

3rd Conference of the Macroeconomic Modelling and Model Comparison Network
June 13, 2019

A Forecasting Competition: First Results

Michael Binder¹, Mátyás Farkas², Zexi Sun¹, John Taylor³, Volker Wieland¹, Maik Wolters⁴

¹Goethe University, ²ECB, ³Stanford, ⁴University of Jena

Motivation

- The failure of macroeconomists to predict the Great Recession of 2008-09 led to a wave of criticism of the state of macroeconomic forecasting and modeling
- Distinguished economists have blamed the use of DSGE models for this failure (Buiter, 2009; Krugman, 2009; Stiglitz, 2015; Romer 2016)
- Policymakers take a more pragmatic view

The key lesson I would draw from our experience is the danger of relying on a single tool, methodology or paradigm. Policymakers need to have input from various theoretical perspectives and from a range of empirical approaches. We do not need to throw out our DSGE models: rather we need to develop complementary tools to improve the robustness of our overall framework.
(Trichet, 2010)

Model Comparison

- Policy simulations under model uncertainty
 - » Macroeconomic model database (www.macromodelbase.com)

- Evaluation of model performance requires estimated models
 - » Compare performance with respect to predicting the Great Recession
 - » Earlier model forecast comparison exercise (Wieland and Wolters, 2011): Models as constructed prior to the global financial crisis failed to predict the crisis. Professional forecasters did not perform better.
 - » This paper: new models as developed after the crisis → progress in macroeconomic modeling?

- New forecast comparison toolbox
 - » Estimation of models based on real-time data vintages
 - » Different conditioning assumptions regarding SPF-nowcasts and financial market data for current quarter
 - » New models are easily added and forecast results can be compared to existing ones

Pre-Crisis Models

- Two small scale New Keynesian models
 - » Del Negro and Schorfheide (2004): standard NK-model with monetary policy, technology and government spending shock, 3 observables
 - » Wieland and Wolters (2011): standard NK-model à la Woodford or Walsh with 5 shocks (preference, fiscal, monetary, technology, mark-up), 3 observables

- Two medium scale DSGE models
 - » Smets and Wouters (2007): many nominal and real frictions, 7 observables and shocks
 - » FRB/EDO by Edge et al. (2008): 14 structural shocks + measurement errors, 11 observables
 - Captures different growth rates and relative prices observed in the data by including two production sectors with differences in technological progress
 - Disaggregated expenditure side: consumption of non-durables and services, business investment, investment in durable goods, residential investment

- Traditional Cowles Commission type model by Fair (2018)
 - » Fair regularly computes forecasts based on the data available at each point in time (<https://fairmodel.econ.yale.edu/record/index.htm>)

Post-Crisis Models

- Large modeling uncertainty regarding the most important financial frictions (see, e.g., Wieland et al., 2016; Binder et al., 2019)
- So far, we have added a financial accelerator mechanism to pre-crisis models
- Small scale New Keynesian model
 - » Bernanke, Gertler and Gilchrist (1999): Financial Accelerator
 - » Some changes to the original paper to get estimatable version: price indexation, flex-price allocation, investment specific technology shock, risks premium shock, five observables (output, inflation, interest rate, investment, spread)
- 2 Medium scale DSGE models
 - » Del Negro and Schorfheide (2013): Smets/Wouters + BGG, 7 time series + spread
 - » Kolasa and Rubaszek (2015): DSSW + BGG with nominal financial contract, 7 time series + spread + nominal loan growth

BVARs + Professional Forecasts

- Bayesian VARs

- » Estimate a BVAR based on the eight observables of the medium scale DSGE model with financial frictions
- » Giannone, Lenza and Primiceri (2015) prior
- » Disentangles the importance of including additional data series covering financial sector developments and of modeling financial frictions

- Professional forecasters

- » Survey of Professional Forecasters:
 - Timing of all model forecasts are aligned with the SPF
 - Look at individual forecasts as well as mean forecast
- » Greenbook projections

Data + Four Scenarios

Data

- » Real-time data vintages, except for financial market data (no revisions)

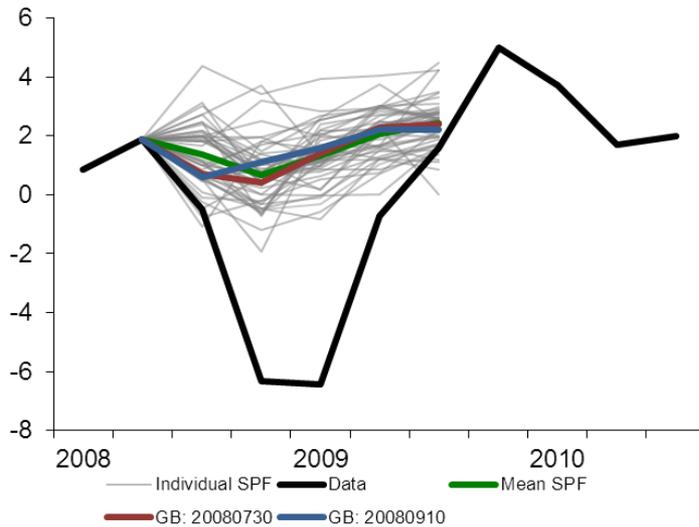
Four scenarios

1. Use data until the previous quarter
2. Condition on SPF nowcast data for output growth, inflation, non-residential investment, residential investment
3. Condition on current quarter financial market data (interest rate, credit spread)
4. Condition on SPF nowcast + current quarter financial market data (output growth, inflation, interest rate, spread)

Professional Forecasts During the Great Recession

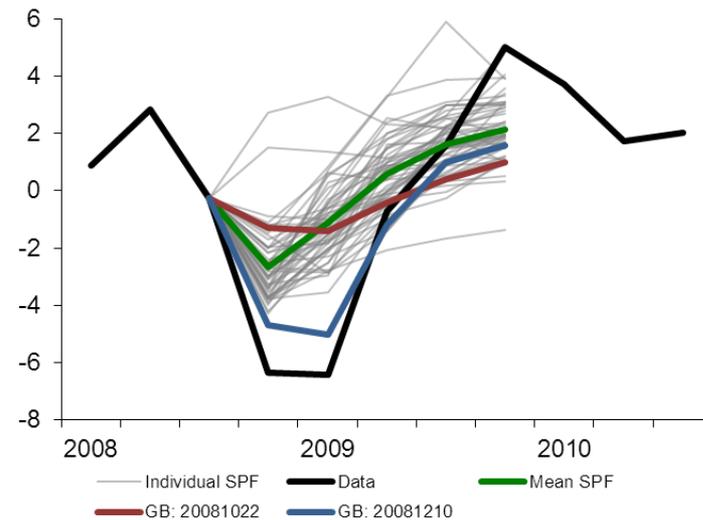
Forecast start: 2008Q3

Greenbook and SPF forecasts



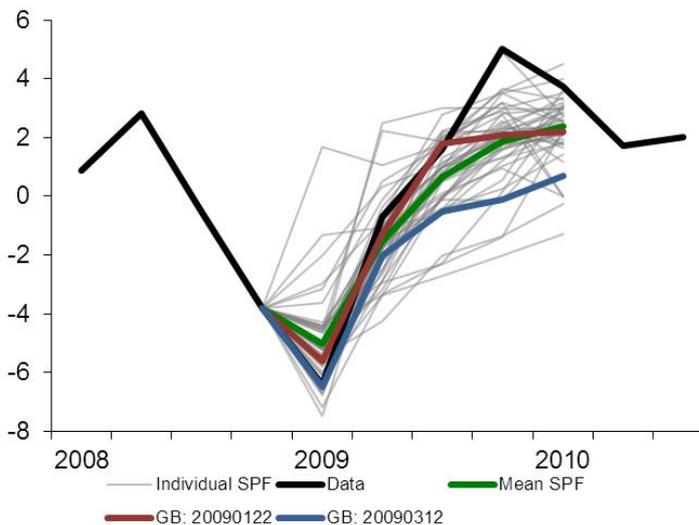
Forecast start: 2008Q4

Greenbook and SPF forecasts



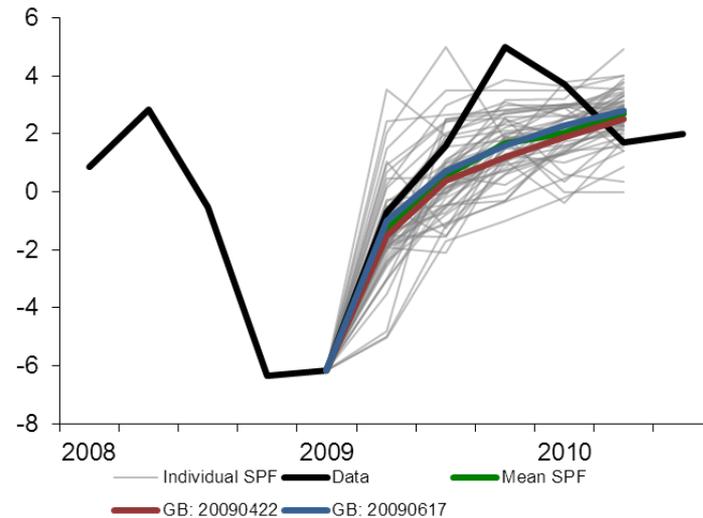
Forecast start: 2009Q1

Greenbook and SPF forecasts



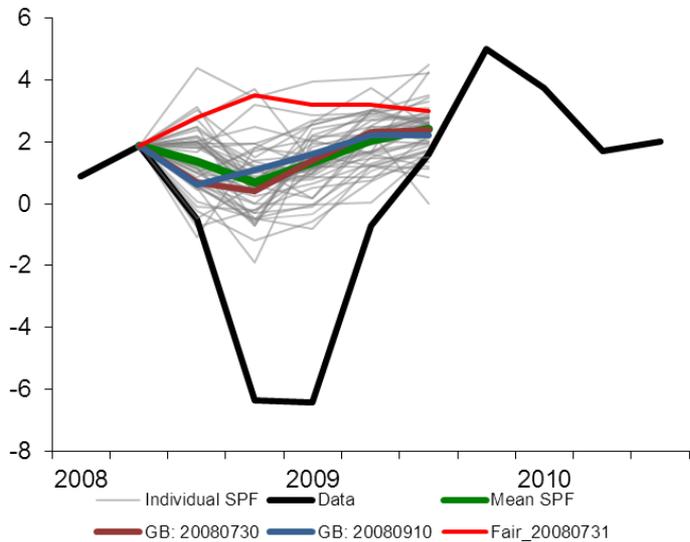
Forecast start: 2009Q2

Greenbook and SPF forecasts



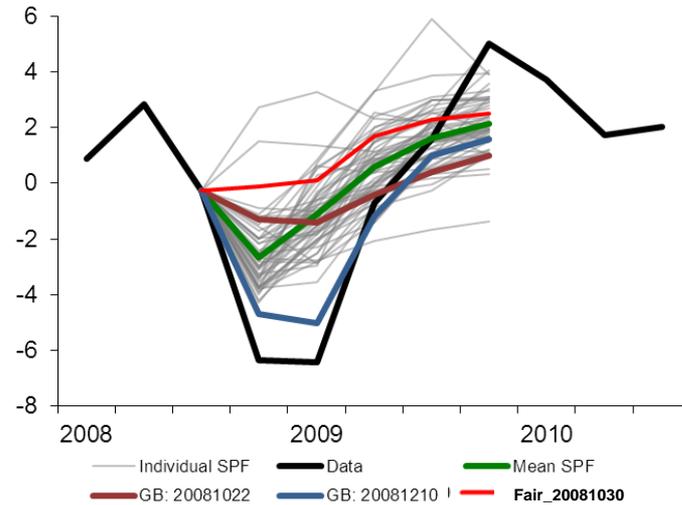
Traditional Cowles Commission Model Forecasts

Forecast start: 2008Q3



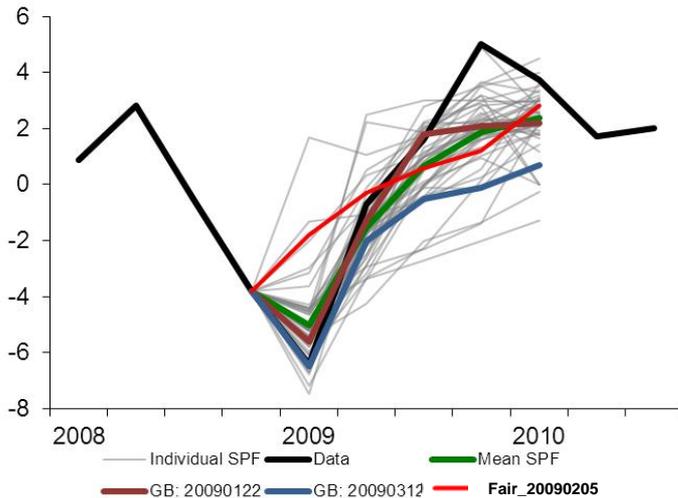
Forecast start: 2008Q4

Greenbook and SPF forecasts



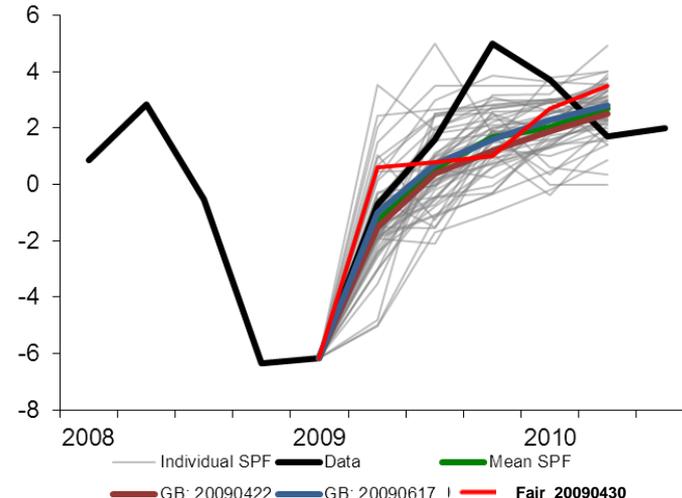
Forecast start: 2009Q1

Greenbook and SPF forecasts

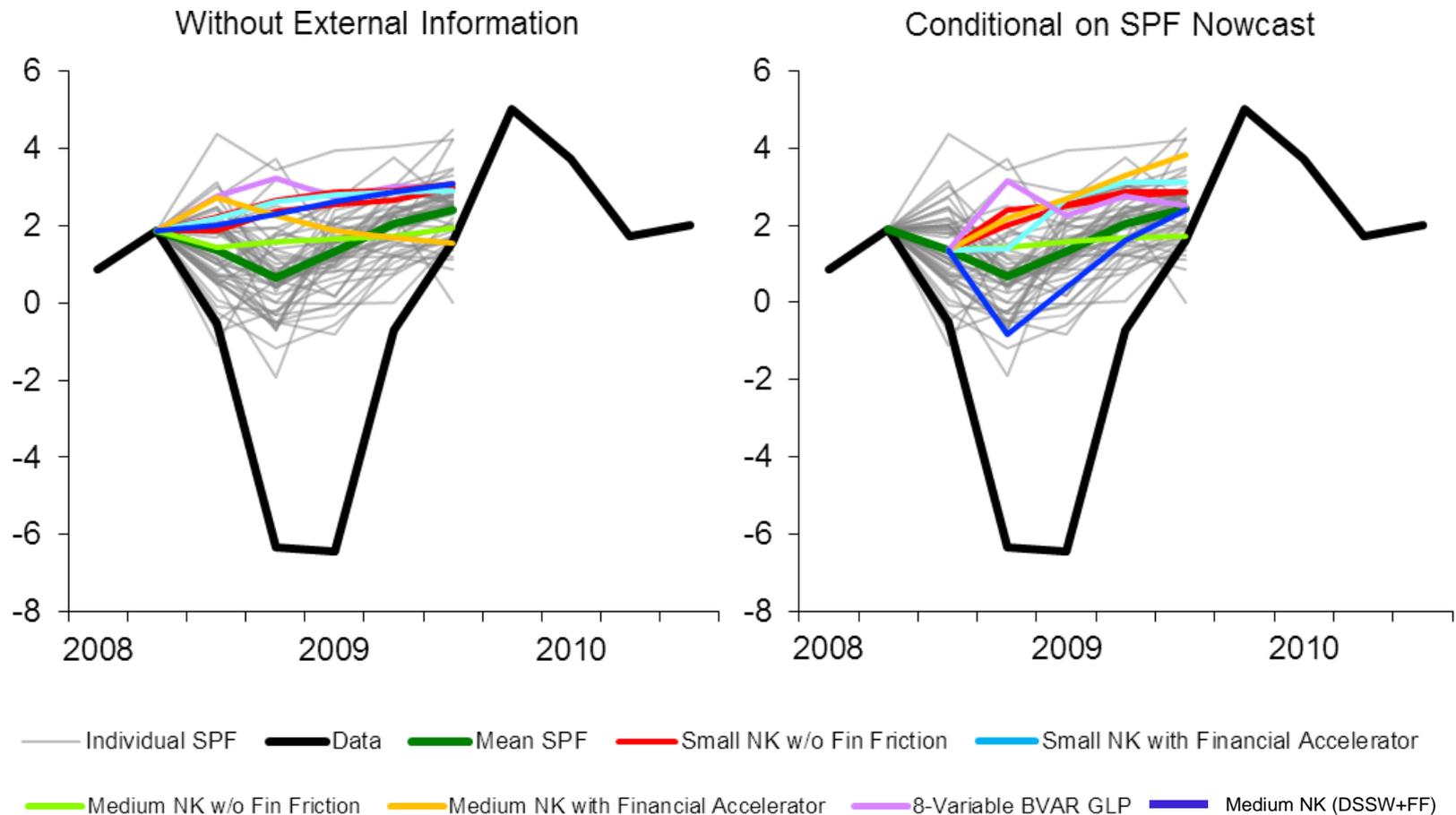


Forecast start: 2009Q2

Greenbook and SPF forecasts

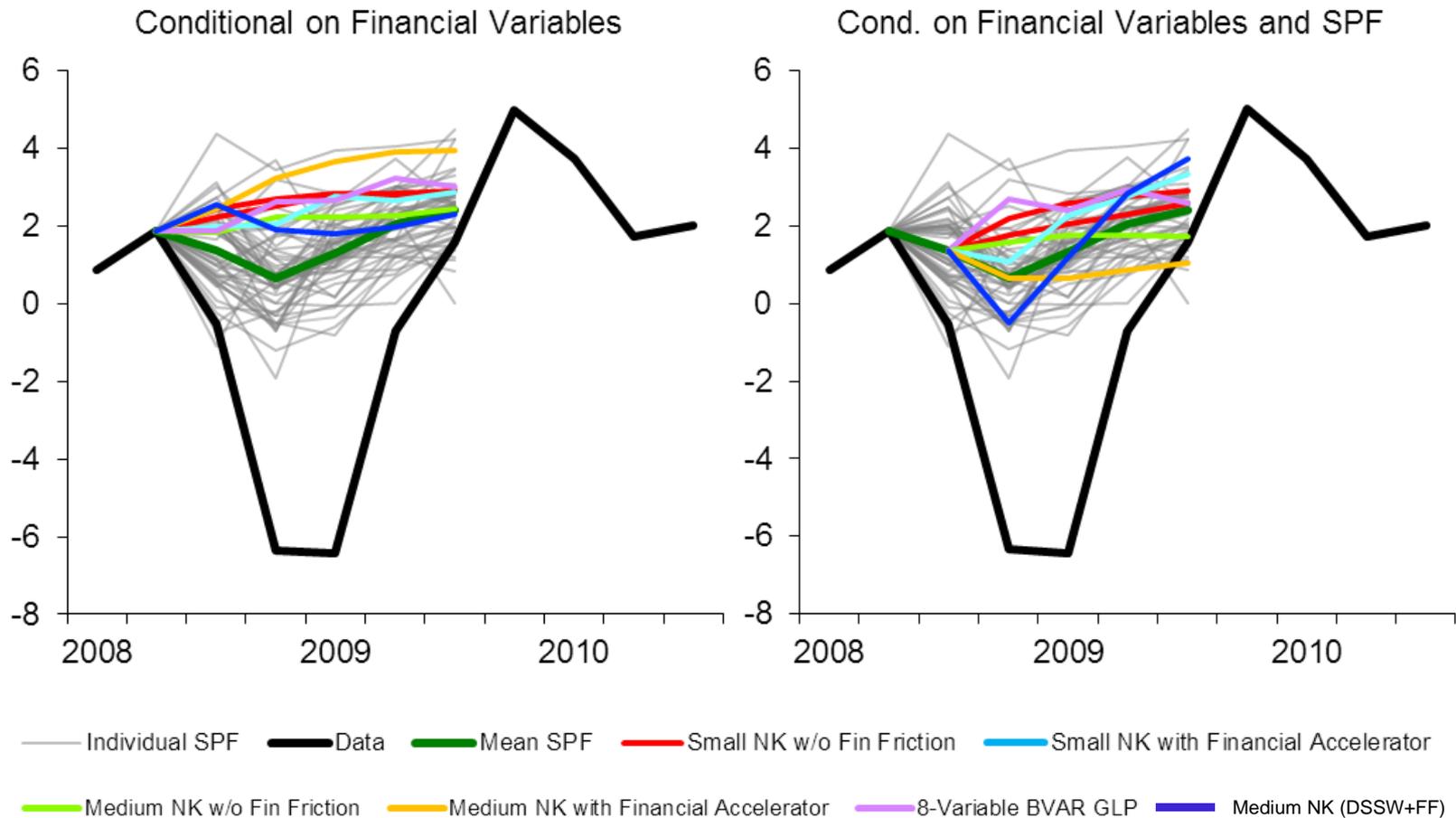


Forecasts Starting 2008Q3, Scenarios 1 & 2



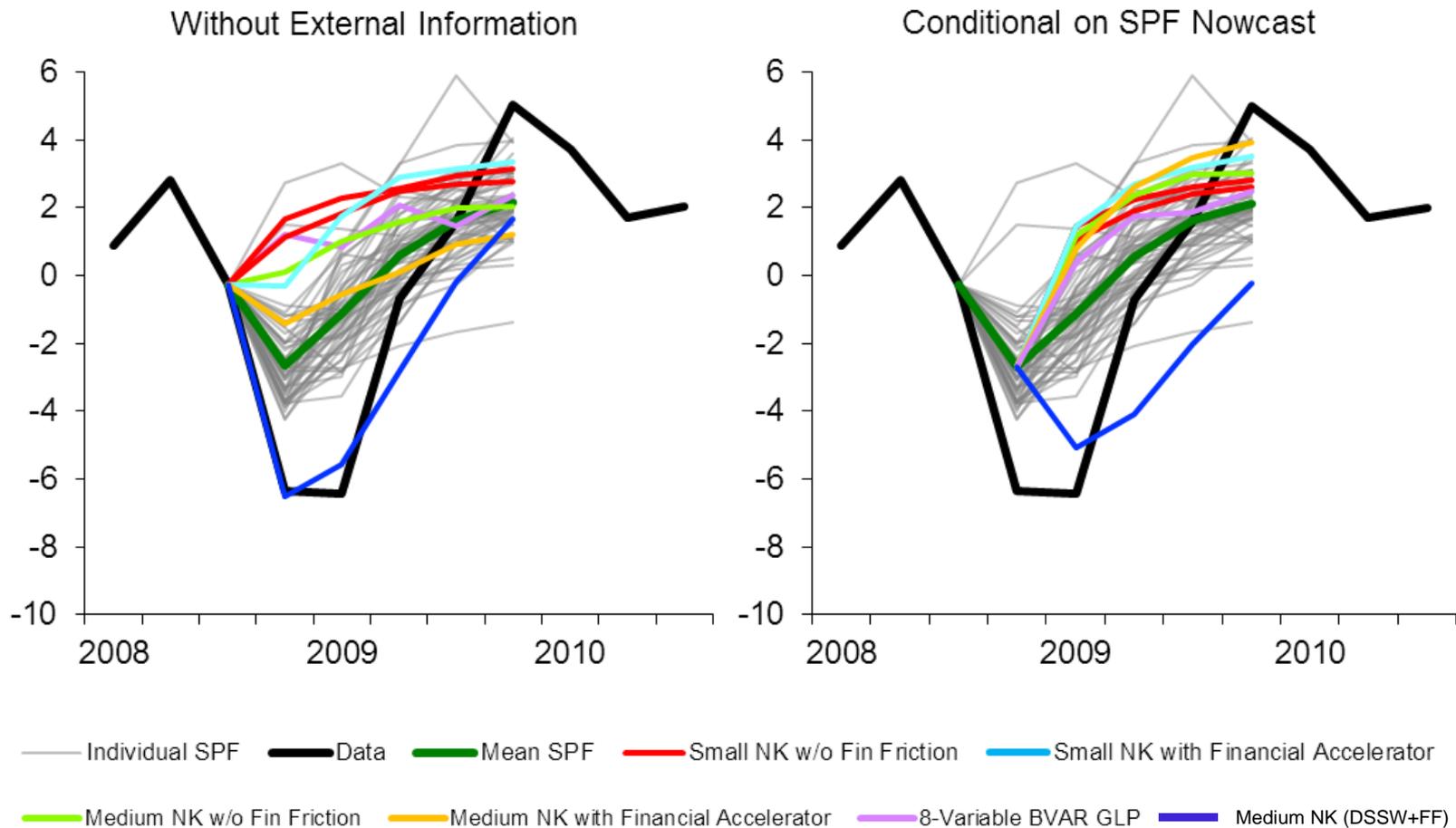
- No systematic difference between models under all four scenarios.

Forecasts Starting 2008Q3, Scenarios 3 & 4



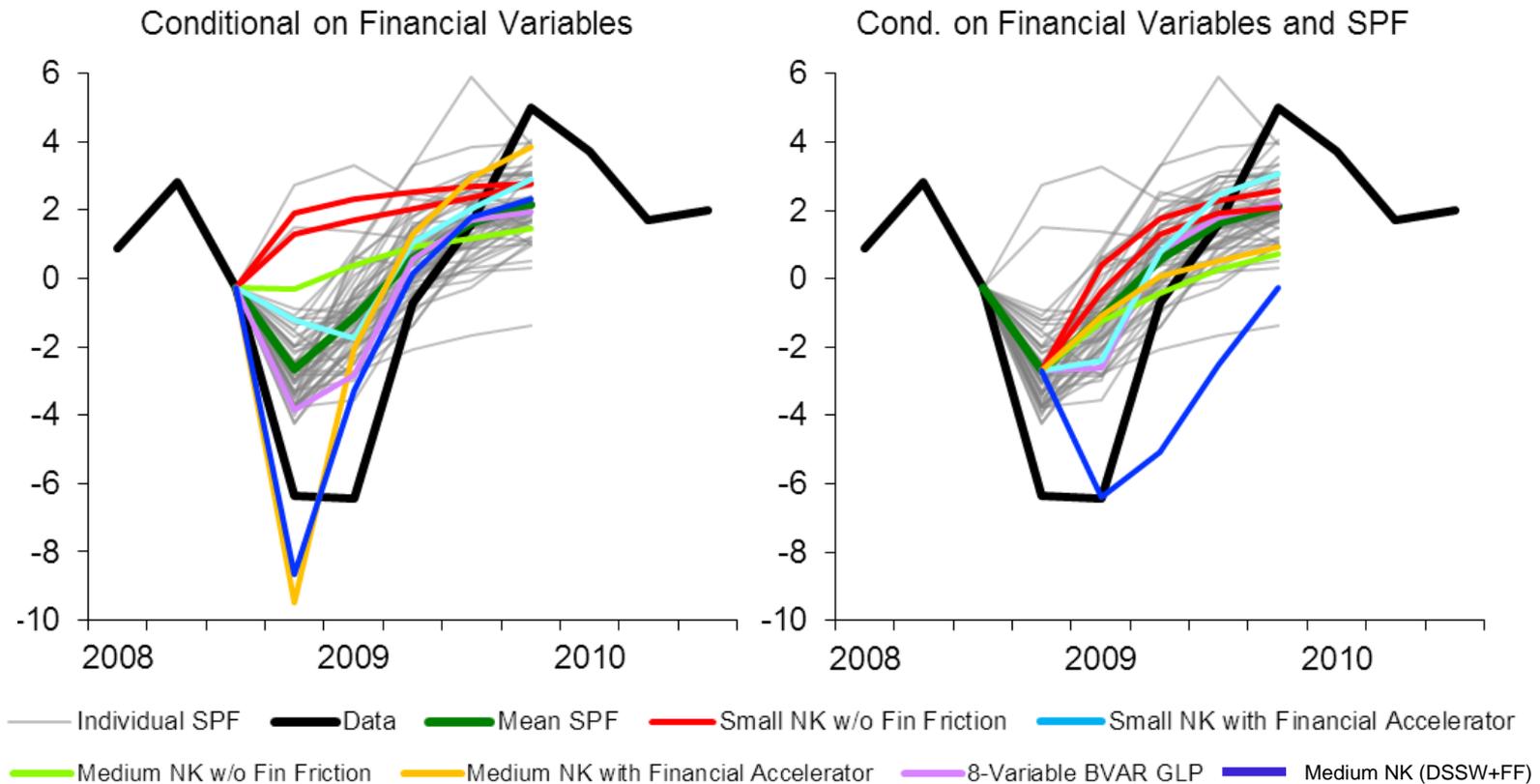
- No systematic difference between models under all four scenarios.

Forecasts Starting 2008Q4, Scenarios 1 & 2



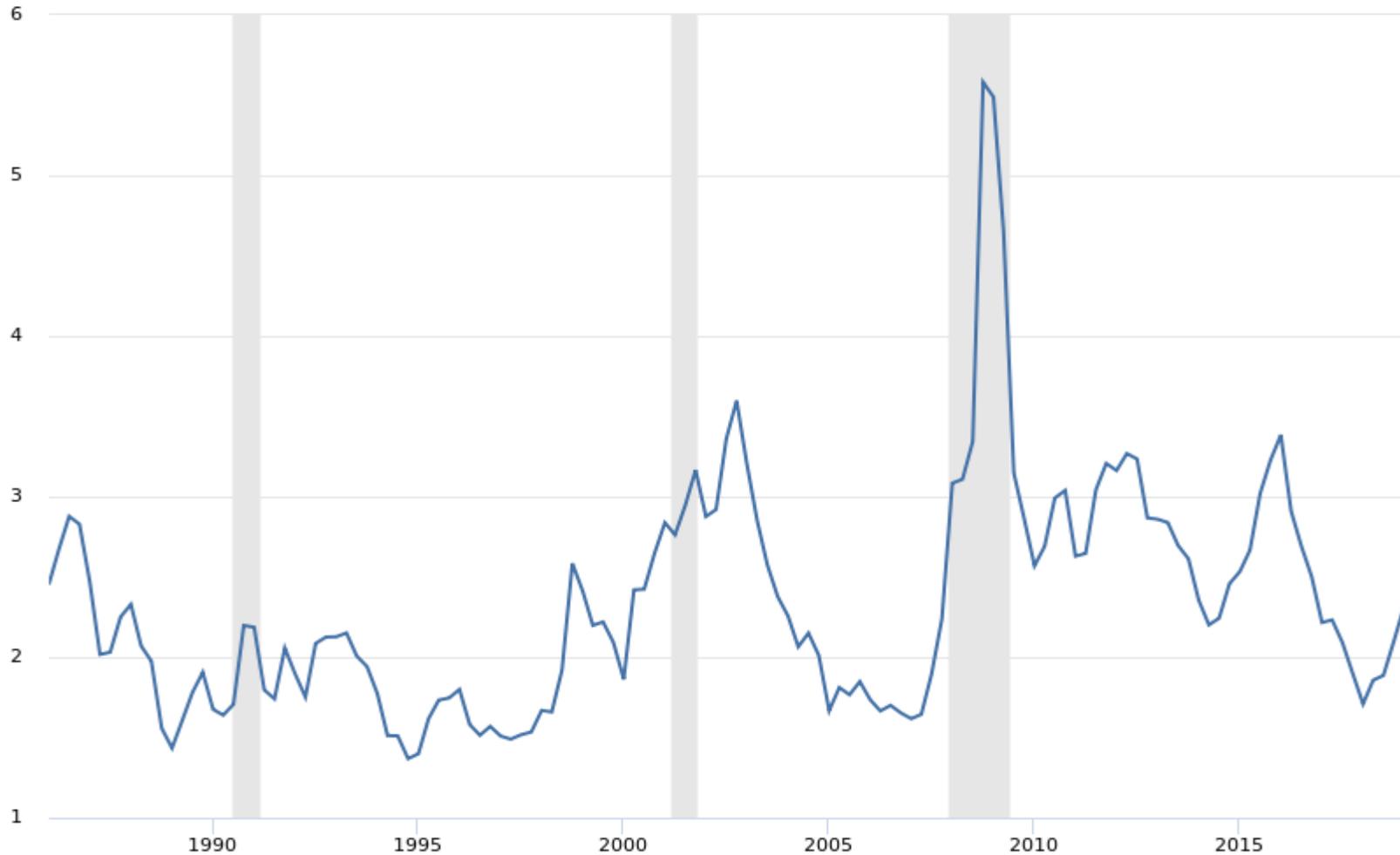
- Models with financial frictions perform better than counterparts without frictions and better than a BVAR

Forecasts Starting 2008Q4, Scenarios 3 & 4

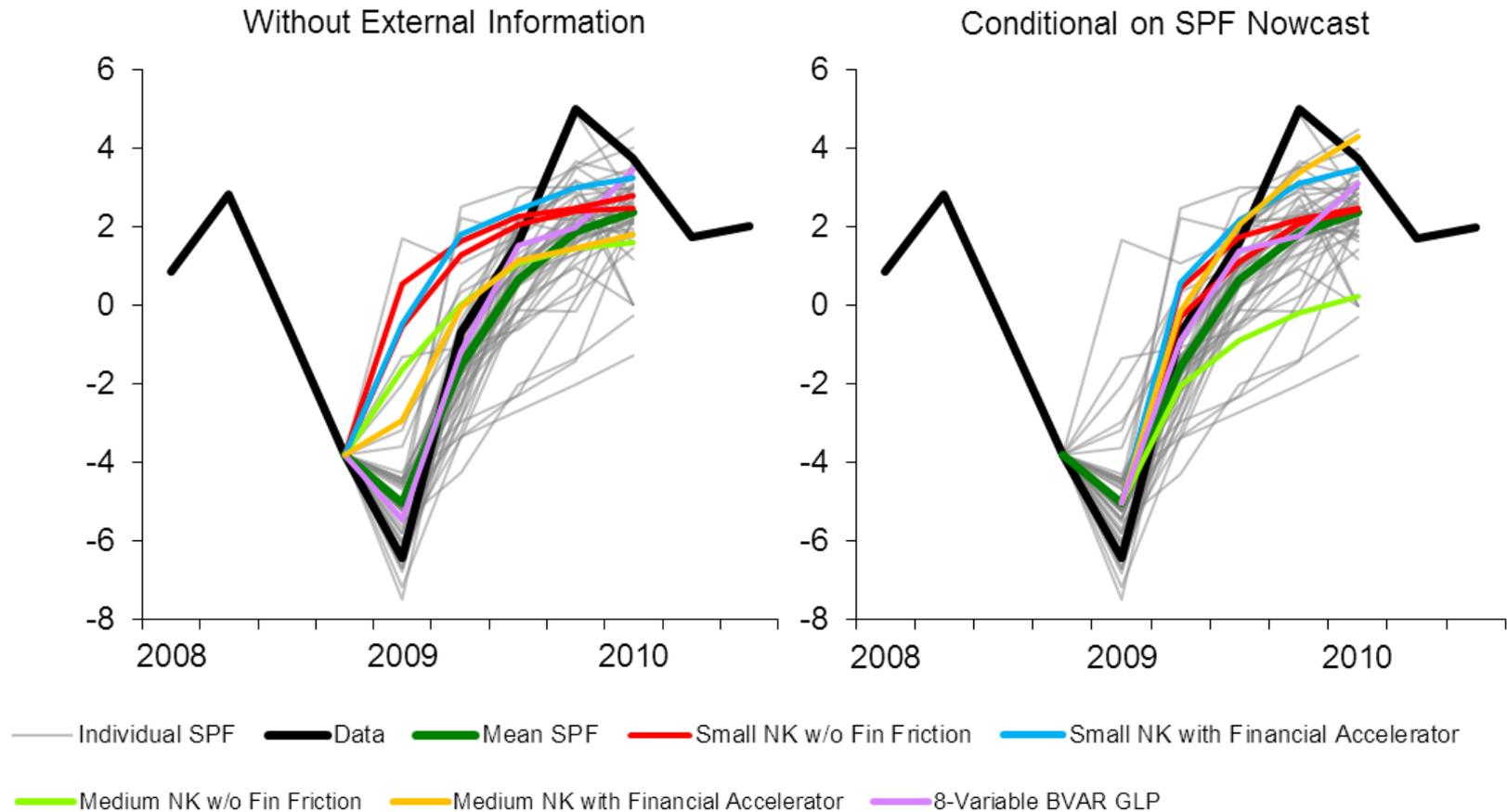


- Medium scale models with financial frictions can generate endogenously highly negative nowcast, when conditioned on the credit spread
- Small model with financial frictions improves upon model without frictions
- BVAR with spread data works quite well as well

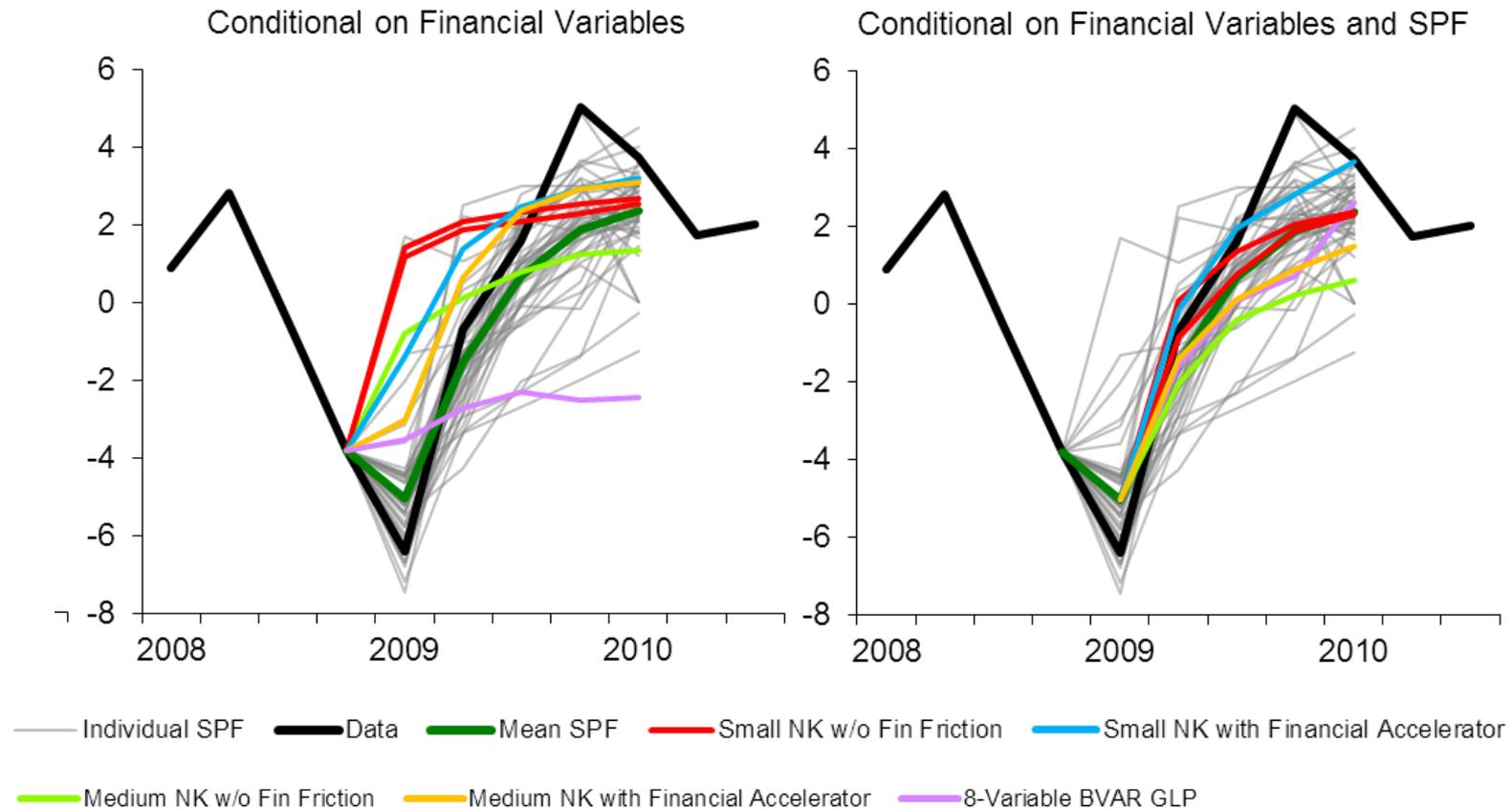
Spread: BAA Corporate Bond – 10 year Treasury



Forecasts Starting 2009Q1, Scenarios 1 & 2



Forecasts Starting 2009Q1, Scenarios 3 & 4



- Recovery predicted quite well by all models.
- BVAR predicts a long recession if conditioned on credit spread

Systematic Forecast Evaluation Based on RMSE (2008Q3-2009Q2)

All Four Scenarios

- » DSGE models worse than SPF for short horizons, better for medium horizons
- » Financial frictions improve forecasts for medium scale DSGE models substantially
- » DSGE model with financial frictions performs better than BVAR counterpart

1. No conditioning

- » DSGE model nowcast worse than SPF nowcast
- » Medium scale DSGE model with financial frictions + spread and loan growth predicts the Great Recession dynamics in 2008Q4

2. SPF-conditioning

- » DSGE model forecast for horizon 1 improves, but not beyond

3. Financial market data conditioning

- » Increases precision of nowcast of medium scale models with financial frictions and BVAR counterpart substantially → captures the large downturn in 2008Q4 endogenously

4. SPF + financial

- » Very similar to just conditioning on SPF

Conclusion

- Important progress in macroeconomic modeling over the last 10 years
 - » Medium-scale model with financial frictions can endogenously generate the large decrease in GDP growth in 2008Q4, when conditioned on the credit spread
 - » Forecasting accuracy more precise than SPF during largest downturn
 - » Medium-scale model with financial frictions increases forecasting accuracy systematically compared to counterpart without financial frictions

- Need to include additional models, because different types of financial frictions work very differently
 - » Christiano, Motto, Rostagno (2014)
 - » Smets and Wouters + collateral housing constraint (Kiyotaki and Moore, 1997; Iacovello, 2005)
 - » ...

Thank You!

