Macro Modeling at the FRB: FRB/US

Ed Herbst, Federal Reserve Board
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Introduction
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
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.
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.
FRB/US can be run under a variety of settings 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

![Graphs showing the effects of a 50bp monetary policy shock on Real GDP, Inflation, Investment, and Hours.](image-url)
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
References


Impulse Responses
50bp Monetary Policy Shock – FFR Response

![Graph showing the response of the Federal Funds Rate (FFR) to a 50bp monetary policy shock. The graph depicts a downward curve, indicating a decrease in the FFR over time, with the y-axis representing the magnitude of the response and the x-axis representing time in weeks. The curve flattens out over time, suggesting a gradual return to baseline.]
50bp Monetary Policy Shock
50bp Spread Shock

![Graphs showing the effects of a 50bp spread shock on Federal Funds Rate, Real GDP, Inflation, Spread, Investment, and Hours.](image-url)