

Macroeconomic Modelling at the Central Bank of Brazil

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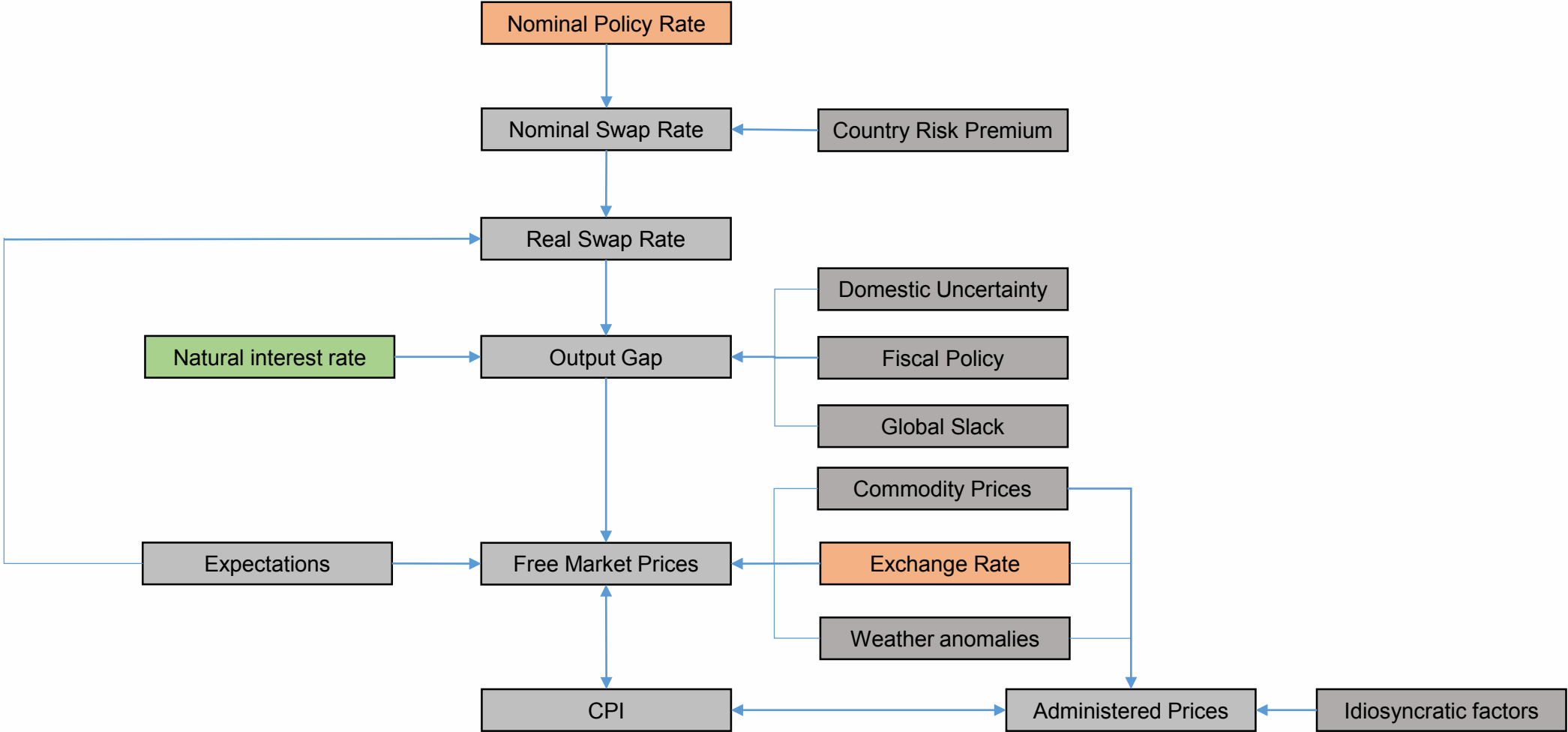
- Economic analysis at the BCB based on three type of models:
 - ✓ Small-scale semi-structural models, focused on inflation and output gap projections
 - ✓ Medium-scale DSGE model, focused on policy analysis
 - ✓ Medium-scale DSGE model with financial frictions for financial stability analysis
- Operational framework for monetary policy analysis reconcile common hypothesis across models

Talking Points

- Small-scale semi-structural models
 - ✓ Current structure and estimation procedure
 - ✓ Challenges and alternative versions of the model
- DSGE model – SAMBA
 - ✓ Current features of the model
 - ✓ Challenges and work in progress
- Combining models for monetary policy analysis
 - ✓ Framework for analysis on MPC
- DSGE model – FaFi – and requested simulations
 - ✓ Monetary policy shock
 - ✓ Financial shock

Small-scale semi-structural models

Overview



Core Structure

- Phillips curve: free market prices and administered prices
 - ✓ Free market prices inflation
 - ✓ Aggregate free market prices
 - ✓ Free market prices by segments: food-at-home; services; industrial goods (ex-food)
 - ✓ Administered prices
 - ✓ System of equations with all 23 administered CPI items modelled
- IS curve
 - ✓ Suite of output gap measures
- Swap rate equation
- Taylor rule

Small-scale semi-structural models

- Core models are estimated using system GMM
- Satellite model to project potential output growth → Combine with IS curve to obtain GDP growth forecast
- Satellite dynamic factor model (DFM) to capture the comovement between domestic uncertainty and the exchange rate
- Endogenous feedback between free market prices and administered prices
- On-going developments include Bayesian estimation of medium-scale semi-structural models with an explicit role for relative price shocks

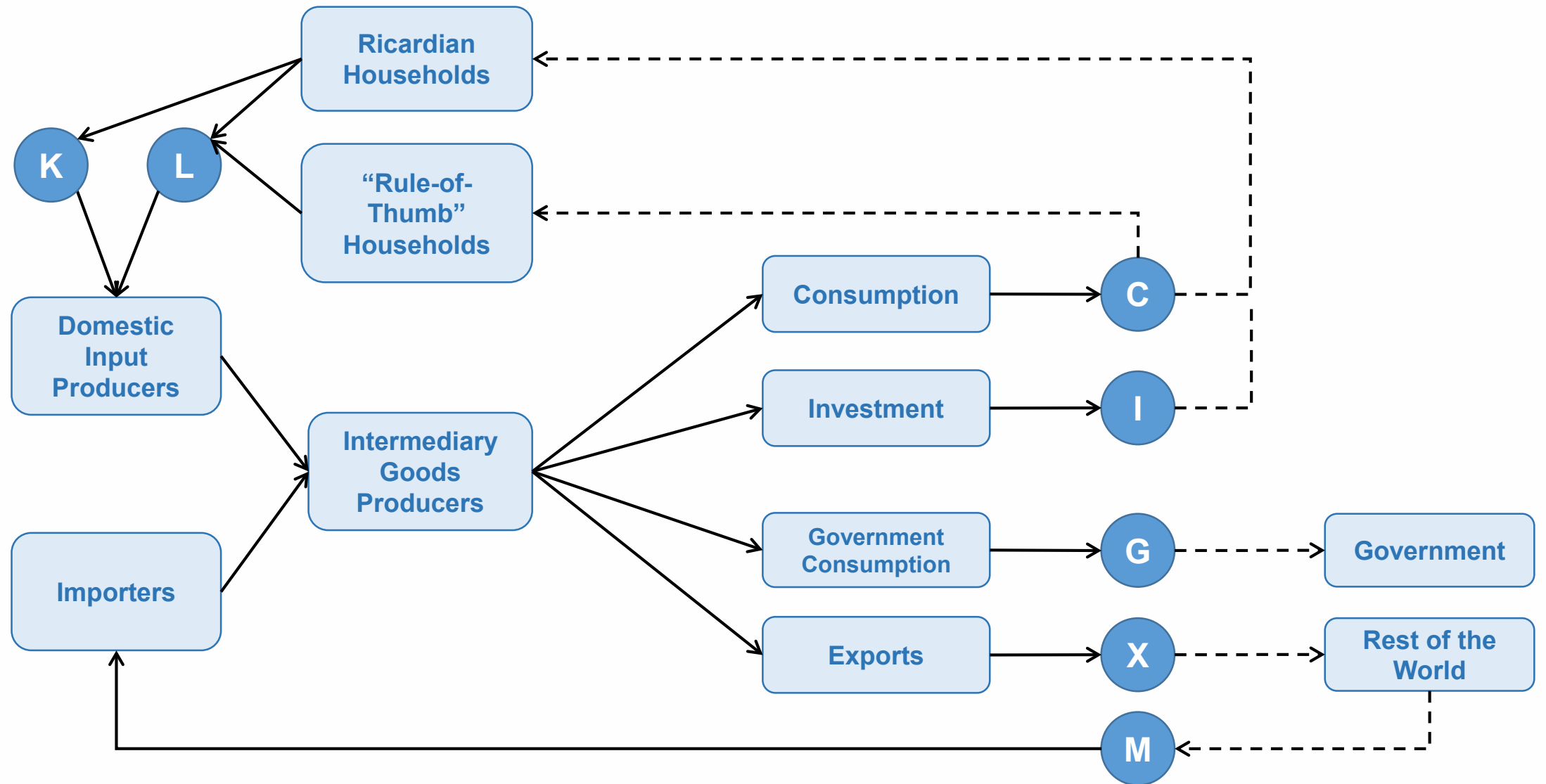
DSGE model – SAMBA

- “SAMBA”: “Stochastic Analytical Model with a Bayesian Approach” – Bad acronym for a good model!
- Medium-scale DSGE model for Brazil, characterizing the main transmission channels from monetary policy to the economy.
- Similar model to those in other central banks (ECB, NZ, Chile, Canada, UK, Sweden, Norway, ...).

DSGE model – SAMBA

- Framework: Brazil as a “small-open economy”
- Standard features of the model:
 - ✓ Nominal rigidities: prices and wages (Calvo, 1983)
 - ✓ Real rigidities: habit persistence in consumption; investment, exports and imports adjustment costs
 - ✓ Monetary and fiscal policy rules
 - ✓ Exogenous foreign sector
- Features from the Brazilian economy:
 - ✓ Separate Phillips curve for administered prices, with different indexation rules
 - ✓ Imports as an input for domestic production
 - ✓ “Rule-of-Thumb” agents calibrated based on income distribution

DSGE model – SAMBA



DSGE model – SAMBA

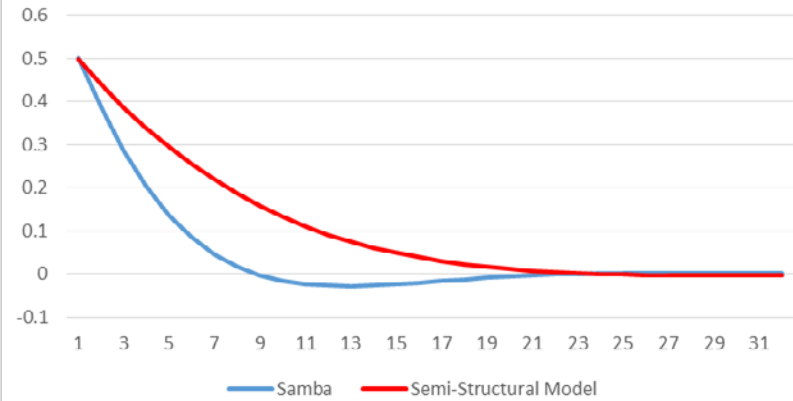
- Recent developments:
 - ✓ Common trends, estimated in the model, for GDP and demand components
 - ✓ Adjustment of the model for new time series of wages and employment
 - ✓ Better dynamics from adjustment costs of exports and imports
 - ✓ SVAR describing foreign sector: include more variables
- Future developments:
 - ✓ Compute the natural real interest rate and natural GDP growth
 - ✓ Description of fiscal policy: distortionary taxation
 - ✓ Additional price disaggregation: food-at-home; services; industrial goods (ex-food)

Combining models for monetary policy analysis

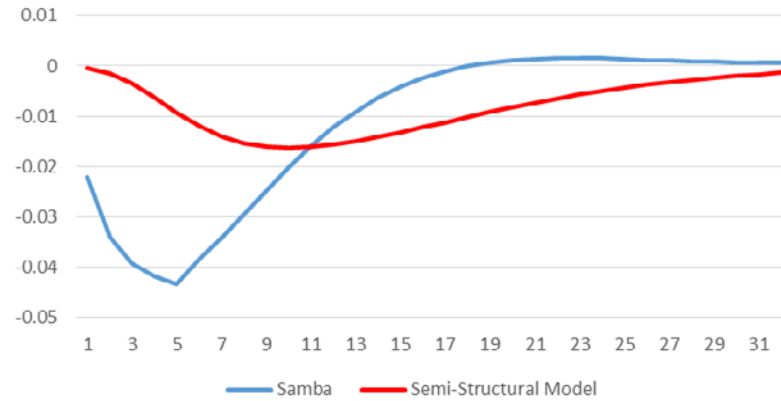
- How to compare forecasts from a DSGE model with other forecasts? Comparing with the semi-structural models:
 - ✓ All exogenous variables conditioned with the same values
 - ✓ All conditioned forecasts based on the same scenario
 - ✓ Experts provide nowcasts and short-run forecasts for both models
 - ✓ Try to reduce as much as possible the information gap among models
- How to present forecasts from a DSGE model? Exploring the output of the DSGE model:
 - ✓ Historical data and shock decompositions
 - ✓ Confidence bands based on parameter uncertainty
 - ✓ Explicit transmission mechanism from other (more complex) scenarios

Simulations: Monetary policy shock

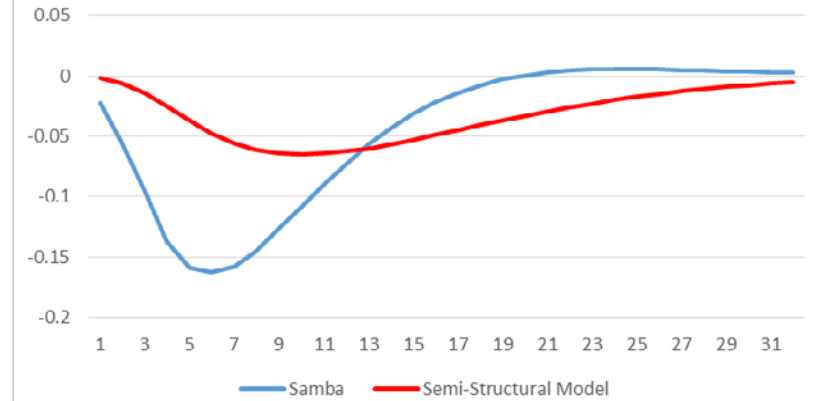
Interest Rate - %p.y.



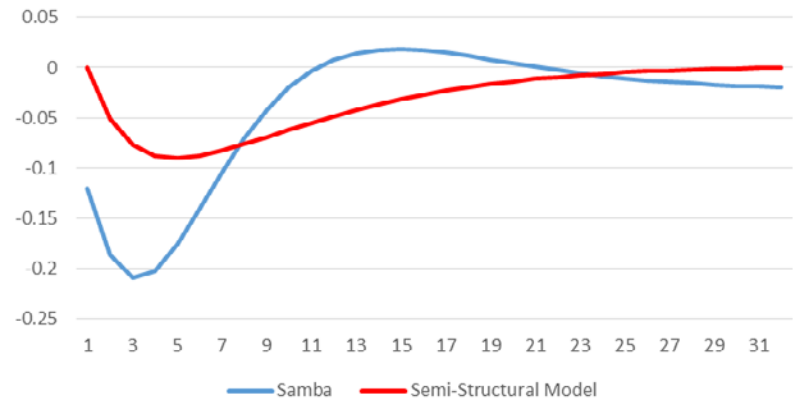
CPI - % Q-o-Q



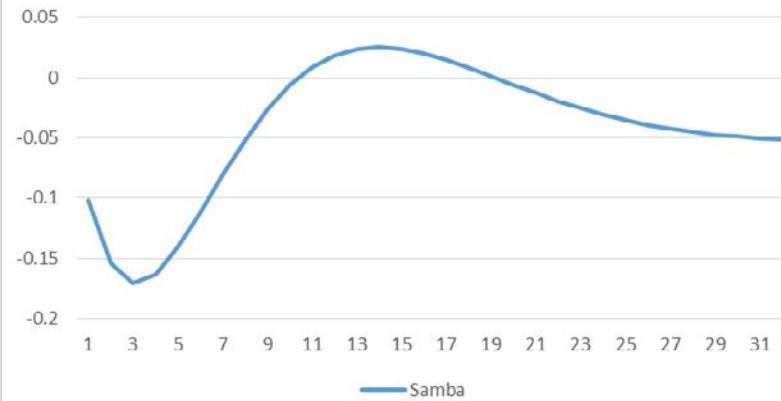
CPI - % Y-o-Y



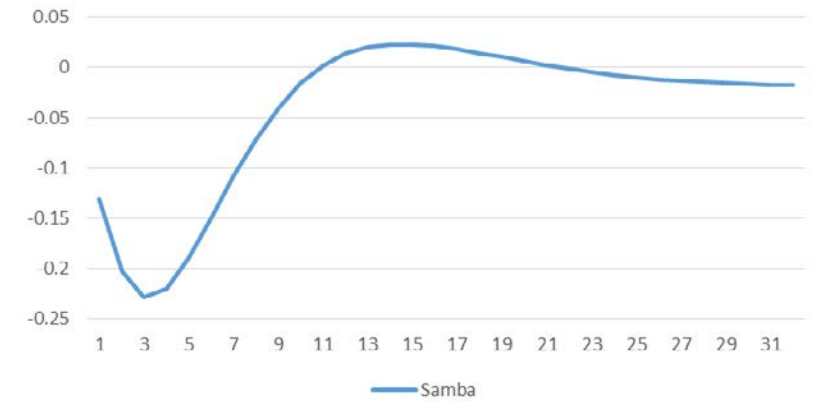
Output Gap - % of GDP



Investment - % dev. SS



Employment - % dev. SS

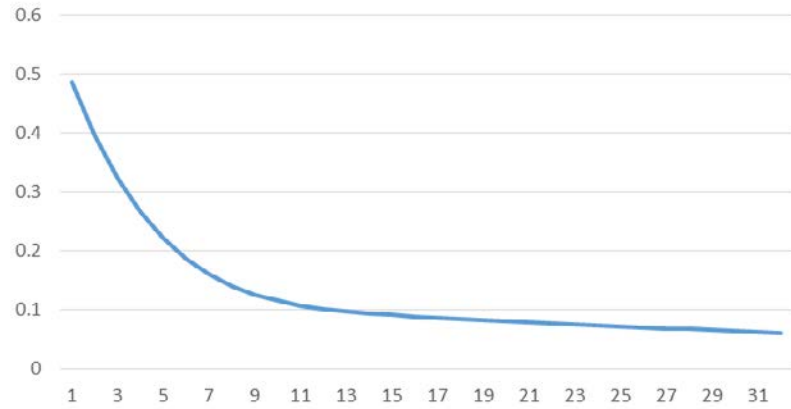


DSGE model – FaFi

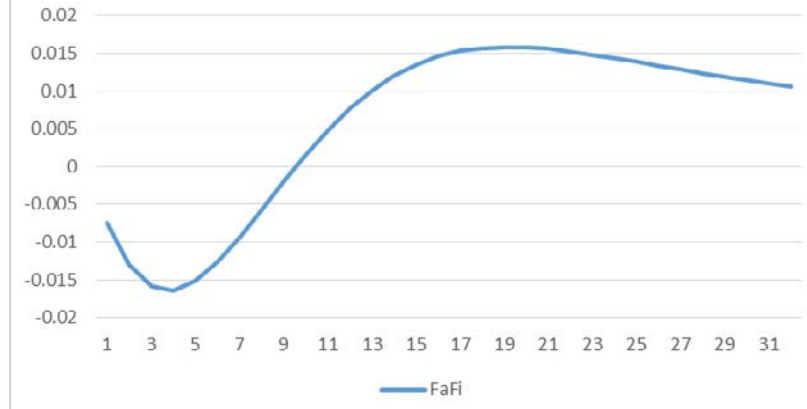
- Estimated open economy DSGE model with financial frictions and a banking sector
- Designed for analysis of macroprudential policies
- Three types of credit:
 - ✓ Firms: variant of BGG financial accelerator
 - ✓ Consumer loans: debt-to-income constraint
 - ✓ Housing loans: regulated interest rates and earmarked funding
- Monetary and macroprudential instruments:
 - ✓ Policy interest rate, capital requirement, reserve requirements, sectoral risk weights, taxes on financial transactions

Simulations: Financial shock

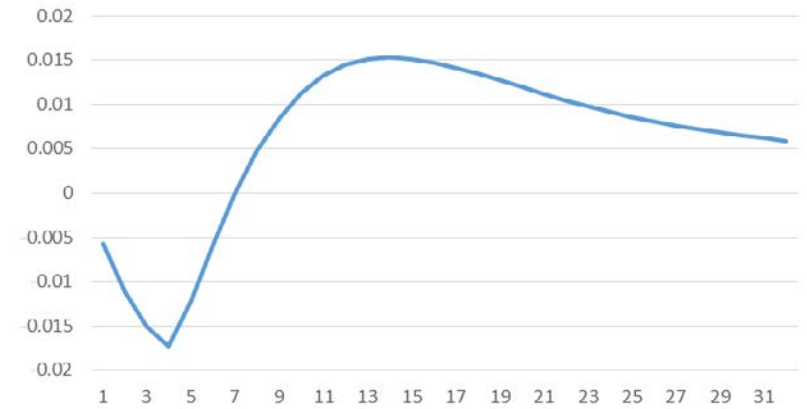
Spread - % p.y.



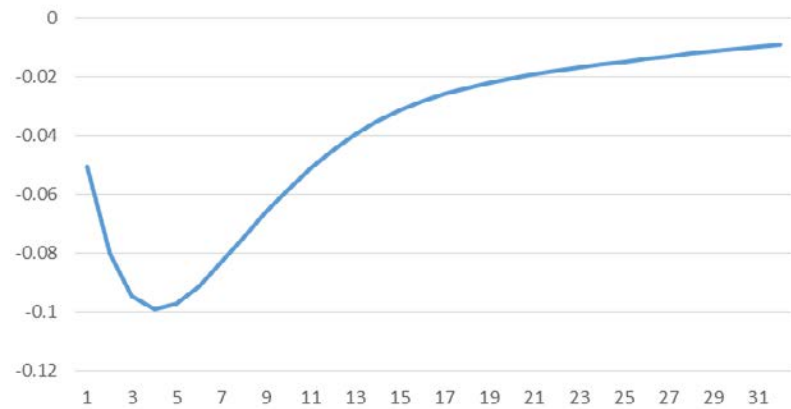
Interest Rate - %p.y.



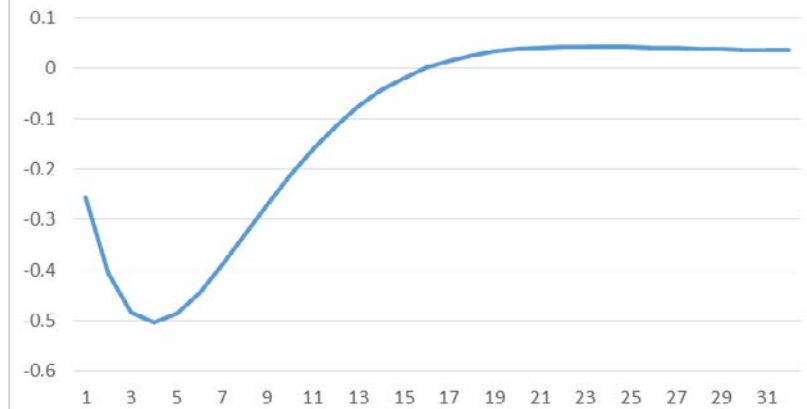
CPI - % Y-o-Y



Output Gap - % of GDP



Investment - % dev. SS



Employment - % dev. SS

