

Macro Modeling at the FRB: FRB/US

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Introduction

In The Beginning...

In the early 1990s, large effort at FRB to develop a new macro model: **FRB/US**

Objectives

- suitability for forecasting
- explicit expectations
- structure: agents optimizing subject to adjustments
- goodness of fit important
- IRFs for standard close to VAR IRFs

Put into use in 1996. *Early papers:*

- Brayton and Tinsley (1996)
- Brayton, Levin, Lyon, and Williams (1997)

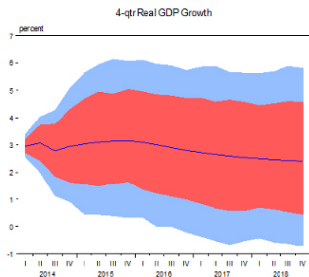
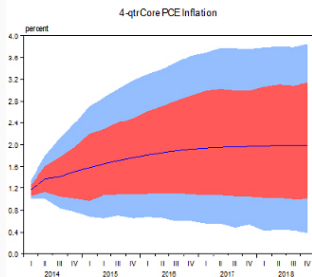
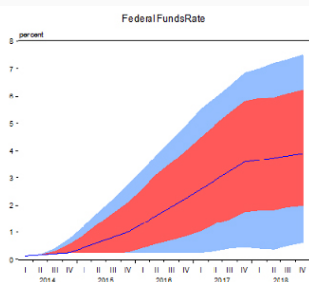
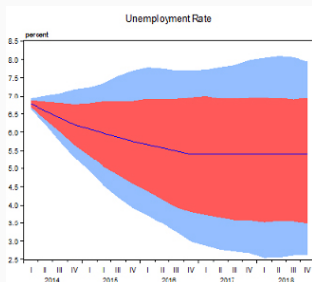
Today

FRB/US is still the main macroeconomic model in use at the Board.

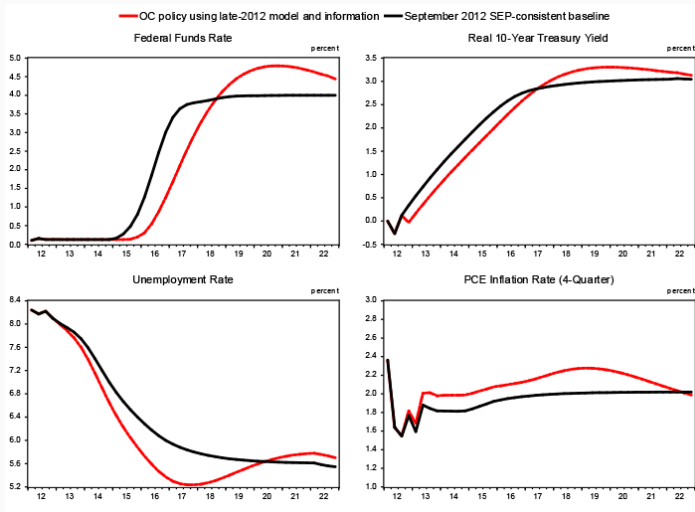
(Some) current uses

- Forecasting, short and long-term
- Alternative scenarios
- Forecast confidence bands (stochastic simulations)
- Optimal monetary policy simulations
- Stress tests

Brayton, Laubach, and Reifschneider (2014a): Stochastic Simulation



Brayton, Laubach, and Reifschneider (2014b): Optimal Control in FRB/US



Model Details

Model Details

Consumption: unconstrained and hand-to-mouth households.

- unconstrained consume optimally subject to (highly discounted) life-time resources and (polynomial) adjustment costs

Labor: movements in labor force driven by available of jobs.

No wealth effect in short or long run.

Firms: Forward-looking firms hire and invest in line with standard neoclassical investment theory.

Financial Sector: interest rates (Treasuries, BBB, auto loan rates, mortgages) are determined as expected average value of FFR plus endogenous term/risk premiums.

Model Details

Supply Side: underlying Cobb-Douglas production function. “Latent” (e.g., technology) variables estimated via a state space model along lines of Fleischman and Roberts (2011).

Price and Wage Setting: New Keynesian Phillips curve determines core PCE inflation and nominal wages (ECI measure). *Slope is very flat!*

Government: Disaggregated components of spending and a wide range of tax rates and credits at both federal and the state and local levels. Many possible fiscal rules.

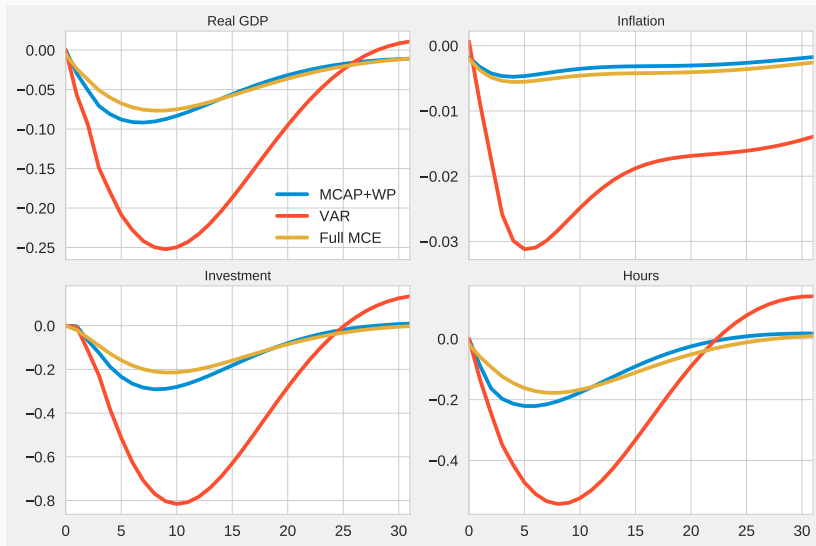
The Role of Expectations

FRB/US can be run under a variety of setting for expectations.

1. **VAR expectations**: limited-information fixed-coefficient formulas derived from small VARs
2. **Model-consistent** expectations (perfect foresight, “MCE”)
3. **Mixed expectations**
 - *MCAP*: MC for asset pricing, VAR elsewhere
 - *MCAP+WP*: MC for asset pricing, wage and price setting, VAR elsewhere

Most monetary policy simulations are run under *MCAP+WP*.

50bp Monetary Policy Shock



Comparison with DSGE

Comparison with DSGE

Size

- FRB/US is a lot bigger than most DSGEs, (≈ 35 core estimated equations)
- “can’t” estimate equations simultaneously

FRB/US has less emphasis on theoretical internal consistency

- no representative agent
- consumers have higher discount rates than agents in financial markets
- no link between consumer preferences and labor supply
- few cross equation restrictions
- (relatively) easy to modify parts of model

Comparison with DSGE, continued

Adjustment costs

- FRB/US: optimization subject to polynomial adjustment costs (PAC)
- generalization of quadratic adjustment costs (Tinsely, 1993)
- Large adjustment costs means that variables in FRB/US tend to be less sensitive to many types of shocks.

FRB/US has relatively more emphasis on fitting (in-sample) data

- flexible PAC approach to adjustment frictions
- limited reliance on serially correlated shocks
- estimation: OLS/ML mix

Further Afield

FRB/US is on the internet. You can get it here:

[https://www.federalreserve.gov/econres/
us-models-about.htm](https://www.federalreserve.gov/econres/us-models-about.htm)

References

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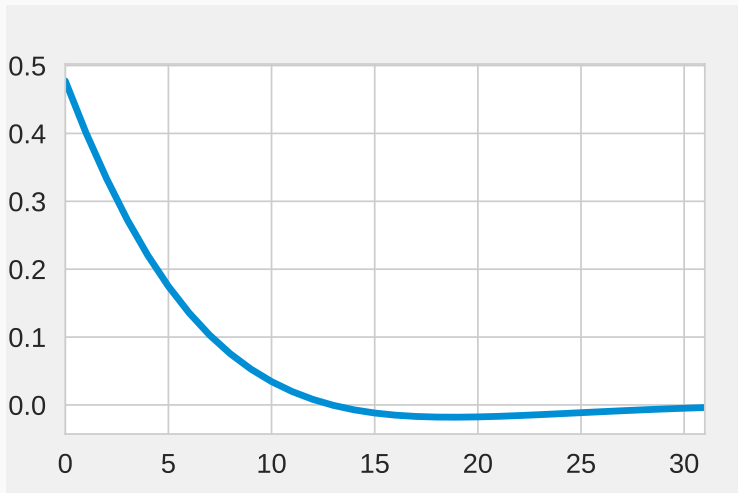
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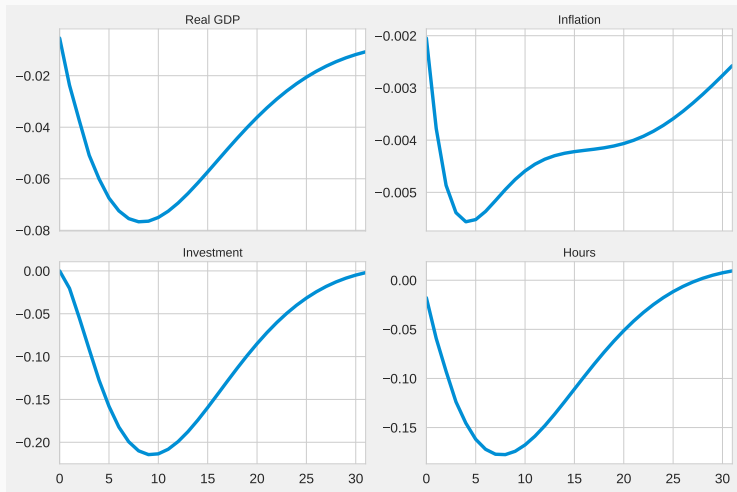
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Impulse Responses

50bp Monetary Policy Shock – FFR Response



50bp Monetary Policy Shock



50bp Spread Shock

