DSGE model-based forecasting

M. Del Negro and F. Schorfheide

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May 2012

- Monumental paper (92 pages!!).

- Lots of useful information for practitioners, forecasters, and graduate students.

- Mostly a review article (which makes life difficult for a discussant); some new material (that is were I am going to focus the discussion).

- Very careful work.

Quick review

- Paper takes 3 DSGE models and compares forecasting performance against Blue Chip, Greenbook, AR(2) models in real time.

- Adds expectations (inflation, output growth and interest rate) and now-casts to the data used for estimation.

- Shows how to do forecasts conditional on interest rate paths in models with unanticipated and anticipated shocks.

- Evaluate forecasting performance on average and in the 2008-2009 recession.

- Plus much more.... (calibration of predictive densities, shock decompositions, etc.)

Punchline

- DSGEs augmented with expectations and nowcasts have reasonably performance on average. Do as well as competitors in 2008-2009 recession.

- DSGE models can be used for things other than forecasting (identify structural shocks, policy analyses, etc.). Thus, the overall the balance is in favor of DSGEs.

Del Negro-Schorfheide (p. 79):

"While a successful decathlete may not be the fastest runner or the best hammer thrower, she is certainty a well rounded athlete"
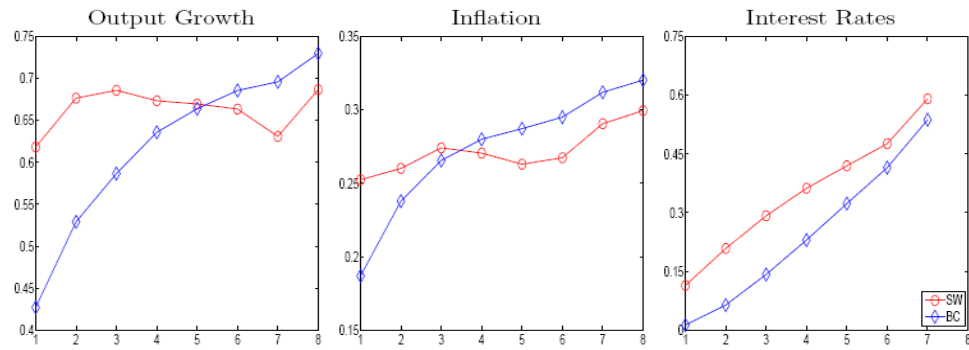
Discussion focuses on two points:

1) Forecasting performance of DSGE in short and medium run?

- We know that even plain vanilla DSGEs better than time series models at 4-8 quarters horizon (consistency conditions imposed by budget and resource constraints and general equilibrium setup make forecast better behaved).
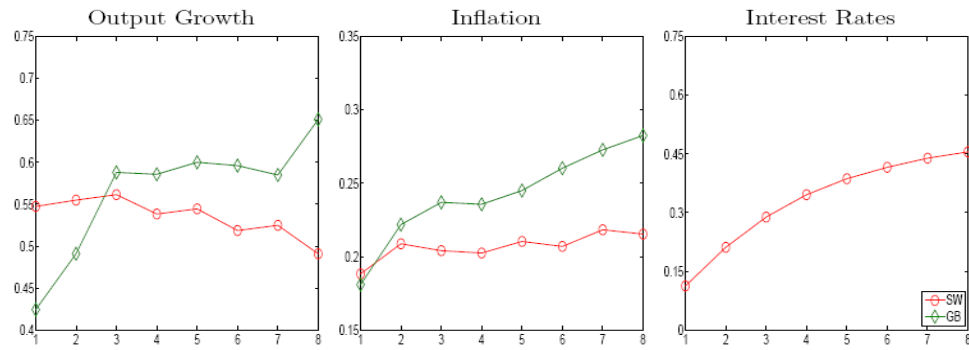
- Here the conclusion is confirmed when compared with Blue Chips and Greenbook forecasts.
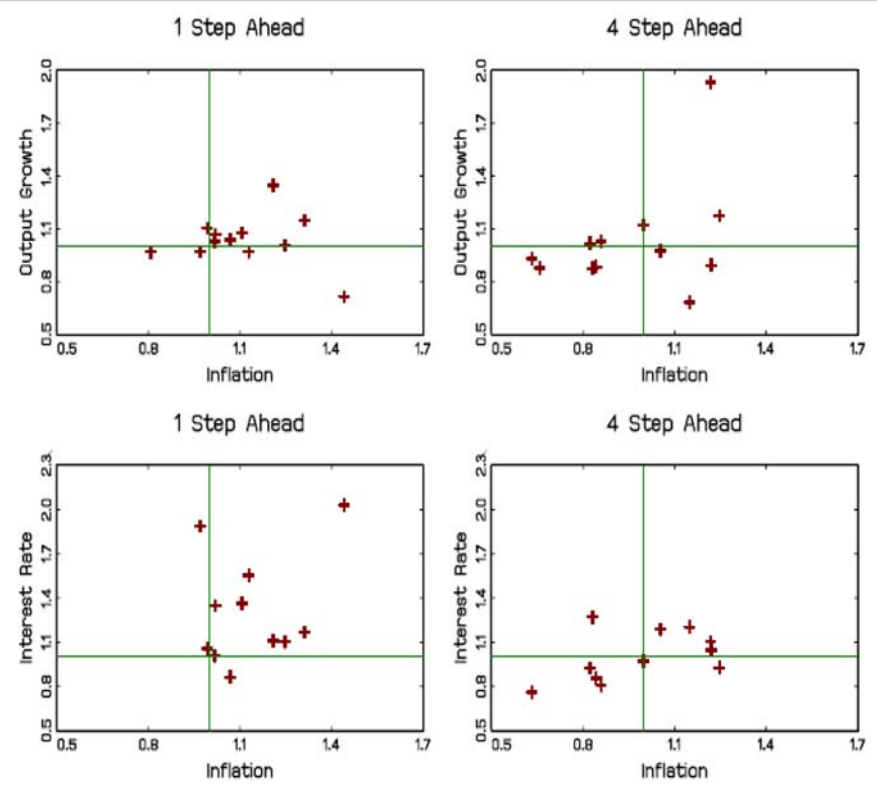
Figure 2: RMSEs for SW Model
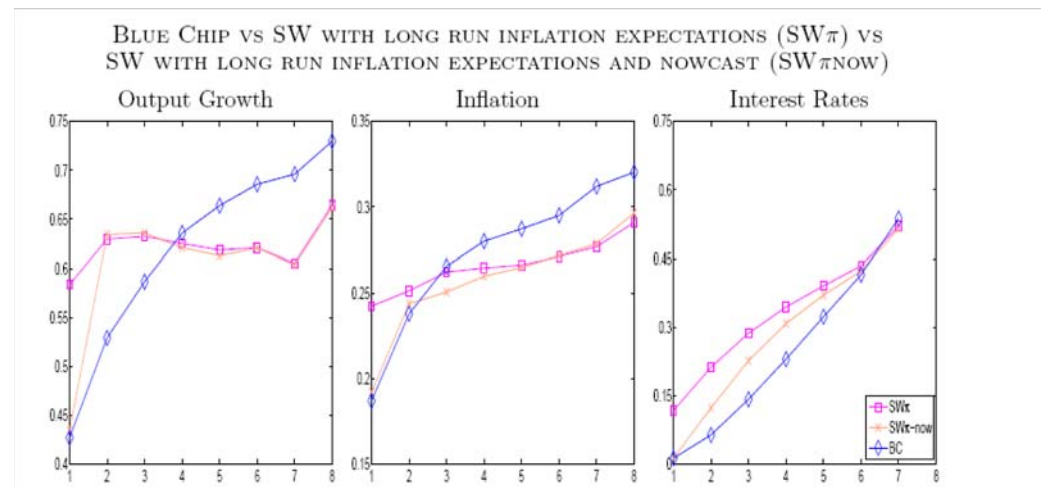

DSGE vs Blue Chip (1992-2011)

Output Growth · Inflation · Interest Rates

DSGE vs Greenbook (1992-2004)

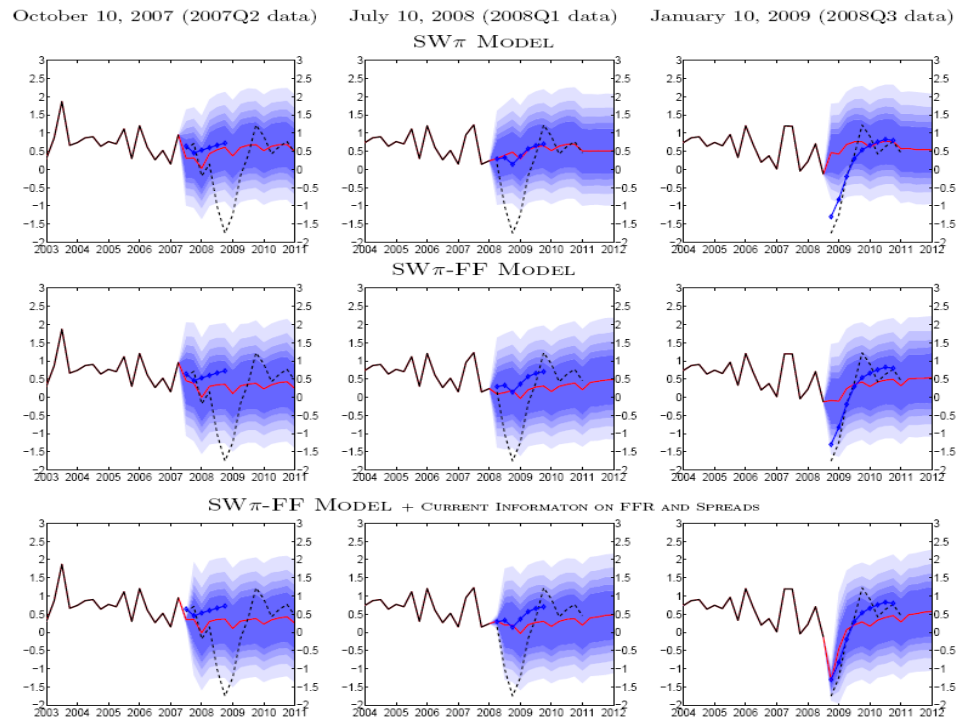Output Growth · Inflation · Interest Rates

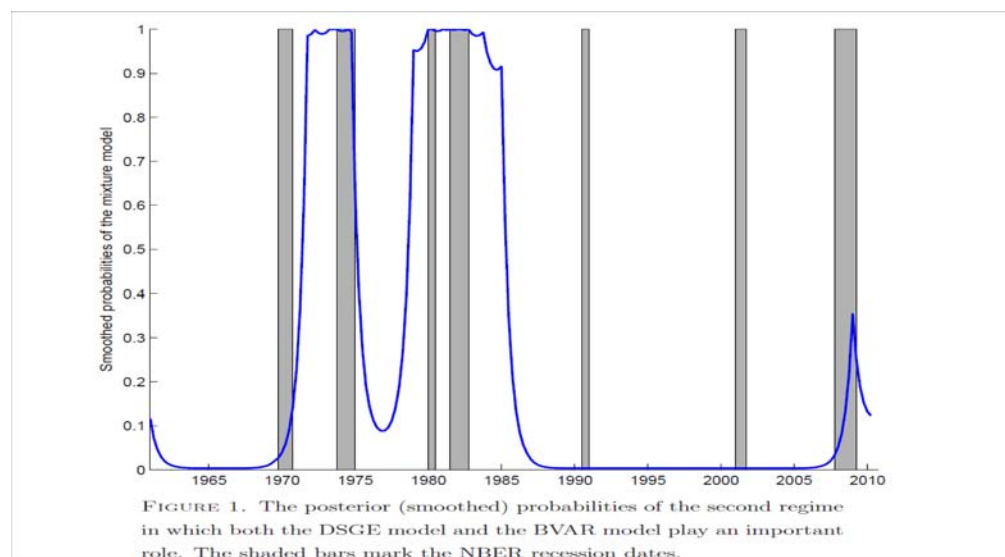- When (non-structural) information forecasters employ is added to the estimation, performance improves also short run.

- Good to know. Poor short performance not an intrinsic failure of the class of models. It is due to the use of a subset of the available information.

Blue Chip vs SW with long run inflation expectations ($SW\pi$) vs SW with long run inflation expectations and nowcast ($SW\pi$Now)

- Good (at least comparable) performance also in 2008-2009 when external info is used.

- Waggoner- Zha (2010) have similar result (Basic DSGE vs. VAR)

FIGURE 1. The posterior (smoothed) probabilities of the second regime in which both the DSGE model and the BVAR model play an important role. The shaded bars mark the NBER recession dates.

• Having the right information set is more important than adding theoretical features (e.g. financial accelerator, housing, etc.) when forecasting.

2) How to incorporate external information into DSGE estimation?

Log-linear decision rules:

$$
\begin{align}
x_t &= A(\theta)x_{t-1} + B(\theta)e_t \tag{1}\\
y_t &= C(\theta)x_{t-1} + D(\theta)e_t \tag{2}
\end{align}
$$

where y_t are the controls, x_t the states (predetermined and exogenous), e_t the shocks, θ the structural parameters.

i) Adding long term expectations (call them w_t, u_t additional structural shocks).

$$
\begin{align}
x_t &= A(\theta)x_{t-1} + B(\theta)e_t \tag{3}\\
y_t &= C(\theta)x_{t-1} + D(\theta)e_t + F(\theta)u_t \tag{4}\\
w_t &= G(\theta)u_t + \frac{1}{k}\sum_k E_t y_{t+k,j} \tag{5}
\end{align}
$$

ii) Adding nowcasts (call them z_t)

$$\begin{aligned}
x_t &= A(\theta)x_{t-1} + B(\theta)e_t & (6) \\
y_t &= C(\theta)x_{1t-1} + D(\theta)e_t & (7) \\
z_{t+1} &= y_{t+1,j} + u_{t+1,j} & (8)
\end{aligned}$$

Noise assumption: $y_{t+1,j}$, $u_{t+1,j}$ orthogonal.

News assumption: z_{t+1}, $u_{t+1,j}$ orthogonal (Sargent, 1989).

Estimation procedure seems complicated because external variables assumed to provide information about controls (rather than states).

iii) Factor model setup (a-la Boivin and Giannoni, 2005)

$$
\begin{aligned}
x_t &= A(\theta)x_{t-1} + B(\theta)e_t & (9) \\
y_t &= C(\theta)x_{1t-1} + D(\theta)e_t & (10) \\
q_t &= \lambda x_t + u_t & (11)
\end{aligned}
$$

q_t includes all info available to the forecaster (nowcasts, expectations, confidence indicators, etc.).

Simpler because KF estimates of x_t obtained using the (y_t, q_t) directly.

• Why should nowcasts give info about the observables (controls) and not the states?