Exchange rate peg versus inflation targeting 

prior to a monetary union entry

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Presentation outline

- Objectives
- Model
  - Household
  - Firm
  - Monetary policies
- Preliminary results
  - IRFs
  - Variance ratio plots
- Ongoing research
- Future research
Objectives

- Focus on small open economy entering a monetary union
- Examine monetary policy rules:
  - differ across economies:
    - 3 economies: independent, transitory and unified
    - Independent and transitory economy: Inflation (IT) vs. exchange (ET) rate targeting
- Evaluate macroeconomic stability
  - variance of series
- Abandon IT after the announcement of monetary union entry?
- How aggressive will be the response of interest rates to shocks?
Small open economy model

• Svensson (2000) framework
  ◦ All goods are tradable
  ◦ Complete markets
  ◦ Nominal rigidities
  ◦ Monopolistically competitive firms
  ◦ Two countries:
    ◦ Home – small economy
    ◦ Foreign – large economy (monetary union)

• Domestic monetary policy rules:
  ◦ independent
  ◦ transitory – no institutional constraints
  ◦ unified – fixed ex. rate
Small open economy model: Household

- Separable utility function: consumption and labor
- Consumes CES composite good: $\omega$ share of foreign good
- Expenditures minimization:
  \[
  P_t = \left[ (1 - \omega)(P_t^h)^{1-\theta} + \omega(P_t^f)^{1-\theta} \right]^{\frac{1}{1-\theta}}
  \]
- Law of one price holds: $P_t^f = S_t P_t^f^*$
- Assume $P_t^{f*} = P_t^*$ $\Rightarrow$ the real exchange rate is given by
  \[
  Q_t = S_t P_t^*/P_t
  \]
- Log–linearization:
  \[
  q_t = p_t^f - p_t = s_t + p_t^* - p_t
  \]
Small open economy model: Aggregate demand

- Euler equation:

\[ c_t = E_t c_{t+1} - \frac{1}{\sigma} (i_t - E_t \pi_{t+1}^{CPI}) \]

- one-period nominal interest rate \( i_t \)
- Domestic CPI inflation: \( \pi_{t+1}^{CPI} = p_t - p_{t-1} \)

- Long term interest rate:

\[ \rho_t = \sum_{\tau=0}^{\infty} r_{t+\tau|t} = \sum_{\tau=0}^{\infty} (i_{t+\tau} - \pi_{t+\tau+1|t}) \]

- Foreign demand:

\[ c_{t}^{*h} = \beta_y y_t^{*} + \theta^* \omega^* q_t \]

- AD:

\[ y_{t+1}^{d} = \beta_y y_t^{d} + (1 - \beta_y) (-\omega) \sigma \rho_{t+1|t} \]

\[ -[\omega \theta^* \omega^* - (1 - \omega)(\sigma - \theta)\omega] q_{t+1|t} + \omega \beta^* y_{t+1|t} + \eta_{t+1}^{d} \]
Small open economy model: Output gap

- Natural output: \( y_{t+1}^n = \gamma^n_y y_t^n + \eta_t^n \)

- Output gap: \( y_t = y_t^d - y_t^n \)

\[
y_{t+1} = \beta_y y_t - (1 - \beta_y)(1 - \omega)\sigma \rho_{t+1|t} + (1 - \beta_y)[\omega \theta^* \omega^* - (1 - \omega)(\sigma - \theta)\omega]q_{t+1|t} + (1 - \beta_y)[\omega \beta^*_y y_{t+1|^t} - (\gamma^n_y - \beta_y)y_t^n + \eta_{t+1}^d - \eta_{t+1}^n]
\]
Small open economy model: Firm

- Continuum of domestic goods
- CRS technology
- Labor supplied by households at composite price
- Dixit-Stiglitz aggregate of domestic with elasticity of substitution $\nu > 1$
- Domestic good demand: $Y_t^j = Y_t^d \left( \frac{\tilde{P}_t^j}{P_t^h} \right)^{-\nu}$
- Calvo (1983): reset price with probability $\alpha$
- Philips curve:
  $$\pi_t = \alpha_\pi \pi_{t-1} + (1 - \alpha_\pi) \pi_{t+1|t} + \alpha_y y_t + \alpha_q q_t + \epsilon_t$$
Foreign economy

- Interest parity condition: \( i_t - i_t^* = s_{t+1|t} - s_t + \phi_t \)

- Large economy
  - AR(1) process:
    - foreign inflation
    - foreign exchange risk premium
    - foreign output
Monetary policy rules

• Independent economy:
  \[ i_t^I = f_\pi \pi_t + f_y y_t + f_q q_t + f_s s_t \]

• Unified economy:
  \[ i_t^U = f^{*\pi} \pi^*_t + f^{*y} y^*_t + f_q q + 10^{14} s_t \]

• Transitory economy:
  \[ i_t^T = \text{regime } i_t^I + (1 - \text{regime}) i_t^U \]
  - Agents know from the start of the simulation about future exogenous changes
  - Compute the rational expectation solution
  - Second order approximation of the rule
  - Dynare: Future information is added to the state space
IRFs Comparison: Inflation targeting

- 1% deviation in natural output

### Independent economy

#### Domestic inflation

![Graph showing deviation in domestic inflation over time.]

#### Domestic output

![Graph showing deviation in domestic output over time.]

#### Real exchange rate

![Graph showing deviation in real exchange rate over time.]

#### Domestic interest rate

![Graph showing deviation in domestic interest rate over time.]

#### Real interest rate

![Graph showing deviation in real interest rate over time.]

#### Long-term interest rate

![Graph showing deviation in long-term interest rate over time.]

#### Domestic CPI inflation

![Graph showing deviation in domestic CPI inflation over time.]

#### Nominal exchange rate

![Graph showing deviation in nominal exchange rate over time.]

### Transitory economy

#### Domestic inflation

![Graph showing deviation in domestic inflation over time.]

#### Domestic output

![Graph showing deviation in domestic output over time.]

#### Real exchange rate

![Graph showing deviation in real exchange rate over time.]

#### Domestic interest rate

![Graph showing deviation in domestic interest rate over time.]

#### Real interest rate

![Graph showing deviation in real interest rate over time.]

#### Long-term interest rate

![Graph showing deviation in long-term interest rate over time.]

#### Domestic CPI inflation

![Graph showing deviation in domestic CPI inflation over time.]

#### Nominal exchange rate

![Graph showing deviation in nominal exchange rate over time.]

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IRFs Comparison: Exchange rate targeting

- 1% deviation in natural output

Independent economy

- Domestic inflation
- Domestic output
- Real exchange rate
- Domestic interest rate
- Real interest rate
- Long-term interest rate
- Domestic CPI inflation
- Nominal exchange rate

Transitory economy

- Domestic inflation
- Domestic output
- Real exchange rate
- Domestic interest rate
- Real interest rate
- Long-term interest rate
- Domestic CPI inflation
- Nominal exchange rate
IRFs: Unified economy

- 1% deviation in natural output
Results: Variance ratio plots

• Comparison of regimes: \( \text{ratio} = \frac{\text{independent}}{\text{unified}} \)
Results: Variance ratio plots

- Comparison of regimes: \( \text{ratio} = \frac{\text{transitory}}{\text{independent}} \)
Recent work

- Caveats:
  - Order of approximation
  - Conditional vs. unconditional variance
- Focus on announcement–entry period
- Conditional variance computation
- Define loss function for comparison
  - \( L = \alpha_1 \pi_t^2 + \alpha_2 y_t^2 + \alpha_3 s_t^2 \)
  - ad hoc variance weights in loss function
Future work

- FOCs for model with habit formation and two sectors (tradable/nontradable)
- Full second order approximation
- Derivation of loss function
  - weights implied by the parameters and model
  - Welfare analysis of regime choice in transition period
    - Is ET preferred regime in transition period?
    - Should IT authority switch to ET/fixed ex. rate?