The MAS, a DSGE Model for the Chile, Implementation, Forecasting and Challenges

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Motivation for developing a DSGE model

Model development

Model features

Empirical implementation

Transmission mechanism

Forecasting

Further Issues and Challenges
Motivation

- Inflation targeting framework in Chile since early 90s
- Monetary policy design relies heavily on forecasts
- Original motivation for developing a DSGE model: to improve upon our current medium-size (semi-structural) macro model
- DSGE models are better equipped to deal with counterfactual analysis
- DSGE models include simultaneously first and second round effects
The Road in the model development

- Dominant view of a one-for-all model
- Initial requirements from senior management focused on forecasting
- Introduction of new concepts (e.g. natural output) and new paradigm regarding the policy response to certain shocks
- Structural interpretation of various shocks (current macro model is a reduced form one)
- Interaction with current macro model: IRFs, Transmission Mechanisms, Forecasting
Model features

- Ricardian households, non-Ricardian households, firms, fiscal authority, monetary authority, foreign agents
- Sticky prices and wages (à la Calvo). Imperfect exchange rate pass-through to both import and export prices
- Habit formation in consumption, adjustment cost for investment, price and wage indexation
- Stochastic trend in productivity
- Oil (energy) consumed by households and utilized as an input in production
- Exogenous endowment of a commodity good owned by the government foreign agents who’s international price is stochastic
- Distinction between food and non food core inflation
- *Structural balance* rule for the fiscal policy; simple feedback rule for the interest rate
Estimation and calibration

- Model parameters estimated using a Bayesian approach with quarterly data for the period 1987:Q1 to 2005:Q4
- A subset of the parameters are calibrated to match the steady-state of the model with some long-run trend data in the Chilean economy
- Baseline estimation uses as observable variables (among others): real GDP, commodity production, short-run interest rate, core inflation, the real exchange rate, current account/GDP ratio, labor and the international prices of copper and oil
Applications

- Bayesian Estimation:
  - Assess the impact of monetary regime changes
  - Determinants of current account evolution
  - Sources of business cycle in Chile (Historical and Variance decomposition)
- Transmission of oil/food price shocks
- Analysis of the structural fiscal rule
- Quantify implications of lack of credibility
Estimation: Results

- Nominal rigidities are relevant in the case of Chile.
- Some key parameters not well identified in the data.
- Productivity shocks play a major role in explaining the business cycle. Foreign shocks are also important.
Posterior distributions of time variant parameters
## Variance Decomposition

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Transmission mechanism

- Assessment of the transmission mechanism through the lens of the MAS model challenges conventional view
- Transmission of copper price shocks depends on the underlying fiscal policy rules
- Oil price shock under the MAS model not only consider aggregate demand effects but also aggregate supply effects
- Food price shock
- Lack of credibility exacerbates the monetary policy trade off
Copper price shock

Transmission mechanism

GDP (y/y %)

CPI Inflation (y/y %)

Interes Rate

Real Exchange Rate

MAS

MAS Alt. Fiscal Rule

MEP
Forecasting with the MAS model shows results that are comparable with the current macro-model.

Some judgement introduced by adjusting constant terms.

Future work includes formal assessment of the quality of the forecasting, although MSE is not larger than the one produced by other models.

The structure of the model allows us to perform a historical decomposition of forecasts.
Forecasts of the model are as good as time series models

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Decomposition of forecast: Inflation

Domestic Supply Factors

Domestic Demand Factors

Food Prices

MP shocks

External Factors

Total

Food Prices


Further Issues

- Imperfect Credibility
  - Persistent oil shocks have stressed the IT regime
  - Can inflation convergence be delayed?
  - Yes, if the private sector perceive the target is modified after the shock
  - Hence, making the target credible is a challenge

- Optimal monetary policy and central bank preferences
  - Taylor Rules are a reduced form representation of the behavior of the CB
  - An alternative (more structural approach) is to implement a policy that minimize a given loss criterion
  - Optimal Policies can be used in the forecasting process
Further Issues and Challenges

Imperfect Credibility: Oil price shock

Headline Inflation
Core Inflation
Nominal Interest Rate
Output growth
Real Exchange Rate
Current Account (% of GDP)

-0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2
-0.1 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8
-0.4 -0.3 -0.2 -0.1 0.0 0.1 0.2 0.3 0.4

-0.4 -0.3 -0.2 -0.1 0.0 0.1 0.2 0.3 0.4

-0.4 -0.3 -0.2 -0.1 0.0 0.1 0.2 0.3 0.4

Perfect Credibility  Imperfect Credibility
Challenges

- General equilibrium v/s sequential thinking
- Role of relative price adjustments (particularly relevant for an open economy where exchange rate fluctuations play a central role)
- Labor market and exchange rate disconnection
- Secular trends and relevant stationary ratios
- Observable variables and historical decomposition
- Modeling, explicitly, the financial sector