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Phillips curve relationship in an emerging economy: Evidence from India[☆]

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ABSTRACT

This paper revisits the issue of determinants of inflation in a major emerging economy in a Phillips curve framework against the backdrop of an intense global debate on the weakening inflation-output relationship, and makes two key contributions in relation to existing studies. First, with the Indian central bank moving towards a flexible inflation targeting framework based on the consumer price index (CPI) inflation, this paper is the first attempt in the Indian context to model dynamics of the CPI inflation. Second, in view of the recent international evidence that the observed flattening of the Phillips curve might more be an artefact of the national inflation rates being the target of monetary policy, and limited data span for the new CPI inflation series, this paper explores the Phillips curve relationship in India using sub-national data in a panel framework. The estimates in this paper confirm the presence of a conventional Phillips curve specification. Excess demand conditions have the expected hardening effect on inflation. Exchange rate movements are also found to impact inflation.

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1. Introduction

A forward-looking assessment of inflation is a critical input for an effective conduct and formulation of monetary policy. The Phillips curve framework relating inflation to economic activity and other determinants such as exchange rate has been used extensively to study the inflation dynamics in both emerging and advanced economies. More recently, despite highly accommodative monetary policies and closing resource gaps, inflation has remained persistently low in major advanced economies such as the US since the early 2010s, raising questions over the utility of the Phillips curve framework for the monetary policy authorities. For example, Brainard (2017) is of the view that “in today’s economy, there are reasons to worry that the Phillips curve will not prove very reliable in boosting inflation as resource utilisation tightens”.

Against the backdrop of this vigorous debate of a flattening or a vanishing Phillips curve in major advanced economies, this paper attempts to assess the universality of such claims by focussing attention on inflation-output dynamics in a major emerging economy (India). Apart from the interesting international debate, the paper is also motivated by recent major reforms in the Indian monetary policy framework. In India, the focus of most of the Phillips curve studies has been on wholesale price index (WPI) as an indicator of inflation. With the move towards consumer price index (CPI) based flexible inflation targeting (FIT) beginning 2014, the determinants of CPI inflation and its forecasts assume critical importance. The

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shift of the monetary policy framework towards the FIT regime was motivated by the jump in inflation – measured by consumer price index for industrial workers (CPI-IW) – from an average of below 5% during 2000–2008 to over 10% in the next five years (2008–2013).¹ During the latter period, inflation in India was highest amongst the G-20 countries. Consequently, household inflation expectations had risen sharply and remained at elevated levels. High and persistent inflation had a deleterious impact on financial savings, the current account balance and external sector sustainability, and the poor sections of the population. Against this backdrop of high inflation, the Reserve Bank of India switched from its multiple indicator approach to the FIT regime beginning 2014 in order to anchor inflation expectations and reduce inflation on a durable and sustained basis (RBI, 2014a, b, 2016). Given these fundamental shifts in the monetary policy framework towards a CPI-based inflation targeting framework, a key objective of this paper is, therefore, to understand the drivers of the new CPI inflation series introduced recently in a more robust framework.

The focus of the Phillips curve studies has typically been on the national level relationship, both in the Indian and the cross-country context. More recently, a number of studies have attempted to assess this relationship using the sub-national level data for a variety of reasons. First, the relatively more variability at sub-national levels in both inflation and output indicators as also more data points provide a rationale for examining this relationship using the sub-national level data. Second, a possible weakening of the inflation-output relationship at the national level could arise if the central bank is successful in keeping the national inflation close to its target; in such a scenario, swings in economic activity (above or below potential) may be only weakly associated with movements in the national level inflation, thereby weakening the inflation-output nexus. At the same time, the continued dispersion in sub-national data on inflation – not the central bank's target *per se* – can still provide the researchers an avenue to explore the inflation-output dynamics. While such sub-national level studies have been undertaken in the context of the US and a few other countries, such an endeavour has not been attempted in the Indian context.

This paper empirically assesses the Phillips curve relationship for CPI inflation in India using state-level data in a panel framework. The structure of the paper is as follows: this introductory section is followed (Section 2) by a brief review of the recent literature on the Phillips curve studies. A discussion of empirical methodology, and data sources and properties are in Section 3. Empirical results across various specifications are presented and analysed in Section 4, with concluding observations in Section 5.

2. Phillips curve framework: A review

The Phillips curve framework relating inflation to economic activity continues to be the workhorse model for understanding inflation dynamics, even as it has faced a number of challenges in the past and is confronted with new complexities in the aftermath of the Great Recession (Stock and Watson, 2009). Inflation in the major advanced economies has deviated persistently from the forecasts from the conventional Phillips curve specifications since 2008: actual inflation during 2009–2010 was higher than expected, while in the more recent period, especially in the US, inflation has turned out to be lower than expected. The years 2009 and 2010 were marked by the phenomenon of “missing deflation” in the US and other major advanced economies: given the large unemployment and output gaps, the Phillips curve framework would have predicted a sharp decline in inflation (or, even outright deflation), whereas the actual core inflation was close to its 2008 level (Ball and Mazumder, 2015). On the other hand, with the unemployment rate falling to almost 4% in the US by 2017, well-below its natural rate, an emergence of inflationary pressures was expected, but inflation has actually turned out to be quiescent.

Although the “US Phillips curve is alive and well (or at least as well as it has been in the past)”, its inability to fully explain inflation dynamics as well as its flattening “raises serious challenges for monetary policy in the future” (Blanchard, 2016 pp. 31 and 34). A number of alternative explanations have been offered for the missing deflation/inflation phenomenon: well-anchored inflation expectations and a flattening of the Phillips curve (Blanchard et al., 2015); the short-term unemployment rate (which has exhibited significantly lower decline than the overall unemployment rate) matters more for inflation than the overall unemployment rate (Ball and Mazumder, 2015); the inflation expectations of households (which are more volatile and elevated) matter and not the relatively stable expectations of financial markets (Coibion and Gorodnichenko, 2015); the Phillips curve might be convex, with the response of inflation to demand conditions being quite muted during recessions *vis-à-vis* expansions (Gross and Semmler, 2017); the nonlinearity could be more complicated and a three-regime threshold regression might better characterise inflation-output dynamics, with the relationship breaking down at high unemployment levels (Donayre and Panovska, 2016). Appropriate Phillips curve specifications, therefore, appear to remain relevant in explaining the recent inflation dynamics in advanced economies.

The weakening link between domestic inflation and domestic activity could also be due to the globalisation phenomenon – not only domestic but global factors need to be factored in appropriately (Bobeica and Jarociński, 2017). Import and oil prices – typically included in the Phillips curve specifications to capture supply shocks – may not capture the influence of global factors on domestic prices appropriately and their impact can be better captured by directly including an indicator

¹ In India, a number of price indices are available to measure inflation, aimed with specific objectives. First, WPI, the oldest price index in India, uses the first point of bulk sale in the domestic market and can be viewed as a proxy for the producer prices. This index was, until 2013, the key indicator for the formulation and conduct of monetary policy. Second, at present, there are four indices for measuring consumer prices: CPI-IW aimed at industrial workers; consumer price index for agricultural labourers (CPI-AL); consumer price index for rural labourers (CPI-RL); and, CPI-C released in 2010 provides a comprehensive view of inflation movements for the country as a whole (Das and George, 2017).

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