Forecasting Canadian GDP: Evaluating Point and Density Forecasts in Real-Time

Frédérick Demers, BOC

Discussant: Jason Wu, FRB

1The views expressed do not represent those of the Board of Governors or its staff.
Summary

- Outlined methods of constructing point and density forecasts of Canadian GDP and ways to evaluate them.
Summary

- Outlined methods of constructing point and density forecasts of Canadian GDP and ways to evaluate them.
- It includes six dynamic non-linear models and a benchmark linear AR model. For density forecasts, the additional assumption that errors are normal is added.
Summary

Outlined methods of constructing point and density forecasts of Canadian GDP and ways to evaluate them.

It includes six dynamic non-linear models and a benchmark linear AR model. For density forecasts, the additional assumption that errors are normal is added.

Point forecasts are evaluated by MSFE (and a break down of bias and variance). Density forecasts are evaluated by PIT type of tests.
Contributions

- The use of real time data.
Contributions

- The use of real time data.
- Showed how some nonlinear models perform in forecasting relative to linear models.
Contributions

- The use of real time data.
- Showed how some nonlinear models perform in forecasting relative to linear models.
- **Most Importantly**: provided results on the effect of window size. Forecast performance varied significantly with the size of the rolling window, and AR model with appropriate size out-performs most nonlinear models!
Point Forecasts

- Comparison across models by aligning $S$ would demonstrate advantages/disadvantages of nonlinear models, net of the sample size issue.
Point Forecasts

- Comparison across models by aligning $S$ would demonstrate advantages/disadvantages of nonlinear models, net of the sample size issue.

- Statistical Inference on MSFE - parameter estimation may introduce significant noise particularly in nonlinear models. Pairwise comparison between AR and nonlinear models can be done using the framework of West (1996, MS models), or Corradi and Swanson (2002, STAR models), for expanding $S$. 
Comparison across models by aligning $S$ would demonstrate advantages/disadvantages of nonlinear models, net of the sample size issue.

Statistical Inference on MSFE - parameter estimation may introduce significant noise particularly in nonlinear models. Pairwise comparison between AR and nonlinear models can be done using the framework of West (1996, MS models), or Corradi and Swanson (2002, STAR models), for expanding $S$.

If inference done with $S$ fixed, Giacomini and White (2006).
Point Forecasts

- Comparison across models by aligning $S$ would demonstrate advantages/disadvantages of nonlinear models, net of the sample size issue.

- Statistical Inference on MSFE - parameter estimation may introduce significant noise particularly in nonlinear models. Pairwise comparison between AR and nonlinear models can be done using the framework of West (1996, MS models), or Corradi and Swanson (2002, STAR models), for expanding $S$.

- If inference done with $S$ fixed, Giacomini and White (2006).

- Point forecasts using same methods with revised data?
Density Forecasts

Judging from the summary statistics, there is a fair amount of skewness/kurtosis. A given model might be able to capture these features if other distributional assumptions (t-distribution, or EDF) are used.
Judging from the summary statistics, there is a fair amount of skewness/kurtosis. A given model might be able to capture these features if other distributional assumptions ($t$-distribution, or EDF) are used.

The PIT suggests directions in which models can be improved. For instance, the fact that the PIT for the AR and STAR models concentrate around small and large $z$’s indicates that many out-of-sample realizations of $y_{t+h}$ are at the tails of the predictive distribution. Again, would something with fat-tails help?
Judging from the summary statistics, there is a fair amount of skewness/kurtosis. A given model might be able to capture these features if other distributional assumptions (t–distribution, or EDF) are used.

The PIT suggests directions in which models can be improved. For instance, the fact that the PIT for the AR and STAR models concentrate around small and large z’s indicates that many out-of-sample realizations of $y_{t+h}$ are at the tails of the predictive distribution. Again, would something with fat-tails help?

Graphical representations of the forecast densities would be helpful. For example...
Density Forecasts

90% 1 Month Forecast Intervals of Yen

- Realization
- 5% Forecast Quantile
- 95% Forecast Quantile

Frédérick Demers, BOC
Forecasting Canadian GDP: Evaluating Point and Density Forecasts
Density Forecasts

- Power of PIT tests are low. Noise introduced by parameter estimation uncertainty possibly a big part of the problem. Moreover, is it a good idea to test whether the models are “correctly specified”? How useful is a statistically “correctly specified” model?
Density Forecasts

- Power of PIT tests are low. Noise introduced by parameter estimation uncertainty possibly a big part of the problem. Moreover, is it a good idea to test whether the models are “correctly specified”? How useful is a statistically “correctly specified” model?

- Two suggestions:
  2. Tests of Giacomini and White (2006) (again): Comparing the population characteristics of density forecasts for a given fixed and finite $S$. Loss function is flexible. For instance, Wu (2007) use the GW06 framework to compare the empirical coverages and lengths of interval forecasts derived from different models.
Conclusions

- Interesting paper describing point and density forecasting models for real time Canadian GDP.
Conclusions

- Interesting paper describing point and density forecasting models for real time Canadian GDP.
- It appears that nonlinear models don’t add much to simple AR models.
Conclusions

- Interesting paper describing point and density forecasting models for real time Canadian GDP.
- It appears that nonlinear models don’t add much to simple AR models.
- Can the AR model be improved by more rigorous modeling of the error distribution? How do ‘plug-in’ forecasts compare to ‘direct’ forecasts?
Conclusions

- Interesting paper describing point and density forecasting models for real time Canadian GDP.
- It appears that nonlinear models don’t add much to simple AR models.
- Can the AR model be improved by more rigorous modeling of the error distribution? How do ‘plug-in’ forecasts compare to ‘direct’ forecasts?
- Density forecasts should be evaluated in a more practical manner.
Conclusions

- Interesting paper describing point and density forecasting models for real time Canadian GDP.
- It appears that nonlinear models don’t add much to simple AR models.
- Can the AR model be improved by more rigorous modeling of the error distribution? How do ‘plug-in’ forecasts compare to ‘direct’ forecasts?
- Density forecasts should be evaluated in a more practical manner.
- Given a univariate model, real time GDP data will likely predict future real time GDP better than revised data, and vice versa. Is the distinction between real time and revised data important?