Forecasting inflation using survey expectations and target inflation: Evidence for Brazil and Turkey[☆]

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ABSTRACT

In this paper, we formulate a statistical model of inflation that combines data on survey expectations with the inflation target set by central banks. Our model produces inflation forecasts that are aligned with survey expectations, thus integrating the predictive power of the survey expectations into the baseline model. Furthermore, we incorporate the inflation target set by the monetary authority in order to examine the effectiveness of monetary policy in forming inflation expectations, and therefore, in predicting inflation accurately. The results indicate that the predictive power of the proposed framework is superior to that of the model without survey expectations, as well as to the performances of several popular benchmarks, such as the backward- and forward-looking Phillips curves and a naïve forecasting rule.

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1. Introduction

Having an understanding of the expectations of economic agents is key when predicting inflation. The importance of expectations is amplified further for many emerging markets, given their relatively recent transitions to inflation targeting regimes. In this paper, we formulate a statistically coherent model of inflation that combines data on survey expectations for inflation. Our model produces inflation forecasts that are aligned with survey expectations, thus integrating the predictive power of the survey expectations with the statistical model. Furthermore, we

also incorporate the inflation target set by the monetary authority, in order to examine the effectiveness of monetary policy in forming inflation expectations, and therefore, in predicting inflation accurately. This model allows us to examine the deviation of inflation expectations and target inflation as a way of judging inflation targeting performances, and to develop a framework for forecasting the term structure of inflation expectations.

In our empirical investigation, we focus on two key emerging economies, Brazil and Turkey. While the inflation experiences of the two countries over the last decade are similar, there are certain differences which we aim to pinpoint using our framework. The inflation process seems to behave in a more volatile manner in Turkey than in Brazil, partly because of a large seasonal component, with an unconditional mean of the annual inflation rate of 8.2% (5.4% for Brazil) accompanied by a unconditional standard deviation of 9.4% (2.7% for Brazil). This difference in the structures of these two markets enables us to examine the importance of survey-based expectations for predicting

inflation in different types of emerging markets. We evaluate the model's performance by comparing it with those of several benchmark models that have proved useful for predicting inflation. The results for Turkey imply that the proposed framework outperforms all of the benchmark models. For Brazil, the results are more ambiguous. Nevertheless, our framework for Brazil performs at least as well as the best performing benchmark models, with better predictions for some variants that involve additional information regarding global inflation and the business cycle.

In our analysis, we control for changes in trend inflation in order to account for the transition from high inflationary periods to periods of lower and more stable inflation for the economies in question. The seasonal variation in the inflation data is modeled explicitly as well. Since macroeconomic data for emerging economies are often available without any seasonal adjustment, implementing a seasonal adjustment based on an arbitrary moving average filter may obscure the inference. By dealing with seasonality together with the other components, the model further exploits the seasonal information that is potentially correlated with the inflation level, see for example Koopman and Lee (2009). The flexibility of this model ensures that specific patterns of inflation for emerging economies such as Brazil and Turkey during the last decade are captured adequately.

A novel feature of our framework is the integration of the monetary policy regime, i.e., inflation targeting, into our predictive model. We do this by confronting model-based inflation expectations with the formal inflation targets set by central banks. This also leads to a statistical measure of the (time-varying) discrepancy between inflation expectations and the target inflation. If the discrepancy is small, inflation targeting provides further information for the prediction of future inflation. Even if the discrepancy is not small, the implicit target inflation can still contribute to the prediction of future inflation as long as the discrepancy is stable over time, with a small variance. On the other hand, if the discrepancy is not small and stable, and thus, not binding, then the model-based inflation expectations and target inflation do not match, and inflation targeting is of no use for predicting inflation.[1]

A number of papers have used survey expectations of inflation to proxy for inflation expectations in both macro and monetary models. The vast majority of these studies aim to conduct inference about structural parameters in fully articulated models without making the assumption of rational expectations, see Klaus and Padula (2011), Mankiw, Reis, and Wolfers (2004) and Ormeno (2011), among others. Del Negro and Schorfheide (2013) examine

the additional predictive gains from including survey data in dynamic stochastic general equilibrium models. Similarly, Basturk, Cakmakli, Ceyhan, and Van Dijk (2014) use survey expectations in a New Keynesian Phillips curve, see also Roberts (1997), in order to enhance the predictive performance of the model.

Our study is most similar to that of Kozicki and Tinsley (2006), who argue that survey-based expectations often capture information about structural changes regarding the future state of the economy, shifts in the perceptions of the goals of monetary policy, or political turmoil, more rapidly than the historical data. They employ a 'shifting endpoint' model (with *a priori* seasonally adjusted data) together with survey expectations focusing on extracting expectations on the term structure of inflation for the US. We take a different stand here, as our framework is directed towards increasing the predictive content of our baseline model, where low frequency movements are modeled explicitly using a flexible approach that is suitable for emerging economies. The term structure of inflation expectations is then obtained as a by-product of our model. In an independent and concurrent study, Altavilla, Giacomini, and Ragusa (2013) focus on anchoring the yield curve using survey expectations. Their analysis is concerned primarily with determining, from a theoretical point of view, the conditions under which combinations of model-based forecasts (using the Nelson–Siegel model of the yield curve) and survey expectations perform better than using only model-based forecasts. In contrast, our paper is oriented towards the provision of a predictive model of inflation, together with information on survey expectations and target inflation.

The remainder of this paper is organized as follows. Section 2 presents the state space model with survey expectations and target inflation. Section 3 presents the full sample estimation results for the baseline model and provides a quantitative illustration of the importance of including survey expectations. Section 4 presents the out-of-sample forecasting results and a comparison with some alternative benchmark models, while Section 5 elaborates on variants of our modeling framework and their forecasting performances. Section 6 provides concluding remarks.

2. Modeling the inflation processes for emerging economies

In this section, we describe a flexible model structure for approximating the inflation processes observed in emerging economies. Furthermore, we integrate survey data on inflation expectations and the inflation target in order to enhance the information content of the model structure.

2.1. The baseline model and incorporating survey expectations

In this section, we develop a local linear trend model that accommodates many of the observed features of inflation for emerging economies; see Harvey (1990) or Durbin and Koopman (2012). First, we allow for changes in trend

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[1] Other papers have also examined the efficacy of inflation targeting regimes for emerging economies. Fraga, Goldfajn, and Minella (2004) employ a small open economy model, as per Batini, Harrison, and Millard (2003). McCallum and Nelson (2000) examine the time paths of inflation and the output gap under imperfect credibility and a Taylor rule for determining the optimal interest rate, in order to assess the inflation targeting performances of emerging economies relative to developed ones. Çiçek and Akar (2014) examine the rate of convergence of inflation expectations to inflation targets versus actual inflation over the period 2002–2013 in Turkey, by controlling for the size of the shocks affecting inflation.