

Interest Rate Modelling And Forecasting In India

Pami Dua*

Nishita Rajee

Satyananda Sahoo

Section I

Introduction

The interest rate is a key financial variable that affects decisions of consumers, businesses, financial institutions, professional investors and policymakers. Movements in interest rates have important implications for the economy's business cycle and are crucial to understanding financial developments and changes in economic policy. Timely forecasts of interest rates can therefore provide valuable information to financial market participants and policymakers. Forecasts of interest rates can also help to reduce interest rate risk faced by individuals and firms. Forecasting interest rates is very useful to central banks in assessing the overall impact (including feedback and expectation effects) of its policy changes and taking appropriate corrective action, if necessary.

An important constituent of the package of structural reforms initiated in India in the early 1990s, was the progressive deregulation of interest rates across the broad spectrum of financial markets. As part of this process, the Reserve Bank has taken a number of initiatives in developing financial markets, particularly in the context of ensuring efficient transmission of monetary policy. An important consideration in this regard is the signaling role of monetary policy and its implications for equilibrium interest rates. Furthermore, the evolvement of a 'multiple indicator approach' to monetary policy formulation has underscored the information content of rate variables to optimize management goals. Besides, with the progressive integration of financial markets, 'shocks' to one market can have quick 'spill-over' effects on other markets. In particular, with the liberalization of the external sector, the vicissitudes of capital flows can have implications for the orderly movement of domestic interest rates. Moreover, given the extant large volume of government's market borrowings and the role of the Reserve Bank in managing the internal debt of the Government, an explicit understanding of the determinants of various interest rates and their expected trajectories over the future could facilitate proper coordination of monetary/interest rate policy, exchange rate policy and fiscal policy.

Against this backdrop, the objective of this study is to develop models to forecast short-term and long-term rates: call money rate, 15-91 days Treasury bill rate and rates on 1-year, 5-year and 10-year government securities. Univariate as well as multivariate models are estimated for each interest rate. Univariate models include Autoregressive Integrated Moving Average (ARIMA) models, and ARIMA models with Autoregressive Conditional Heteroscedasticity (ARCH)/Generalised Autoregressive Conditional Heteroscedasticity (GARCH) effects while multivariate models include Vector Autoregressive (VAR) models specified in levels, Vector Error Correction Models (VECM) and Bayesian Vector Autoregressive (BVAR) models. In the multivariate models, factors such as liquidity, Bank Rate, repo rate, yield spread, inflation, credit, foreign interest rates and forward premium are considered. The random walk model is used as the benchmark for evaluating the forecast performance of each model.

For each interest rate, a search for the "best" forecasting model, *i.e.*, one that yields the most accurate forecasts is conducted. This search encompasses the evaluation of the performance

of the aforementioned alternative forecasting models. Each model is estimated using weekly data from April 1997 through December 2001 and out-of-sample forecasts up to 36-weeks-ahead are made from January through September 2002. The most significant finding is that multivariate models generally perform better than naive and univariate models and that the forecasting performance of BVAR models is satisfactory for all models.

The format of the study is as follows. Section II highlights, as a backdrop to the ensuing discussion, some stylized facts on interest rates in the context of financial sector reforms and the changes in the monetary policy environment in India. Section III describes the conceptual underpinnings of the different models considered. It also reviews the tests for non-stationarity and describes the methodology for comparing the out-of-sample forecast performance of the models. Section IV presents the empirical results of the alternative models and Section V concludes.

* Pami Dua is Professor in the Delhi School of Economics, University of Delhi, New Delhi. Nishita Raje and Satyananda Sahoo are Assistant Adviser and Research Officer, respectively, in the Department of Economic Analysis and Policy, Reserve Bank of India, Mumbai.