Learning in Real Time: Theory and Empirical Evidence from the Term Structure of Survey Forecasts
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Discussion by

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Value Added

- Refreshing model of agent learning in fixed event setting

- Model incorporates agent beliefs, signals, measurement error, overlapping data structure

- Fixed event forecasting under-exploited in the literature

Value Added

- Novel application:
  - Consensus Economics Inc survey
  - 600 private sector forecasters
  - 1991-2004
  - 24 forecasts each
  - US real growth and inflation forecasts for current and subsequent year
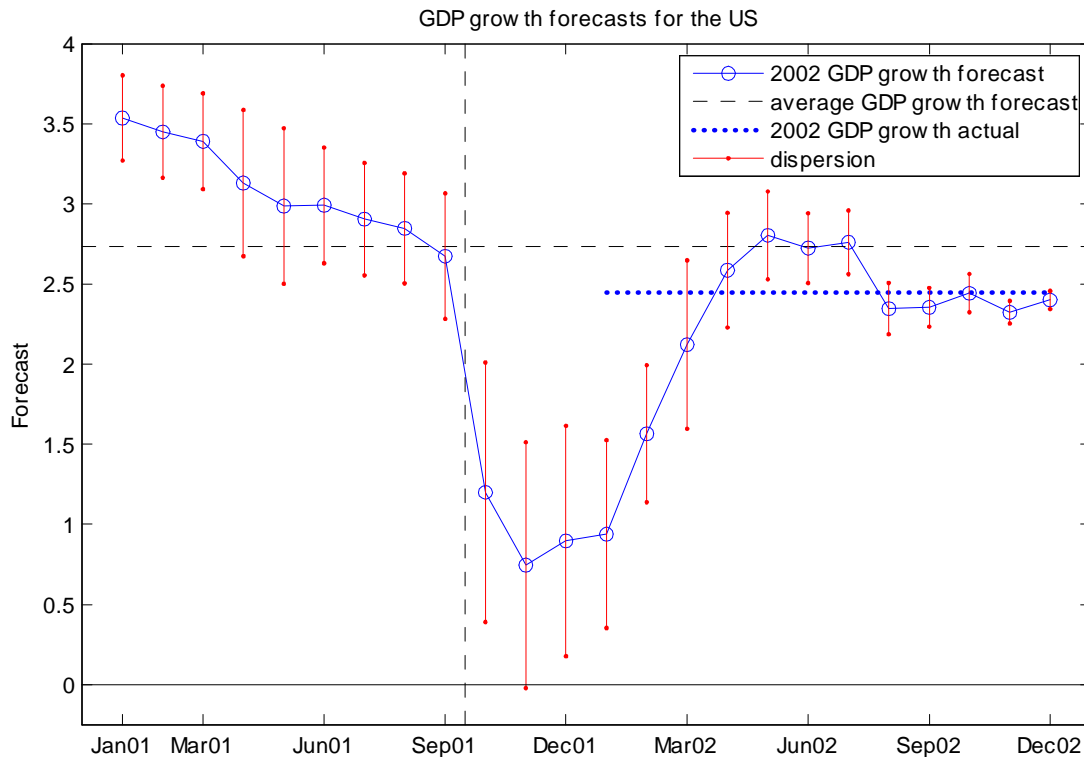   - handling information timing important

Figure 1: Evolution in consensus forecasts and forecast dispersions for US GDP growth in 2002, for horizons ranging from 24 months (January 2001) to 24 months (December 2002). The vertical lines plotted here are the consensus forecasts plus/minus the dispersion (measured in standard deviations).

Figure 1

- Plot says a lot (more please)
- Cross section dispersion – here standard deviation – changes as event approaches
- Horizon H not that big; but lots happen
- Is this a typical path?
- Are some of these guys/gals really bad?
  - some bias at individual level (how much?)

Irritation: Outturns change too

- Real-time data literature studies patterns of revisions for GDP growth and inflation
- FRB Philadelphia (Croushore and Stark, 2001, J Econometrics)
- Arouba ``Data Revisions Are Not Well-behaved'': US revisions bias, predictable
- Corradi, Fernandez, and Swanson (2007) suggest focus on first measurements outturns

Data Matrix Implied Alternative

- Summarise agents' forecasts into a density
- Wallis (2005, Ox Bull) suggestion of linear opinion pool; Timmermann (2006)
- Related work by Giordani and Soderlind (2003, EER)
- Some central banks treat internal staff survey forecasts this way

The Norges Bank Nowcasting Framework:

- Recast each "model technology" as an Expert

- Each Expert produces h-step ahead forecast densities for output, prices, interest rates

- Consider decision-maker, DM, evaluates Experts' densities by out-of-sample log score, RMSE, Info Criteria

- Given $i = 1, \ldots, N$ VAR and AR models, combined densities defined by convex combination (linear opinion pool)

$$p_\tau(y_{\tau,h}) = \sum_{i=1}^{N} w_{i,\tau,h} g(y_{\tau,h} \mid I_{i,\tau}), \qquad \tau = \underline{\tau}, \ldots, \overline{\tau} \tag{1}$$

- where $g(y_{\tau,h} \mid I_{i,\tau})$ are h-step ahead forecast densities from individual model i, $i = 1, \ldots, N$ of a variable y_τ, conditional on the information set I_τ

- Publication delay in production real-time data: information set contains macroeconomic variables dated $\tau - 1$ and earlier

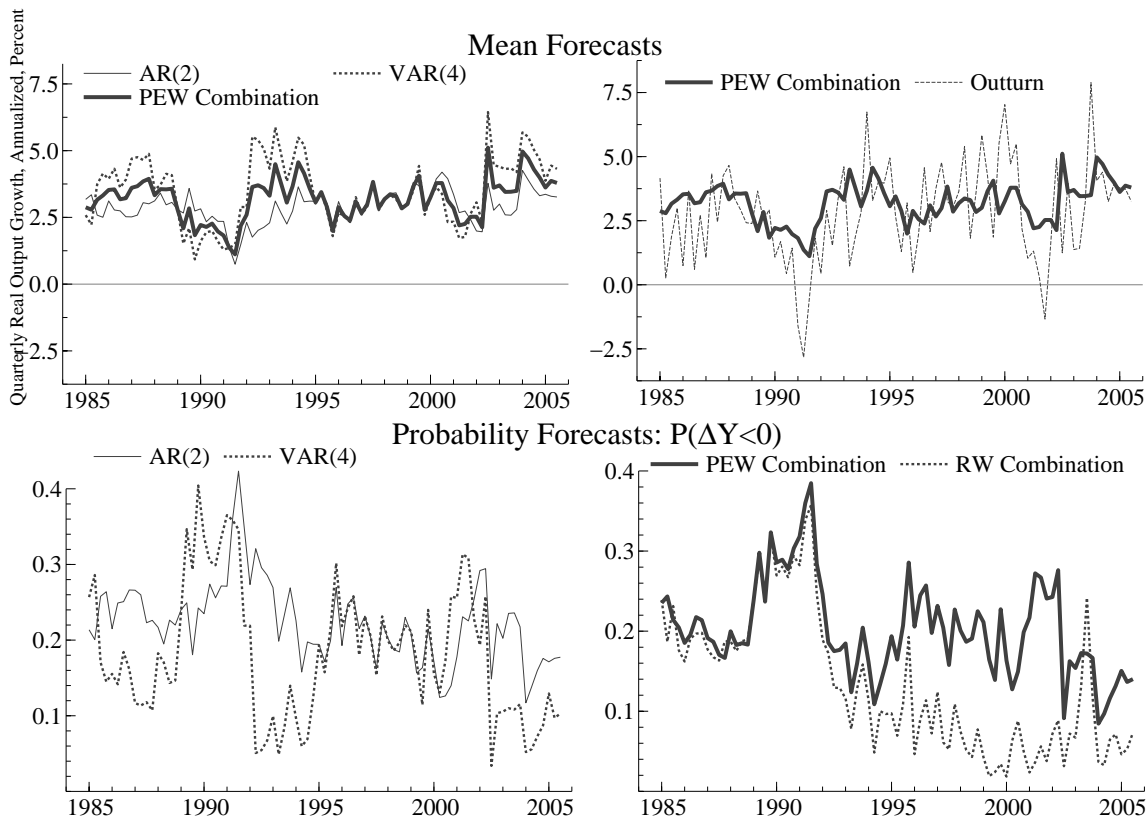- Each individual model is used to produce h-step ahead forecasts via the direct approach

Figure 1: Forecasting performance of AR(2) and de-trended VAR(4) models for GDP growth

Some Density Issues

- What is shape of cross section?

- Is standard deviation sufficient?

- How do the shape and location change as we approach the fixed event?

- Related work by Mitchell (2007, NIESR) looks at SPF for US inflation and GDP growth

Some Things to Know More About

- Shape, location and summary statistics for the dataset used in the application

- Why were those data selected?

- Which other studies have used the same data?

Some Things to Know More About

- Model of learning requires some strong assumptions

    - AR(1) nature of persistent component
    - Measurement error is just noise (real time data)
    - Many extensions possible, which would help?

Some Things to Know More About

- Plenty of model uncertainty here

  - Are there ways to allow for uncertainty in GMM estimation
  - Would Bayesian methods help?
  - Perhaps something for future work…

Minor Points

- Term structure title: how does thinking of this as like interest rate behaviour help?
- More attention to related fixed event literature – a lot of interesting stuff has been relegated to footnotes
- The application could use more emphasis iff journal focuses on applied econometrics
- Why do inflation forecasts over-, but output forecasts under-estimate persistent component?