



Forecasting inflation in emerging markets: An evaluation of alternative models

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ABSTRACT

This paper carries out a comprehensive forecasting exercise to assess the out-of-sample forecasting performances of various econometric models for inflation across three dimensions: time, emerging markets (EMs) and models. The competing models include univariate and multivariate models, fixed and time-varying parameter models, constant and stochastic volatility models, models using small and large datasets, and models with and without Bayesian variable selection. The results indicate that the forecasting performances of the different models change notably across both time and countries. Similarly to recent findings in the literature from developed countries, models that account for stochastic volatility and time-varying parameters provide more accurate forecasts for inflation than the alternatives in EMs. The results suggest that inflation predictability is correlated negatively with central bank independence. Also, institutional forecasts are superior to model-based forecasts for the majority of EMs. This suggests that the incorporation of subjective judgement can improve model-based inflation forecasts.

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1. Introduction

In recent decades, most of the central banks around the globe have adopted inflation targeting. Naturally, this has made inflation the key economic statistic that monetary authorities evaluate when forming their policies. However, since monetary policy is associated with significant lags, it is optimal for policy to be designed in a forward-looking manner, which underlines the importance of obtaining accurate forecasts for inflation. On the other hand, the macroeconomic dynamics and dependencies of both global and national economies have gone through significant changes over recent decades. Some of these changes are commonly attributed to changes in policies (including inflation targeting), while others tend to be attributed to globalization or other factors. For instance, the great moderation brought about a significant reduction in the volatility of the business cycle, and hence of key indicators, including inflation. At the same time, emerging market countries (EMs) have witnessed even greater changes,

with increases in globalization and capital inflows, sounder macroeconomic policies, and significantly lower levels and volatilities of inflation, which accompanied the rise of the BRICs. All of these changes pose significant difficulties for econometricians in various different ways in their forecasting of key indicators, including inflation. This paper employs a wide range of econometric models, each of which is partially robust to the types of changes that the time series of EMs have gone through, and assesses their forecasting performances across time, emerging market countries and models.

Although various studies have conducted forecast comparisons across alternative models and time, most of these studies have focused only on one particular country. For instance, [Clark and Ravazzolo \(2015\)](#) and [D'Agostino, Gambetti, and Giannone \(2013\)](#) assess the macroeconomic forecasting performances of alternative models for the United States (US); [Barnett, Mumtaz, and Theodoridis \(2014\)](#) and [Groen, Kapetanios, and Price \(2009\)](#) focus on the United Kingdom (UK); and [Berg and Henzel \(2015\)](#), [Caggiano, Kapetanios, and Labhard \(2011\)](#) and [Giannone,](#)

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Lenza, Momferatou, and Onorante (2014) consider Europe. For EMs, some of the country studies include those of Gupta and Kabundi (2011) for South Africa; Bailliu, Garcés, Kruger, and Messmacher (2003) and Ögünç et al. (2013) for Turkey; Kaya and Yazgan (2014) for Mexico; and Duasa, Ahmad, Ibrahim, and Zainal (2010) for Malaysia. Even though such individual studies provide evidence on the forecasting performances of alternative models, it may be challenging to compare their findings about different models' performances across time and countries, for various reasons. For instance, Eickmeier and Ziegler (2008) conduct a meta-analysis of the literature regarding the forecasting performance of factor models. However, Stock and Watson (2011) point out the potential difficulties of such analysis, including possible differences in the methods applied, the quality of implementation or the benchmarks chosen. Hence, this paper's key contribution is its implementation of a comprehensive forecast comparison exercise with some of the latest time series models and techniques for inflation in different EMs over time.

A total of ten econometric models have been used to forecast inflation in nine emerging market countries; Chile, India, Indonesia, Malaysia, Mexico, Philippines, South Africa, Thailand and Turkey. The motivation for the choice of forecasting models has been to include models which are partly robust to various possible causes of forecast errors. With this objective, the models used include a benchmark autoregressive model (AR), an autoregressive moving average model (ARMA), rolling and recursive Bayesian vector autoregressive models (BVAR) and factor-augmented VAR models (FBVAR), an unobserved component stochastic volatility model (UCSV), a time-varying parameter VAR model (TVAR), a factor-augmented TVAR model (TFVAR), a TVAR with Bayesian variable selection model (TVBVS), and TVFBVS.¹ A forecast evaluation is carried out over the period 2001Q1 to 2015Q4. The models' forecasting performances are examined along three dimensions: time, models and emerging market countries. In addition, similarly to Benati and Surico (2008) and Cogley, Primiceri, and Sargent (2010), inflation predictability across time and EMs is investigated. Finally, these model-based forecasts are compared to the institutional forecasts from the International Monetary Fund's World Economic Outlook (IMF-WEO).

The results indicate that the forecasting performances of the alternative models illustrate notable differences across both time and countries. On the other hand, similarly to the findings of Barnett et al. (2014), Clark and Ravazzolo (2015) and D'Agostino et al. (2013) and for the US and the UK, models that account for time variation in the coefficients and volatilities perform better than the alternatives on average across both EMs and time. This implies that the forecast accuracies of the aforementioned models are superior for inflation not only in developed countries, but also for EMs. Regarding performances over time, UCSV generally performs the best among the alternatives, except

during the global financial crisis (GFC) period. The rolling BVAR and TVAR models also performed quite well across time and countries. In the aftermath of the GFC, models that utilized larger datasets generally performed notably poorly. For commodity exporters, accounting for commodity prices improved the forecast accuracy. Of the various countries considered, the best performing model was UCSV in Mexico and Turkey; the rolling BVAR in Chile, the Philippines and Thailand; and TVAR in Indonesia and Malaysia. The results also indicate that there is no pervasive evidence of any relationship between inflation predictability and either the central bank policy regime or regulatory quality. However, inflation predictability is correlated negatively with central bank independence across EMs. Comparing these model-based forecasts with the subjective forecasts from the IMF-WEO, the institutional forecasts are superior to the model-based forecasts on average across EMs.

The remainder of the paper is organised as follows. Section 2 describes the empirical setup with the dataset, forecasting exercise and forecasting models; Section 3 presents the results; and Section 4 concludes.

2. Setup

2.1. Dataset

The dataset has been constructed using various sources, and covers the period from 1979Q2 to 2015Q4. The main sources include Datastream, IMF, the Organization for Economic Co-operation and Development (OECD), the European Central Bank (ECB), and the datasets originally constructed by Dees, Mauro, Pesaran, and Smith (2007) and Smith and Galesi (2011).² The analysis focuses on the forecasting of inflation in nine emerging countries. The choice of focus countries was made based at least partly on their data availability for the sample period under investigation. However, additional data from nineteen other (developed and emerging) countries are used in models that utilize large datasets in order to take into account more information at the international level. Table 1 lists the countries used in the overall dataset.

The variable under investigation is the quarterly growth rate of the consumer price index (CPI), p . The multivariate models also include the quarterly percentage change in real GDP (y) and the short interest rate (r).³ In addition, the large dataset (factor) models make use of further domestic and international information. Depending on the data availability, the additional domestic variables for these models may include nominal exchange rates to USD (e), the unemployment rate (u), long interest rates (lr), bank lending rates (blr), domestic private sector credit growth (cg), real stock prices (rsm),⁴ industrial production (ip), and

¹ See Bernanke, Boivin, and Elias (2005) for FBVAR, Korobilis (2013) for UCSV, Primiceri (2005) for TVAR and TFVAR, and Stock and Watson (2007) for BVS. Note that TVAR and TFVAR also feature stochastic volatility.

² The last dataset was extended to 2013Q1 by R. Marisca, A. C. Bianchi and A. Rebucci for the Global VAR (GVAR) Toolbox; it was obtained from <https://sites.google.com/site/gvarmodelling/data>. See Table A.1 in the Appendix for a more detailed description of the data sources.

³ One possible alternative to the GDP growth variable is the output gap. However, the output gap requires an estimate of the potential output, which may introduce measurement errors for this variable.

⁴ Note that rsm is calculated by deflating nominal stock price series by CPI.

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