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Can the Phillips Curve Help Forecast Inflation?

During the early 1960s, many economists and policymakers believed that monetary policy could exploit a stable trade-off between the level of inflation and the unemployment rate. One version of the hypothesized trade-off, originally described by A.W. Phillips (1958) using U.K. data from 1861–1957, implied that policymakers could permanently lower the unemployment rate by generating higher inflation. Some years later, economists Edmund Phelps (1967) and Milton Friedman (1968), argued persuasively that any such trade-off was bound to be short-lived: once people came to expect the higher inflation, monetary policy could not keep the unemployment rate permanently below its equilibrium or “natural” level (i.e., the rate of unemployment that prevails when inflation expectations are confirmed). This claim was later borne out by the experience of the 1970s when rising U.S. inflation did not bring about the lower unemployment rates promised by the Phillips curve. On the contrary, higher inflation coincided with higher unemployment—a combination that became known as “stagflation.”

Though the Phelps-Friedman argument proved to be valid, there still remained the possibility of a short-run trade-off between inflation and unemployment. This idea led to the intellectual development of the short-run (or expectations-augmented) Phillips curve, which says that short-term movements in inflation and unemployment tend to go in opposite directions. When unemployment is below its equilibrium rate (indicating a tight labor market), inflation would be expected to rise. When unemployment is above its equilibrium rate (indicating a slack labor market), inflation would be expected to fall. The equilibrium unemployment rate is often referred to as the “NAIRU,” i.e., the Non-Accelerating Inflation Rate of Unemployment.

In a recent paper, Atkeson and Ohanian (2001) challenge the usefulness of the short-run Phillips curve as a tool for forecasting inflation. This *Economic Letter* summarizes their results and discusses some evidence regarding the empirical instability of the short-run Phillips curve.

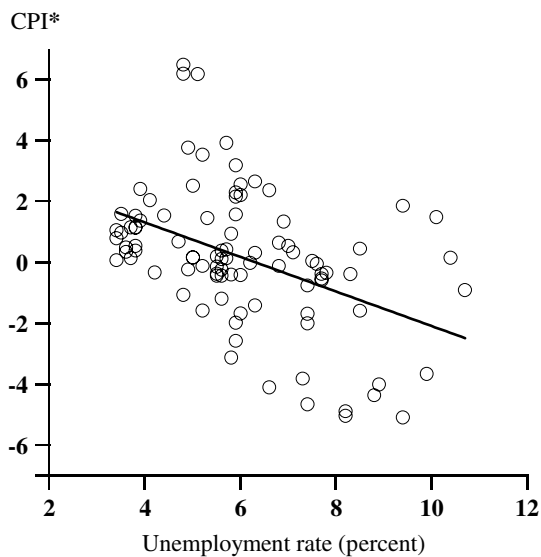
The Atkeson-Ohanian results

Atkeson and Ohanian (2001) argue that, similar to its long-run predecessor, the short-run Phillips curve does not represent a stable empirical relationship that can be exploited for the purpose of constructing reliable inflation forecasts. Their version of the short-run Phillips curve is obtained by regressing the four-quarter change in the inflation rate on the unemployment rate and a constant term. In each quarter, the most recent version of the regression equation is used to construct a forecast of average inflation over the next four quarters.

Atkeson and Ohanian (2001) show that the regression coefficient on the unemployment rate (which measures the slope of the short-run Phillips curve) varies substantially across different sample periods. In particular, they demonstrate that the regression coefficient is significantly negative in the 1960–1983 sample period, but close to zero in the post-1983 sample period. This result is depicted in Figures 1 and 2 where we see that the slope of the best-fit regression line is much flatter in the later sample period. A completely flat regression line would imply that there is no relationship between the current unemployment rate and future inflation.

Further evidence of empirical instability is shown in Figure 3 which plots the slope obtained from a series of 15-year rolling regressions (quarterly data from 1960 to 1974 are used for the initial regression). The point estimate of the slope parameter varies from a low of -1.17 to a high of $+0.05$. A positive value for the slope parameter turns the standard Phillips curve intuition on its head: when unemployment is below the NAIRU (indicating a tight labor market), inflation would be expected to fall, not rise. Although not shown in Figure 3, the constant term obtained from the regressions also varies substantially over the sample period. According to the model, the ratio of the constant term to the absolute value of the slope parameter is an estimate of the NAIRU. Hence, the regressions imply that the NAIRU has not been stable over time. Some possible explanations

Figure 1
Short-run Phillips curve 1960 to 1983



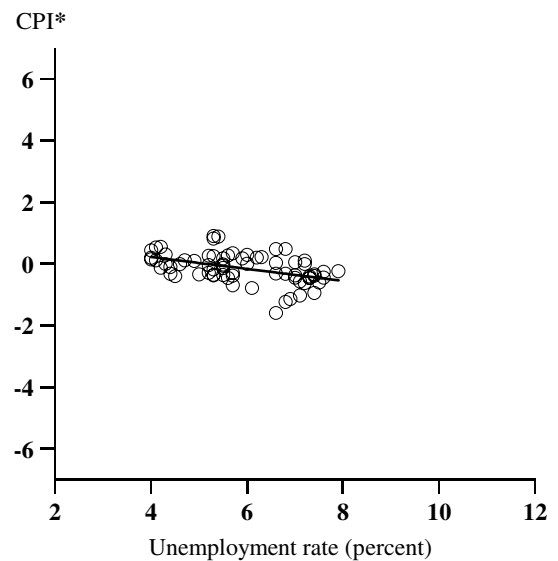
*4-quarter % change in core CPI inflation over the next year

for the empirical instability of the short-run Phillips curve include: (1) changes in the monetary policy regime that affect people's expectations of future inflation, (2) demographic shifts in the labor force that influence the level of the NAIRU, or (3) changes in worker productivity that affect the pass-through of wage growth to price inflation.

Using the most recent estimate of the short-run Phillips curve, Atkeson and Ohanian (2001) construct out-of-sample inflation forecasts from 1984 onwards. They find that the Phillips curve-based forecast underperforms a naive "no change" forecast, which says that inflation over the next year will be the same as it has been over the most recent four quarters. The naive forecast assumes that the current unemployment rate provides no useful information about future inflation. (The metric for assessing performance is the root-mean squared error of the inflation forecast.) The authors obtain similar results for a wide array of Phillips curve models that employ different measures of inflation, different measures of real economic activity (as an alternative to the unemployment rate), or additional lags of real economic activity. Finally, the authors show that the accuracy of the naive inflation forecast is essentially identical to the Federal Reserve Board staff's real-time inflation forecasts for the period 1984 to 1996.

Based on the above results, Atkeson and Ohanian (2001) conclude that inflation forecasts based on the Phillips curve should be abandoned. It should be noted that they do not advocate the adoption of the naive model as a structural economic relationship. Rather, they argue that policymakers

Figure 2
Short-run Phillips curve 1984 to 2002



*4-quarter % change in core CPI inflation over the next year

should be very skeptical of arguments to change monetary policy based on some particular version of the short-run Phillips curve.

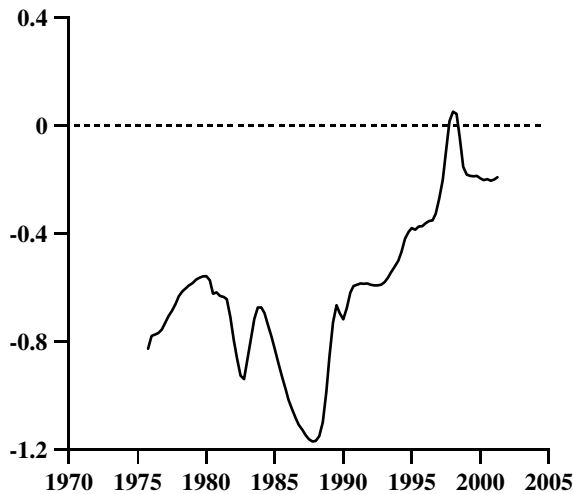
Robustness of the Atkeson-Ohanian results

One may wonder whether the conclusions of the Atkeson-Ohanian study are sensitive to the post-1983 time period over which the authors compare the out-of-sample inflation forecasts. A follow-up study by Fisher, Liu, and Zhou (2002) examines this issue. The authors confirm that the naive inflation forecast outperforms the Phillips curve forecast from 1985 to 2000, but find that the reverse holds true from 1977 to 1984. Over the period 1993 to 2000, the naive forecast again outperforms the Phillips curve forecast for a measure of inflation based on the core CPI (Consumer Price Index), but the reverse holds true for a measure of inflation based on the core PCE (Personal Consumption Expenditures) price index. The authors show that the naive model consistently *underperforms* the Phillips curve model when the inflation forecast horizon is shifted out to two years. Finally, the authors demonstrate that the Phillips curve model can correctly predict the direction of change of future inflation about 60–70% of the time. By construction, the naive model offers no information about the direction of change of future inflation.

The 1990s: a puzzle?

During the second half of the 1990s, the U.S. economy exhibited low and falling inflation combined with low and falling unemployment. At the time, many commentators and economists viewed this combination as a puzzle or a breakdown in the

Figure 3
Slope of short-run Phillips curve from 15-year rolling regressions



short-run Phillips curve. A study by Brayton, et al. (1999), for example, shows that the standard Phillips curve model consistently overpredicted inflation during the late 1990s when the unemployment rate was dropping to 30-year lows.

One factor that could help account for the late 1990s breakdown in the short-run Phillips curve is an acceleration in the trend growth rate of worker productivity—perhaps driven by the advent of new technologies associated with the so-called “new economy.” Recent empirical studies by Staiger, Stock, and Watson (2001) and Ball and Mankiw (2002) present evidence of a potential link between movements in trend productivity growth and movements in the NAIRU. According to these authors, augmenting the standard Phillips curve model to incorporate a declining NAIRU during the second half of the 1990s would help account for the unusual inflation-unemployment experience in those years (for a related study, see Lansing 2000).

Conclusion

During the 1970s, inflation and unemployment both trended upward for an entire decade. This observation led economists to abandon the notion of a stable long-run trade-off between the two variables. Nevertheless, the evidence continued to support the existence of a short-run trade-off between inflation and unemployment, albeit one where the slope of the curve appears to change over time. During the second half of the 1990s, the short-run trade-off also appeared to break down when extremely low unemployment rates did not bring about the predicted increase in inflation. This breakdown has drawn attention to an augmented

Phillips curve model that incorporates a time-varying NAIRU.

The need to update the short-run Phillips curve to account for changes in slope or changes in the NAIRU (neither of which can be observed in real time) poses a difficult challenge for anyone who wishes to use the model for the purpose of forecasting inflation. Even within a given sample period, the large amount of scatter around the best-fit regression lines shown in Figures 1 and 2 reveals the fundamental imprecision of the inflation-unemployment relationship. In light of these difficulties, the short-run Phillips curve should be viewed as a limited tool for forecasting purposes. The evidence suggests that the short-run Phillips curve is more likely to be useful for forecasting the direction of change of future inflation rather than forecasting the actual magnitude of future inflation.

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