Overview of a recent Reserve Bank workshop: nowcasting with model combination

Kirdan Lees

In December 2008, jointly with the Bank for International Settlements, the Reserve Bank hosted a workshop entitled "Nowcasting with Model Combination". This workshop was an opportunity for central bank practitioners and local and offshore academics to discuss recent technical advances in how to combine models for 'nowcasting' – the forecasting of current or near-term economic conditions. This note provides an overview of some themes that emerged from the workshop. Full papers are available from http://www.rbnz.govt.nz/research/workshops/december2008/3421588.html

1 Nowcasting

In some ways, meteorologists have it easy. Despite the difficulties in predicting the vagaries of future weather conditions, they can at least be completely confident about current conditions simply by looking out the window. In contrast, key macroeconomic data are only available with a lag of some months. Macroeconomists must therefore produce 'nowcasts' of the current situation.[1]

The term 'nowcasting' refers to the forecasting of current economic conditions for which data are not immediately available, although the term is often loosely used to describe short-term forecasting one or two quarters ahead. An ability to accurately estimate the current situation is important because it influences future economic outcomes, and hence the appropriate monetary policy response.

Macroeconomists have constructed a number of ways to deal with the nowcasting problem. One approach is to use large sets of macroeconomic indicators, such as surveys of business confidence, to help infer what GDP might look like.[2] Other researchers have shown that simpler approaches that use lags of GDP only can produce reasonable nowcasts for GDP. In one paper from the workshop, Lee, Olekalns and Shields (2008) show that modelling the properties of data revisions can help improve nowcasts.

2 Model combination

A strong theme that came through in the workshop was that nowcasting performance can often be improved by combining forecasts from a suite of models. Model combination entails constructing forecasts from a number of statistical models and combining them to give a single estimate. This approach produces better forecasts than simply including everything in one single model. The latter approach tends to produce a model that fits historical data very well, but fails to adapt to new data, producing poor forecasts.

In the paper titled "Improving and evaluating short term forecasts at the Norges Bank" (Björnland *et al.*, 2008), Leif Anders Thorsrud shows how the Norges Bank weights forecasts from a very large number of alternative models using their forecasting performance, such that models with smaller errors take a higher weight in the averaging scheme. Other papers applied the same principle to alternative sets of models. For example, Shaun Vahey presented a paper (Jore *et al.* 2008) "Combining forecast densities from VARs with uncertain instabilities" that looked at averaging forecasts from variants of vector autoregressive (VAR) models.

Model combination is also an important component of weather forecasting, where the technique is known as ensemble forecasting. Two papers from the conference (Galbraith and van Norden, 2008 and Mitchell and Wallis, 2008) explore some of the overlap and connections between economics and the weather forecasting literature.

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[1] For example, the Reserve Bank *Monetary Policy Statement* released on 12 March 2009 was predicated on nowcasts of New Zealand GDP for the first quarter of 2009, since the official figures (that will still be subject to revision) will be released by Statistics New Zealand on 12 June, 2009.

[2] See Matheson, Mitchell and Silverstone (2007), for example, who use firms' responses to the New Zealand Quarterly Survey of Business Opinion as macroeconomic indicators.

3 Structural change

A second theme that came through in several of the conference sessions was the issue of how to detect structural change in our models of the economy, and how to sensibly adjust our forecasts when we know structural change is present. This theme was particularly relevant given the current financial crisis, which challenges the use of fixed-parameter statistical models estimated on recent historical data.

The first paper in the conference, "Has models' forecasting performance for US output and growth and inflation changed over time and when?" (Rossi and Sekhposyan, 2008), shows that most variables lose their information content for forecasting US output growth around the mid-1970s. For the US, very few variables actually help improve the forecasting performance over simple statistical models that only use previous values of inflation to predict inflation and previous values of output growth to predict output growth. The ability to predict US inflation has decreased, with general moderation in macroeconomic volatility.

Later in the workshop, Simon Price presented some simple methods for detecting structural change. In a companion paper, Eklund, Kapetanious and Price (2008) show that combining forecasts from models both with and without breaks, and employing rolling regressions, can help improve forecasting performance.

4 Density forecasts

The final area of discussion was the use of 'density' forecasts or fancharts to portray the full balance of risks for a specific event, such as the probability of recession, or the probability of inflation moving above three percent over the medium term. Densities and fancharts show the full range of possible events and the likelihood of each event. The Bank of England has produced forecasts for a number of years to show the probability of different inflation outcomes. Many of the papers in the conference (for example, Gerard and Kristoffer, 2008) apply model combination techniques to density forecasts, rather than to simple point forecasts, to improve forecasting results.

5 Concluding comments

At the workshop, participants learnt about a range of developments in the recent forecasting literature. The Reserve Bank will continue to keep abreast of developments. In particular, producing density forecasts is an appealing method for presenting the full range of risks around forecasts, and is an area the Reserve Bank will pursue in the future.

The success of the Nowcasting workshop can be directly attributed to the willingness of a wide range of academics and policymakers, from both New Zealand and offshore, to come together and engage in productive debate about the issues.

References

Bates, J M and C W J Granger (1969) 'The combination of forecasts', *Operational Research Quarterly*, 20, pp 451-468.

Björnland, H, K Gedrup, A S Jore, C Smith and L A Thorsrud (2008) 'Evaluating combination densities at the Norges Bank', conference manuscript.

Eklund, J, K Kapetanios and S Price (2008), 'Forecasting in the presence of recent structural breaks', conference manuscript.

Galbraith, J and S van Norden (2008) 'Calibration and resolution diagnostics for Bank of England density forecasts', conference manuscript.

Gerard, H and K Nimark (2008) 'Combining multivariate density forecasts using predictive criteria', Reserve Bank of Australia *Research Discussion Paper* 2008-02.

Groen, J J, K Kapetanios and S Price (2008) 'Multivariate methods for monitoring for structural change', working paper.

Jore, A S, J Mitchell, and S Vahey (2008) 'Combining Forecast Densities from VARs with uncertain instabilities', NIESR *Working Paper* No 303.

Lee, K, N Olekalns and K Shields (2008) 'Nowcasting business cycle dating and the interpretation of new information when real time data are available', working paper.

Matheson, T, J Mitchell and B Silverstone (2007) 'Nowcasting and predicting data revisions in real time using qualitative panel survey data', Reserve Bank of New Zealand *Discussion Paper* 2007/02.

Mitchell, J and K F Wallis, (2008) 'Evaluating density forecasts: forecast combinations, model mixtures, calibration and sharpness', NIESR *Working Paper* No 320.

Rosssi, B and T Sekhposyan (2008) 'Has models' forecasting performance for US output growth and inflation changed over time and when?', conference paper.

Nowcasting with model combination: conference programme

Thursday, 11 December 2008

Has models' forecasting performance for US output growth and inflation changed over time, and when?

Barbara Rossi, Duke University

Forecast combination and monitoring for structural change

Simon Price, Bank of England

Nowcasting, business cycle dating and the interpretation of new information when real-time data are available

Kalvinder Shields, University of Melbourne

Nowcasting the New Zealand economy with a big BVAR

Troy Matheson, Reserve Bank of New Zealand

Combining forecast densities from VARS with uncertain instabilities

Shaun Vahey, Melbourne Business School

Predicting local and national house prices

Chris Otrok, University of West Virginia

Friday, 12 December 2008

Improving and evaluating short term forecasts at the Norges Bank

Leif Anders Thorsrud, Norges Bank

Incorporating conjunctural analysis in structural models

Francesca Monti, European Center for Advanced Research in Economics and Statistics

Short run forecasting at the Federal Reserve Bank of Atlanta

John Robertson, Federal Reserve Bank of Atlanta

Combining multivariate density forecasts using predictive criteria

Hugo Gerard, Reserve Bank of Australia

Evaluating density forecasts: is sharpness needed?

James Mitchell, National Institute of Economic and Social Research

The calibration of probabilistic economic forecasts

Simon van Norden, HEC Montréal