

1.2 Medium-term forecast

- Ultimately judgmental
- Both bottom-up and top-down model input
- Top-down:
 - Use of FRB/US and other multipliers to calibrate GDP responses to changes in financial and fiscal conditions
- Bottom up:
 - Decentralized
 - Reduced-form and semi-structural models used to inform judgment
 - Top-down and bottom-up tensions resolved through negotiation

Examples of medium-term models

- Okun's Law
 - Linking GDP and labor-market forecasts
- Reduced-form consumption models
 - Relating consumer spending to income, financial conditions, consumer sentiment, and other factors
- Semi-structural models of investment
 - Relating investment to business output and the user cost of capital
 - "Accelerator"
- Reduced-form Phillips-curve models of inflation

1.3 The Long-Term Forecast

- We recently adopted a simple semi-structural model to generate our long-term forecast.
 - Core is a New Keynesian “three-equation model.”
- This model is close in spirit to a DSGE model.
- It is calibrated to have properties similar to our main large-scale semi-structural model, FRB/US.

Experience with our long-term model

- In use since beginning of 2016.
- Difficult to evaluate forecast performance of a long-term model.
- In our view, simple structure is a virtue:
 - Very easy to use and explain.

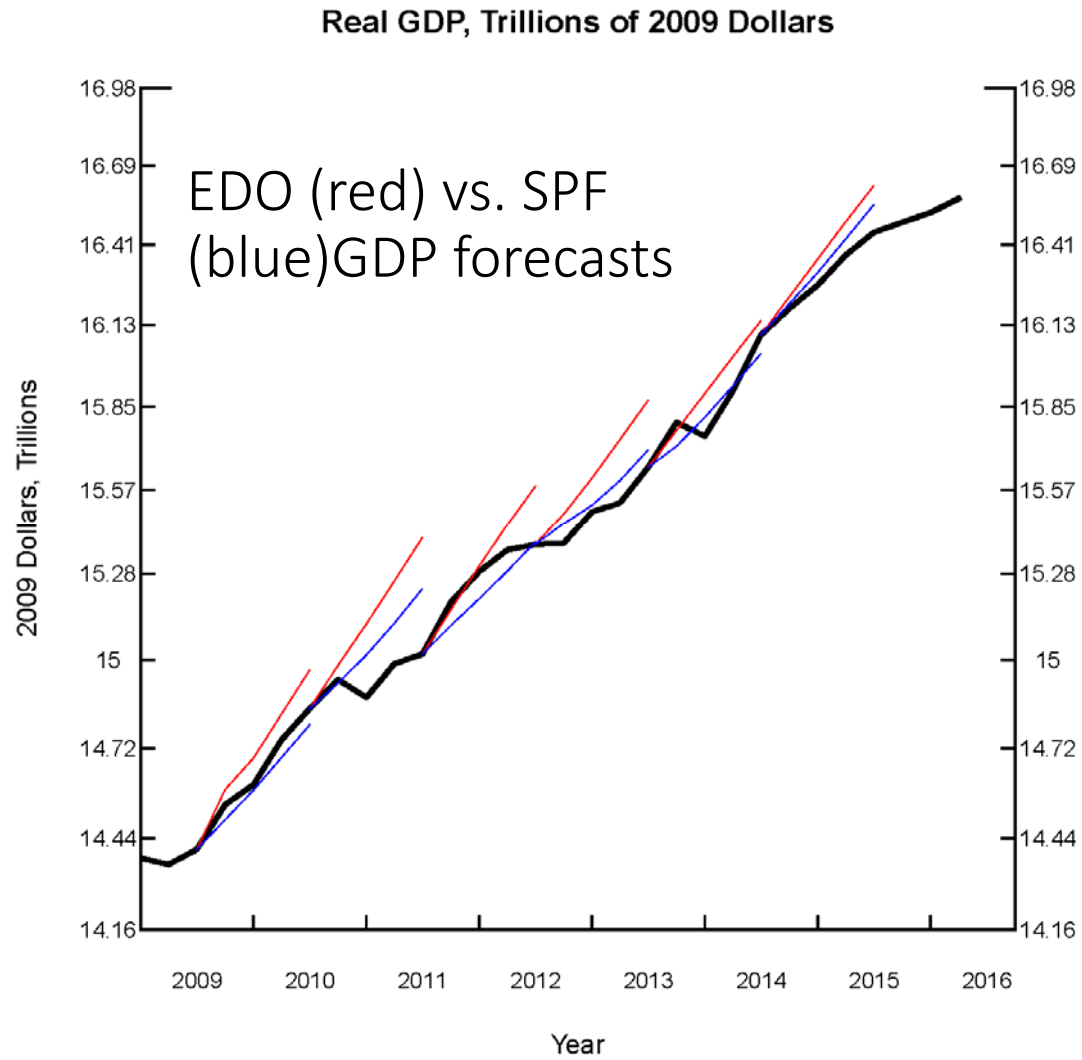
2. *Will DSGE models eventually improve enough to replace semi-structural models?*

DSGE models can be assessed on two key dimensions:

1. Forecasting
2. Story telling

2.1 EDO's forecast performance

- EDO is the Board staff's oldest domestically oriented DSGE model: In use since 2009.
- As a reminder, the Board staff doesn't use EDO—or any other one model—to generate its baseline forecast.
- It is nonetheless of interest to compare EDO's real-time forecasting performance with that of the Survey of Professional Forecasters (SPF).



EDO has performed somewhat less well

- Four-quarter-ahead RMSE is about 12 percent higher than the SPF.

But

- SPF is an average over many forecasts—an advantage in forecasting.
- A disadvantage in story-telling.

2.2 Models and stories

- In principle, DSGE models are well-suited to story-telling.
 - Because they are structural.
- Many practical policymakers disagree.

Blanchard: *DSGE models are bad communications devices.*

Models and stories, continued

- Greater flexibility in model structure is an advantage of semi-structural models.
 - Don't need to wait for theory to catch up.
- Example: Wealth effect on labor supply.
 - Some more-recent DSGE models have dropped it.
- There are lessons in both directions.
 - For example, in FRB/US, all dynamics are determined by adjustment costs. Would probably want to allow for serially correlated errors.
- Possible outcome: Eventual convergence.
 - Theoretical stories catch up with reality.
 - Better understanding of theoretical stories.

2.3 How we use structural models at the FRBOG

- Not for forecasting
- But we have long used our workhorse semi-structural model, FRB/US, for many other purposes.
 - Alternative scenarios
 - Assessment of policy strategies
 - *We currently use DSGE models alongside FRB/US for these purposes.*
- As just noted, we recently moved away from FRB/US, toward a simpler semi-structural model, for our long-term forecast.
 - Closer to a DSGE model

3. Nonstandard data at the FRBOG

- Looking at a broad range of new data sources
- Current view is that **search data are not very helpful.**
- The experience of an early experiment in this area, Google Flu Trends
 - Top search result:

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WHAT WE CAN LEARN FROM THE EPIC FAILURE OF GOOGLE FLU TRENDS



Nonstandard data, continued

- More promising are **transactions data**.
 - Credit-card transactions
 - Payroll processing data
- Working with traditional statistical agencies to improve timeliness, coverage, sample sizes.
- Evolutionary, not revolutionary

4. The regime-based approach

- Forecasting approach recently adopted by the St. Louis Fed
- While the St. Louis forecast is formally judgmental, it has many points of contact with a **Markov-switching approach**.
 - Focus on infrequent changes in regime.
- Will therefore consider some issues with forecasts in a formal Markov-switching approach

Forecasting in the face of nonlinearities

- Casually, Board staff would characterize their forecast as a mode rather than a mean.
 - Prompted by desire to have a narrative.
 - Brexit either happens or it doesn't.
- In linear models with normal errors, the mean and the mode are the same, so there is no tension.
- But (U.S.) business cycle appears to be nonlinear.
 - Change in the unemployment rate is highly skewed.

Nonlinearities, continued

- One useful nonlinear model is the Markov-switching model.
- In a two-state Markov-switching model, mean and modal forecasts can differ substantially.
 - If the states are persistent, the modal forecast will initially involve staying in one of the states.
 - The mean forecast will instead be a weighted average of the two states.
- After a while, however, the probability of staying in the initial state becomes very low.

Preliminary assessment of regime approach

- Promising, because it recognizes the world isn't linear.
- Unresolved issues about interpretation of longer-horizon forecasts.