stronger competitive pressures might reduce the pricing power of domestic firms, limiting their ability to change prices over the cycle and so flatten the domestic Phillips Curve” (Carney 2015).

6 “Various estimates of the euro area Phillips curve show that, while the slope has varied over time, it has steepened in recent years. In particular, there is evidence that inflation has become increasingly responsive to cyclical conditions in countries that have reformed their product and labour markets” (Draghi 2015).

Figure 1: Varieties of Inflation Rates



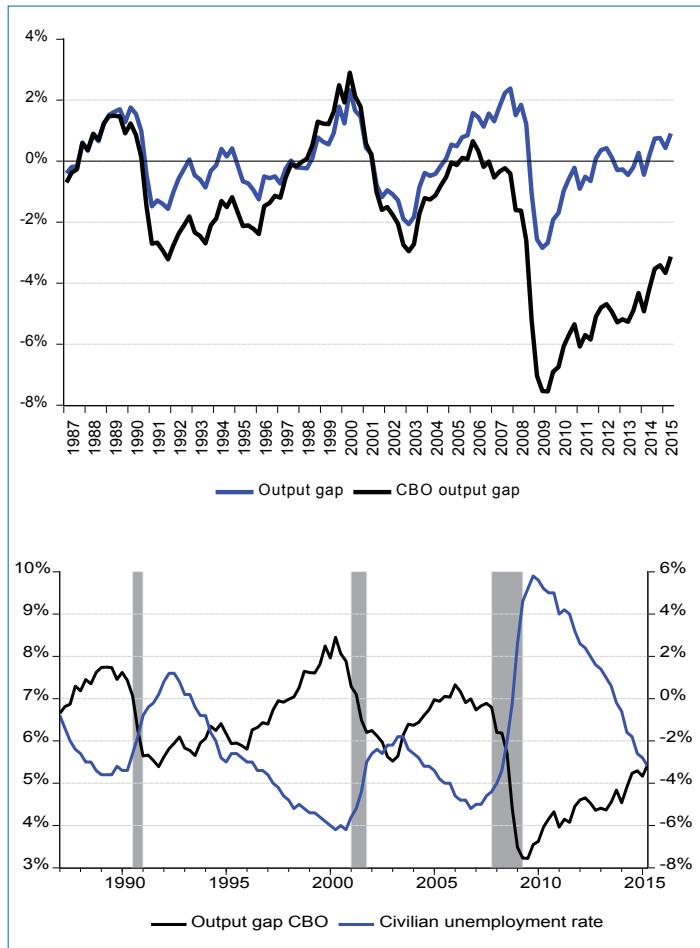
Sources: Federal Reserve Bank of St. Louis, Federal Reserve Economic Data and authors' calculations.

Note: All series are expressed in annualized rate of change form.

banks are also keenly aware, never more so than in the last two years, that supply-side shocks such as changes in oil and other commodity prices do not warrant a response unless the public's expectations of future inflation become unanchored. The reason is that, in the case of lower oil prices, inflation is reduced and the economy is given a boost. Unless the boost drives the economy to produce output that exceeds capacity, and if the price shock is temporary, there is no reason for the central bank to change its policy stance. Accordingly, removing these elements from CPI inflation gives rise to the core inflation measure that, as one can see from Figure 1, is smoother than CPI inflation. While it is true that the removed elements are on average more volatile — hence the relatively less volatile core inflation result — it is not the case that they always experience more volatility than other variables included in the CPI measure.

Still, CPI and core inflation rate measures have their own challenges because they may not adequately capture changes in consumer behaviour toward the purchase of goods and services, or they may include price changes that are the result of changes in interest rates prompted by changes in the policy stance of the central bank (for example, mortgages, consumer credit). In addition, it is not always the case that excluding food, energy and indirect taxes from inflation — resulting in core inflation — is necessarily the best way to exclude volatile items over time. As a result, some prefer a trimmed measure of inflation that leaves out any items deemed too volatile, while the US Federal Reserve prefers to communicate inflationary conditions using the personal consumption expenditures (PCE) measure of inflation. Regardless of the chosen inflation indicator, there are considerable differences between the various measures that analysts focus on.

Figure 2: Varieties of Macroeconomic Slack

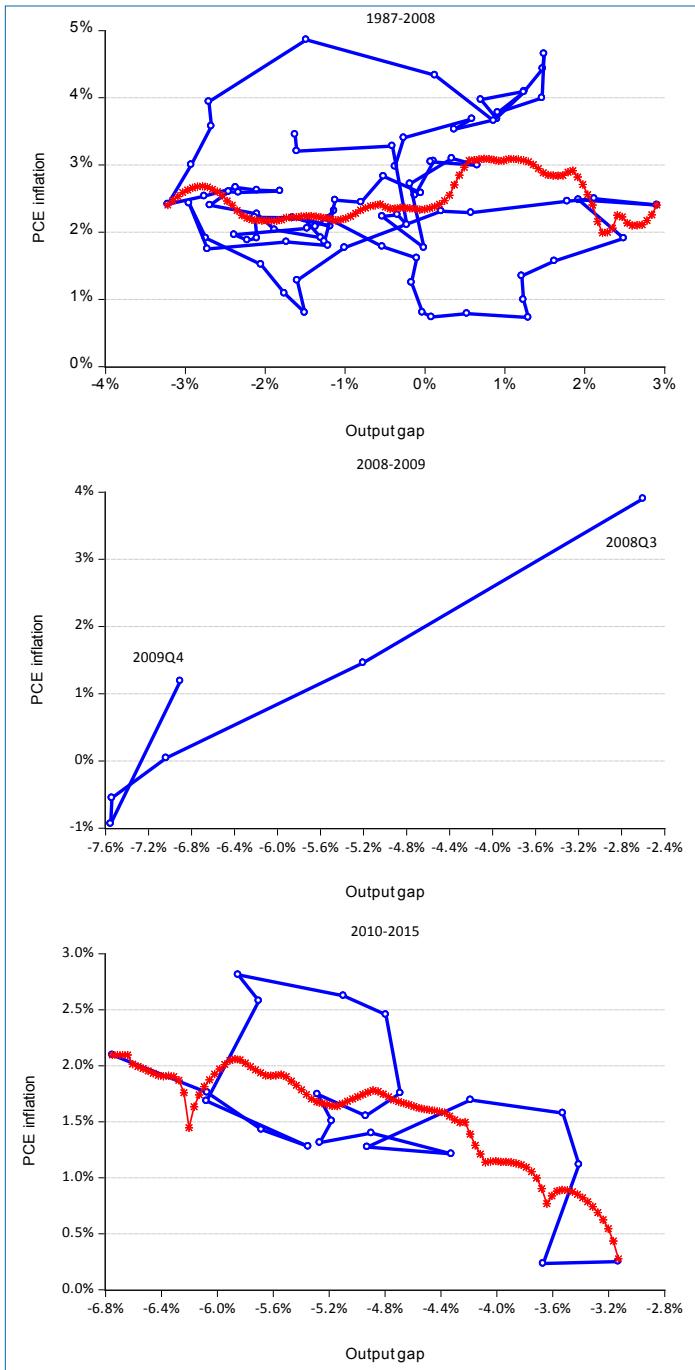


Sources: Same as in Figure 1.

Note: Both output gaps are the difference between (log) real GDP and (log) potential real GDP. CBO potential output is the CBO's estimates while the other series is the Hodrick-Prescott filtered estimate of potential output (smoothing parameter = 1,000,000). The shaded areas are the recession dates as identified by the National Bureau of Economic Research (NBER), www.nber.org.

Figure 2 considers the other half that makes up the Phillips curve, namely an indicator of economic slack. The top portion shows two proxies for the output gap, that is, the difference between potential real GDP and observed real GDP. Potential real GDP, unfortunately, is unobserved and must therefore be estimated. Consequently, the central bank's position about the output gap will be sensitive to what it believes potential output to be. Notice that one of the indicators shows a positive value for the output gap by 2015. In other words, the economy appears to be operating at excess capacity. This may provide some justification for the December 2015 Fed decision to raise its policy rate for the first time in a decade. In contrast, the output gap that is published by the Congressional Budget Office (CBO) shows a rapidly falling but still negative output

Figure 3: The Changing Phillips Curve



Sources: Same as Figure 1.

Note: The data are quarterly. The solid line is a non-linear estimate of the relationship between inflation and the output gaps using an Epanechnikov kernel fit. The CBO measure of the output gap and PCE inflation are used. The top figure is for the 1987Q1–2008Q2 sample, the middle figure is 2008Q3–2009Q4 and the bottom is 2010Q1–2015Q2.

gap in 2015. Both indicators, of course, show large negative output gap values during the 2007–2009 GFC.

The bottom portion of Figure 2 shows that the output gap and the unemployment rate — another potential measure of economic slack — move in opposite directions, as one would expect. Indeed, the relationship between the two has been one of the few stable ones to have survived the GFC. It is referred to as Okun's law.⁷

Clearly, if policy is partially predicated on the relationship between inflation and economic slack, there is considerable latitude in interpreting the behaviour of the Phillips curve. As revealed in Figure 3, there is no clear negative relationship between these two variables, with the notable exception of the period of the GFC.⁸ Indeed, while the circles, which identify pairs of inflation and output gaps in the three samples considered, fluctuate all over the space shown, the Phillips curve, the thick solid line, is either flat (pre-GFC) or slightly downward sloping (post-GFC). The latter relationship goes against the usual narrative of the Phillips curve. Perhaps it is this sort of evidence that has some prominent central bankers around the world puzzled about when they will be able to move away from the current state of ultra-low interest rates.

If the foregoing challenges are not enough, Figure 4 reveals that CPI inflation expectations are just as diverse as the underlying changes in purchasing power they purport to measure. The Greenbook of the Federal Reserve Board of Governors forecasts are those closely followed by the Fed,⁹ while the Michigan Survey attempts to find out what households think inflation will be in the coming year. Clearly, since the GFC, households believe that US inflation will be considerably higher than the inflation expectations published by the central bank and international agencies, namely the International Monetary Fund's World Economic Outlook and the Organisation for Economic Co-operation and Development (OECD). As noted previously, if expectations diverge, then the "location" of the Phillips curve is also in doubt, which further complicates the task of monetary policy implementation.

7 Named after the economist Arthur Okun, who describes a constant relationship between unemployment rates and changes in real economic activity. See Ball, Leigh and Loungani (2013) for recent evidence.

8 In Figure 2, the NBER recession dates are 2007Q4–2009Q2. Although there is no definitive dating of the GFC, the period from 2008Q3, when the Fed lowered its policy rate to the effective zero lower bound, until 2009Q4, by which time some of the Fed's most important unconventional policies had been introduced, seems reasonable.

9 They represent Fed staff forecasts as distinct from the forecasts of members of the Fed's policy-making committee. Greenbook forecasts are published with a lag. Hence, observations after 2010 are unavailable.

Finally, it is worth reminding readers that Phillips' original curve was in terms of wage growth, and not consumer price inflation. After all, even today, labour costs represent the lion's share of total costs. Hence, it is not surprising that there ought to be a connection between economic slack and wage growth. As illustrated in Figure 5, the dynamics of wage changes can differ substantially from those for inflation. This implies that a Phillips curve evaluated according to wage growth may look quite different from the standard type shown in Figure 3.

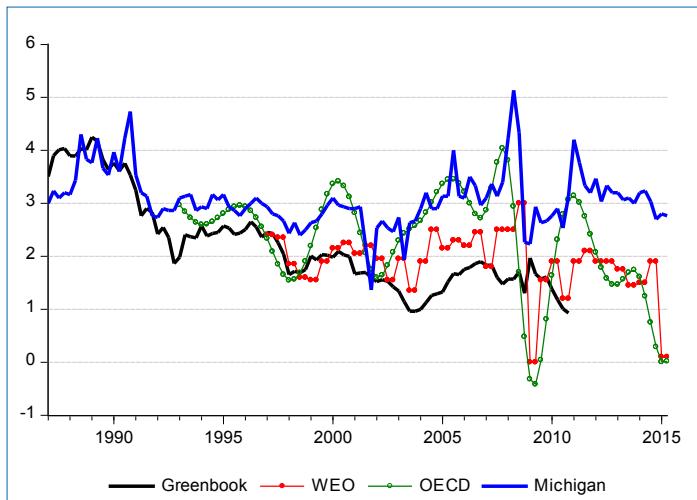
Conclusions and Recommendations

Central bankers are fond of explaining current economic conditions and the role of monetary policy relying on a relationship that was introduced to the profession almost 70 years ago. Nevertheless, the simplicity and seemingly intuitive explanation that negatively links inflation and economic slack faces numerous challenges in practice. Instead, central banks would be wise to use the Phillips curve to highlight the difficulties and uncertainties of conducting monetary policy in a world that is simultaneously experiencing low inflation and low economic growth.

More precisely, the authors' analysis suggests the following:

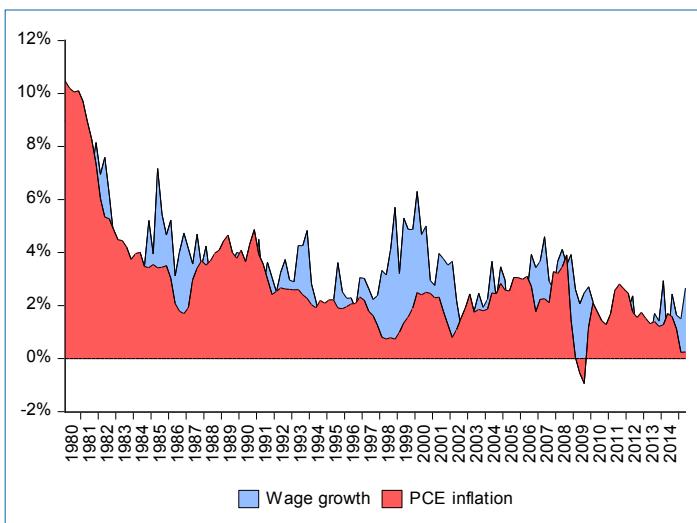
- Central banks should devote more effort to developing reliable measures of inflation instead of arbitrarily changing inflation targets. It should be noted that, as this is written, the Bank of Canada and the Swedish Riksbank, have been tasked with a similar project, namely to improve how accurately and reliably inflation should be measured. It could well be that multiple inflation measures will be required to properly communicate the stance of monetary policy.
- Central bankers should be more careful about the ability of the Phillips curve to explain inflation or as a framework that is useful to explain future inflation prospects. There are simply too many unobservable elements or components that are difficult to measure with precision. Indeed, the challenge of measuring the degree of economic slack alone renders the Phillips curve more fragile than is acknowledged.
- Differences in inflation expectations are so large — and not only in the United States (see Siklos 2016, forthcoming) — that they raise the concern that expectations may actually not be well anchored, contradicting what is believed by some central bankers. Ben Bernanke, former chair of the Fed's policy-making committee, once acknowledged as much (Bernanke 2007). Typically, empirical evidence relies on a single measure of expectations. However, in practice, governments, central banks and households can strongly disagree about the inflation outlook.

Figure 4: Varieties of Inflation Expectations



Source: Siklos (2016 forthcoming).

Figure 5: Wage Growth and Inflation



Sources: Same as Figure 1.

Note: Wage growth is the annualized rate of change in average hourly earnings.

- The original Phillips curve was stated in terms of wage growth. Given recent concerns in some quarters that wage growth has fallen behind inflation and the prospects for future sluggish growth are strong in view of low economic growth, central banks could offer useful suggestions about the appropriate policy mix between fiscal and monetary policy that would prevent the future erosion of real wage growth.

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