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The accuracy of forecasts prepared for the Federal Open Market Committee



Andrew C. Chang*, Tyler J. Hanson¹

Board of Governors of the Federal Reserve System, 20th St. NW and Constitution Ave., Washington DC 20551, USA

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ABSTRACT

We analyze forecasts of consumption, nonresidential investment, residential investment, government spending, exports, imports, inventories, gross domestic product, inflation, and unemployment prepared by the staff of the Board of Governors of the Federal Reserve System for meetings of the Federal Open Market Committee from 1997 to 2008, called the Greenbooks. We compare the root mean squared error, mean absolute error, and the proportion of directional errors of Greenbook forecasts of these macroeconomic indicators with the errors from three forecasting benchmarks: a random walk, a first-order autoregressive model, and a Bayesian model averaged forecast from a suite of univariate time-series models commonly taught to first-year economics graduate students. We estimate our forecasting benchmarks both on end-of-sample vintage and real-time vintage data. We find that Greenbook forecasts significantly outperform our benchmark forecasts for horizons less than one quarter ahead. However, by the one-year forecast horizon, typically at least one of our forecasting benchmarks performs as well as Greenbook forecasts. Greenbook forecasts of personal consumption expenditures and unemployment tend to do relatively well, while Greenbook forecasts of inventory investment, government expenditures, and inflation tend to do poorly.

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Abbreviations: EOS, end-of-sample vintage; FOMC, Federal Open Market Committee; MDE, mean directional error; RTV, real-time vintage.

* Corresponding author. Tel.: +1 657 464 3286.

E-mail addresses: a.christopher.chang@gmail.com (A.C. Chang), thanson2691@gmail.com (T.J. Hanson).

¹ Present address: Vokal Interactive, 153 W Ohio Street, Chicago, IL 60654, USA.

1. Introduction

Accurate assessments of the real-time state of economic activity and accurate forecasts of the future path of activity are important inputs for monetary policy decisions. Central banks invest considerable resources forecasting economic activity to help guide policy decisions. For example, prior to meetings of the Federal Open Market Committee (FOMC), the staff of the Board of Governors of the Federal Reserve System prepares a detailed projection of US economic activity for the FOMC, known as the Greenbook.² Production of the Greenbook employs around a hundred economists and research assistants in addition to other editorial, legal, and administrative staff.³ Despite the considerable effort that goes into Greenbook production because of its contribution to monetary policy decisions, significant uncertainty surrounds Greenbook forecasts (Reifschneider & Tulip, 2007; Tulip, 2009).

Our primary contribution to the economics literature is analyzing the accuracy of Greenbook forecasts of 10 key aggregates of the US economy in a unified framework, as opposed to only gross domestic product (GDP) or inflation (Arai, 2014; Faust & Wright, 2009; Romer & Romer, 2000; Tulip, 2009; Wright, 2009). In addition to these two key macroeconomic indicators, we analyze the unemployment rate and the major components of GDP from the national income and product accounts (NIPA): consumption, nonresidential investment, residential investment, government spending, exports, imports, and business inventories. We consider forecasts from 1997 to 2008.

We compare the accuracy of Greenbook forecasts to the accuracy of forecasts from three benchmark reduced-form univariate methods: a random walk, a first-order autoregressive (AR) model, and a Bayesian model averaged forecast from a pool of univariate time-series models taught in first-year economics graduate courses. We choose these benchmarks because of their parsimony, ease of implementation, and independence from auxiliary data. We assess whether the Greenbook forecasts, which require substantially more resources to prepare than any of these methods, empirically outperform these simple forecasts. Our dependence on only simple univariate methods also allows us to use only models that were available to forecasters at the time that the forecasts were generated, which reduces potential hindsight bias in model selection (Tulip, 2009). We measure accuracy as root mean squared error (RMSE), mean absolute error (MAE), and the proportion of forecasts with an incorrect predicted sign of acceleration, which we call mean directional error (MDE).

To avoid the pitfalls of conducting pseudo out-of-sample forecasting exercises on current-vintage data, we estimate our three benchmarks using two classes of data available to Greenbook forecasters at the time the forecasts were generated.⁴ For the first class of data, we estimate models using the “conventional” data that professional forecasters employ, or what Koenig et al. (2003) refer to as *end-of-sample vintage* (EOS) data. These data are the fully revised version of a series at a given point in time. For example, to forecast GDP growth for 2000:Q1, we estimate models using the latest-revised data available as of 1999:Q4. To forecast GDP growth for 2000:Q2, we estimate models using the latest-revised data available as of 2000:Q1, and so on. Because US statistical agencies continually revise previously published estimates, the older data points in EOS data have undergone more revisions than more recent data points.

For the second class of data, we estimate models on *real-time vintage* (RTV) data, a time series of data points in which each data point has undergone the same number of data revisions. For example, to estimate the third-release (twice-revised) estimate of GDP growth for 2000:Q1 using a univariate model in GDP with RTV data, the right-hand-side observations consist of only previous third-release

² Since 2010, this projection has been called the Tealbook.

³ As of this writing, approximately forty economists and research assistants are formally assigned to Greenbook preparation, but many more participants are informally involved.

⁴ Estimating models using *current-vintage* data, the fully revised versions of data that are available today, can skew the forecasting performance of models with information not available to forecasters at the time forecasts were actually generated (Clements & Galvão, 2013; Koenig, Dolmas, & Piger, 2003; Reifschneider & Tulip, 2007; Tulip, 2009).

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