Macroeconomic stability

Transition towards the unilateral peg

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June 12, 2008

[1] The views expressed on this site are my own and do not necessarily represent the views of the CNB.

Outline

1. Introduction
2. Model
3. Simulation results

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Presentation outline

1 Introduction

2 Model

3 Simulation results

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Motivation

- Czech Republic is considering monetary union entry
- Behavior of economy after the announcement of switch toward unilateral peg
- How aggressive will be the response of interest rates to shocks?
- Macroeconomic stability in small open economy environment: Collard & Dellas (2002)
  - variance of series
  - evolution of variance
- Modeling a monetary regime change in DSGE model
- Farmer, Waggoner and Zha (2007): Recent works rely on Markov switching processes

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Model I

Justiniano and Preston (2004) framework:

- Two countries:
  - Home – small economy
  - Foreign – large economy (monetary union)
- Model features:
  - No capital
  - All goods are tradable
  - Complete markets: Symmetric equilibrium
  - Nominal rigidities: Monopolistically competitive firms
    - ★ Inflation indexation
    - ★ Domestic producers
    - ★ Importers: Law of one price gap

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Model II

- Domestic monetary policy rules:
  - Pre-transition:
    Targeting of inflation, output gap or change in nominal exchange rate
  - Transition:
    Follow pre-transition rule with knowledge of regime switch
  - Post-transition:
    Rule of offsetting changes in the nominal exchange rate

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Monetary policy rules

Generalization of monetary regimes:

- Pre-transition regime:
  $i_t^I = \rho_i i_{t-1} + (1-\rho_i)(\rho_\pi \pi_t^{CPI} + \rho_y y_t + \rho_e \Delta e_t)$
- Post-transition regime:
  $i_t^U = \rho_i^U \Delta e_t$
- Transition regime:
  $i_t^T = regime_t\ i_t^I + (1 - regime_t)\ i_t^U$, where $regime_t \in \{0, 1\}$

Information buffer

- Regime indicator:

$$
\begin{aligned}
regime_t &= inf_{t,1} && (1)\\
inf_{t,1} &= \rho_{inf}\, inf_{t,2} + \nu_{t,1}\\
inf_{t,2} &= \rho_{inf}\, inf_{t,3} + \nu_{t,2}\\
&\vdots\\
inf_{t,N-1} &= \rho_{inf}\, inf_{t,N} + \nu_{t,N-1}\\
inf_{t,N} &= \nu_{t,N}, && (2)
\end{aligned}
$$

  where $\nu_{t,i},\ i \in 1, \ldots, N-1$ are information shocks and $0 < \rho_{inf} < 1$

- Future information is added to the state space
- Agents foresee the future changes of monetary regime

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Solution

1. Solve model:
   - Second order approximation of the monetary policy rule
   - Dynare++: fast solver for large problems
2. Estimate model
   - Dynare
3. Evaluate information shocks and simulate

Estimation

- Bayesian estimation method: Dynare
- Testing properties of the model:
  - Sample moments vs. model moments
  - Evaluate impulse response functions
  - Prior vs. Posterior distributions

Moments comparison

Variable	Data		Model	
	Std. dev.	Corr.	Std. dev.	Corr.
Output growth	1.05	1.00	3.04	1.00
Nominal interest rate	1.38	-0.53	1.84	-0.26
CPI inflation	3.14	-0.12	4.02	-0.15
Change in nominal ex. rate	8.37	0.17	8.54	0.02
Real ex. rate	3.48	0.17	6.79	-0.03
Foreign output gap	0.81	0.02	0.67	0.00
Foreign inflation	0.66	0.21	0.76	-0.01
Foreign nom. int. rate	0.65	-0.03	0.60	0.00

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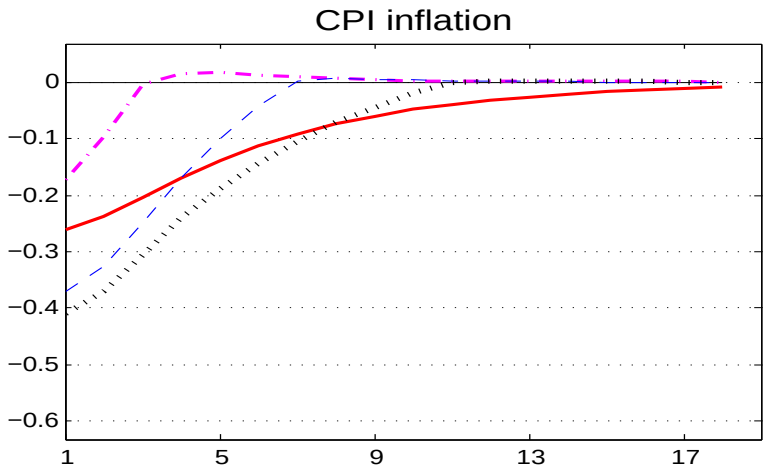
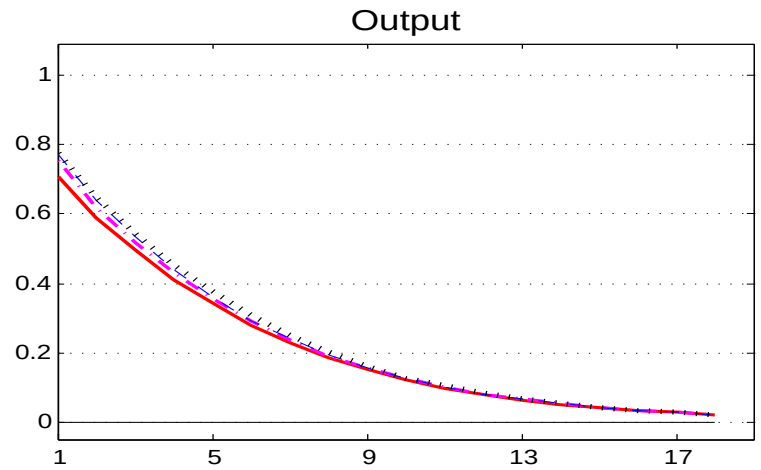
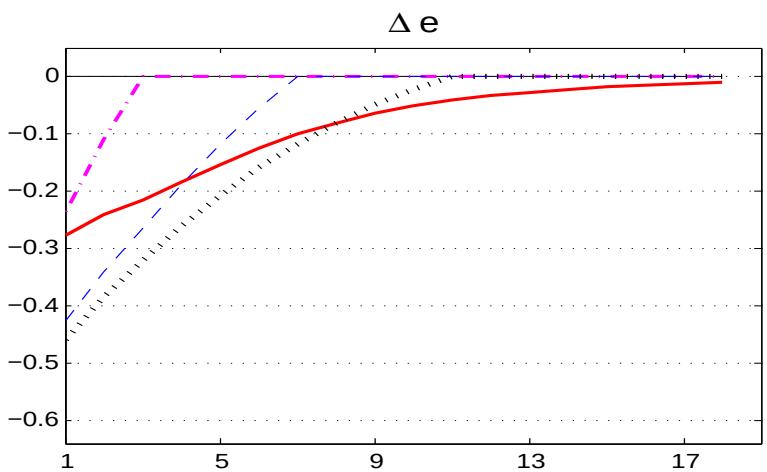
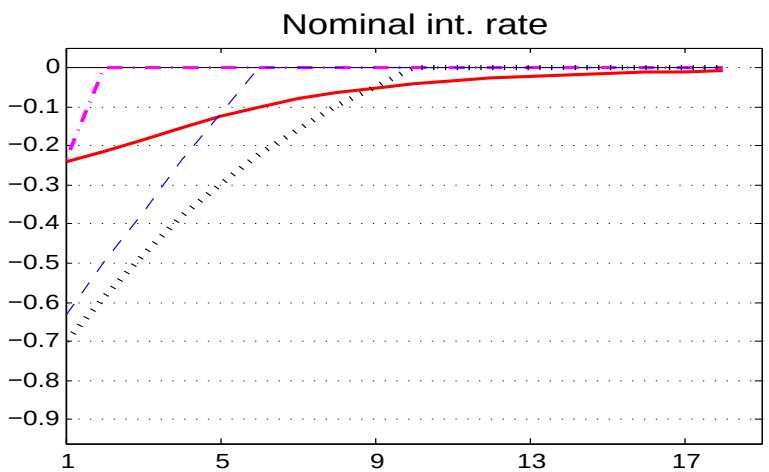
Irf: Technology shock









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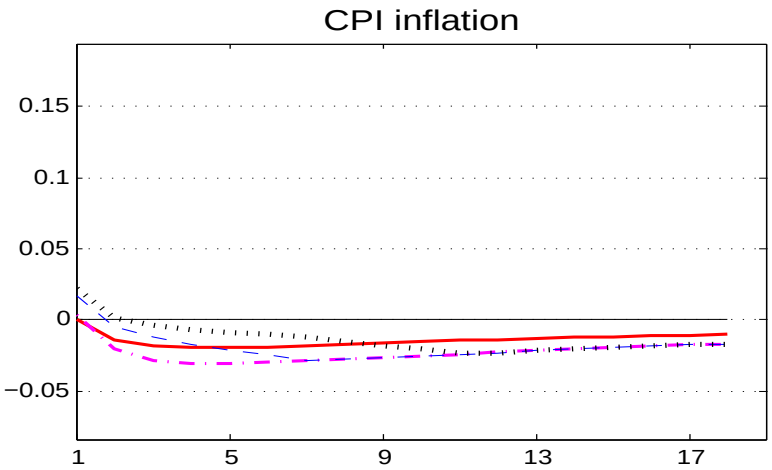
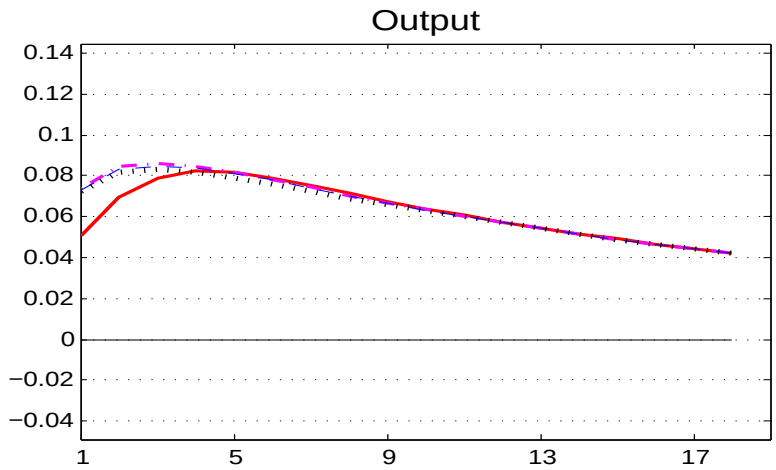
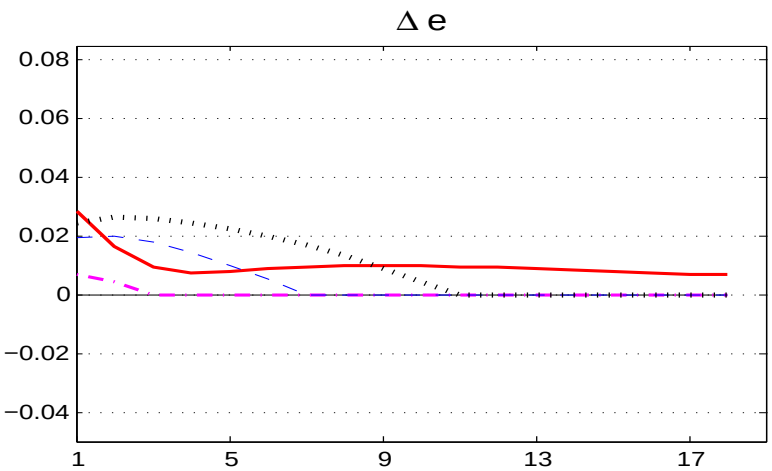
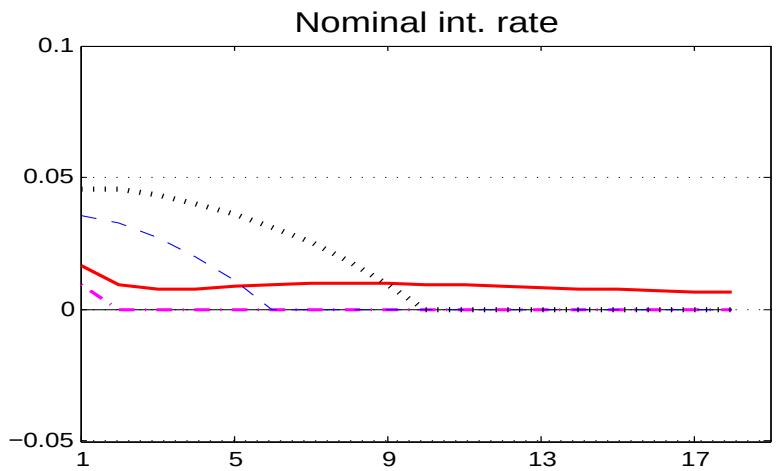
Irf: Preference shock









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Transition period: Welfare evolution

Welfare evaluation:

- Santacreu (2005):

$$L_t = \tau Var(\pi_t) + (1-\tau) Var(y_t) + \frac{\tau}{4}(\Delta i_t),$$

  where $\tau \in <0, 1>$

- Gali & Monacelli (2005):

$$L_t = \frac{\varepsilon}{\lambda} Var(\pi_t) + (1+\phi) Var(y_t),$$

  where $\lambda = (1-\theta)(1-\beta\theta)/\theta$ and ϕ are parameters of the underlying model

- Terms of trade: Gali & Monacelli (2005) show that the higher the terms of trade volatility $\Rightarrow$ the lower the volatility of inflation and output gap

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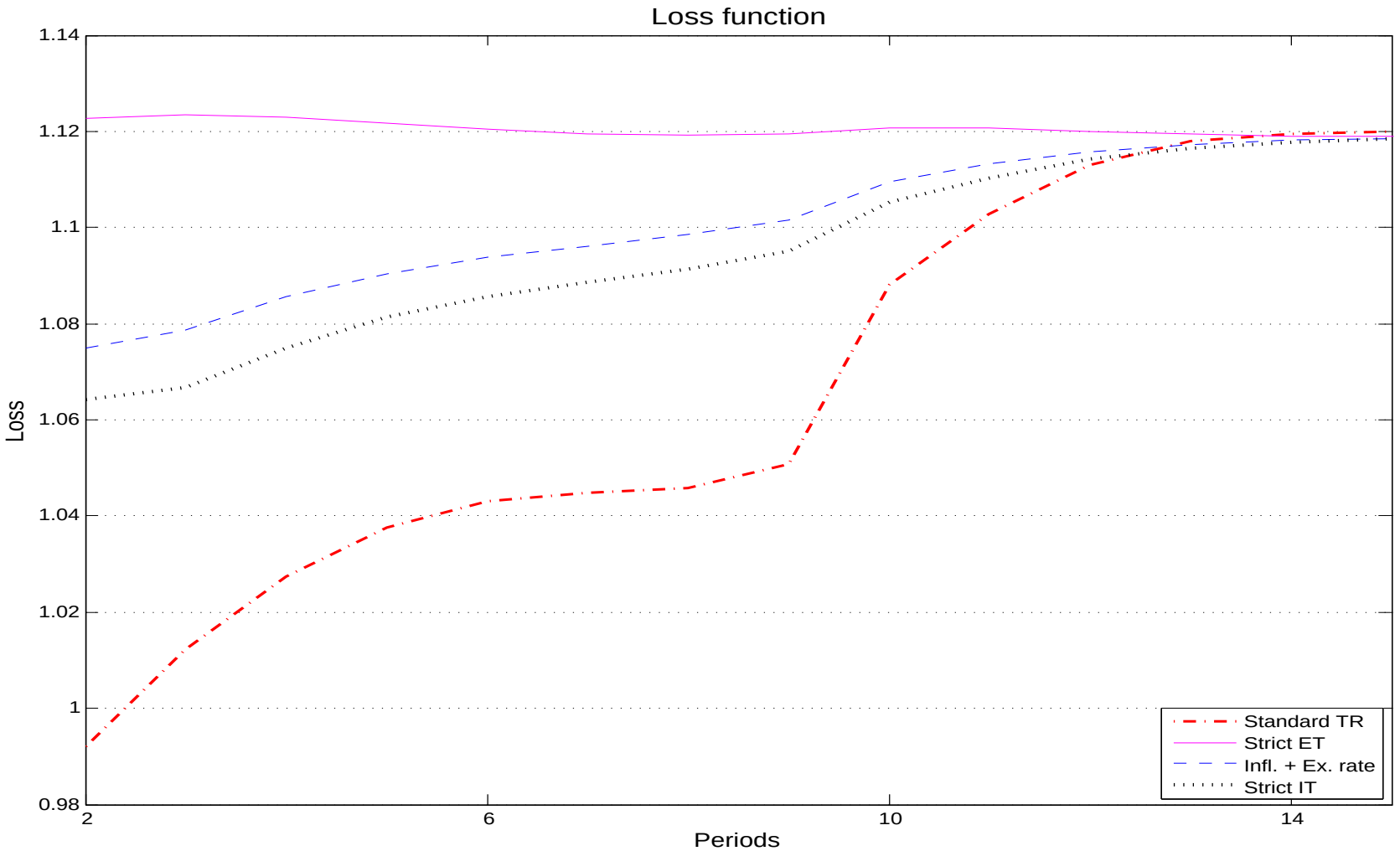
Loss function: Sancrateu (2005), $\tau = 0$



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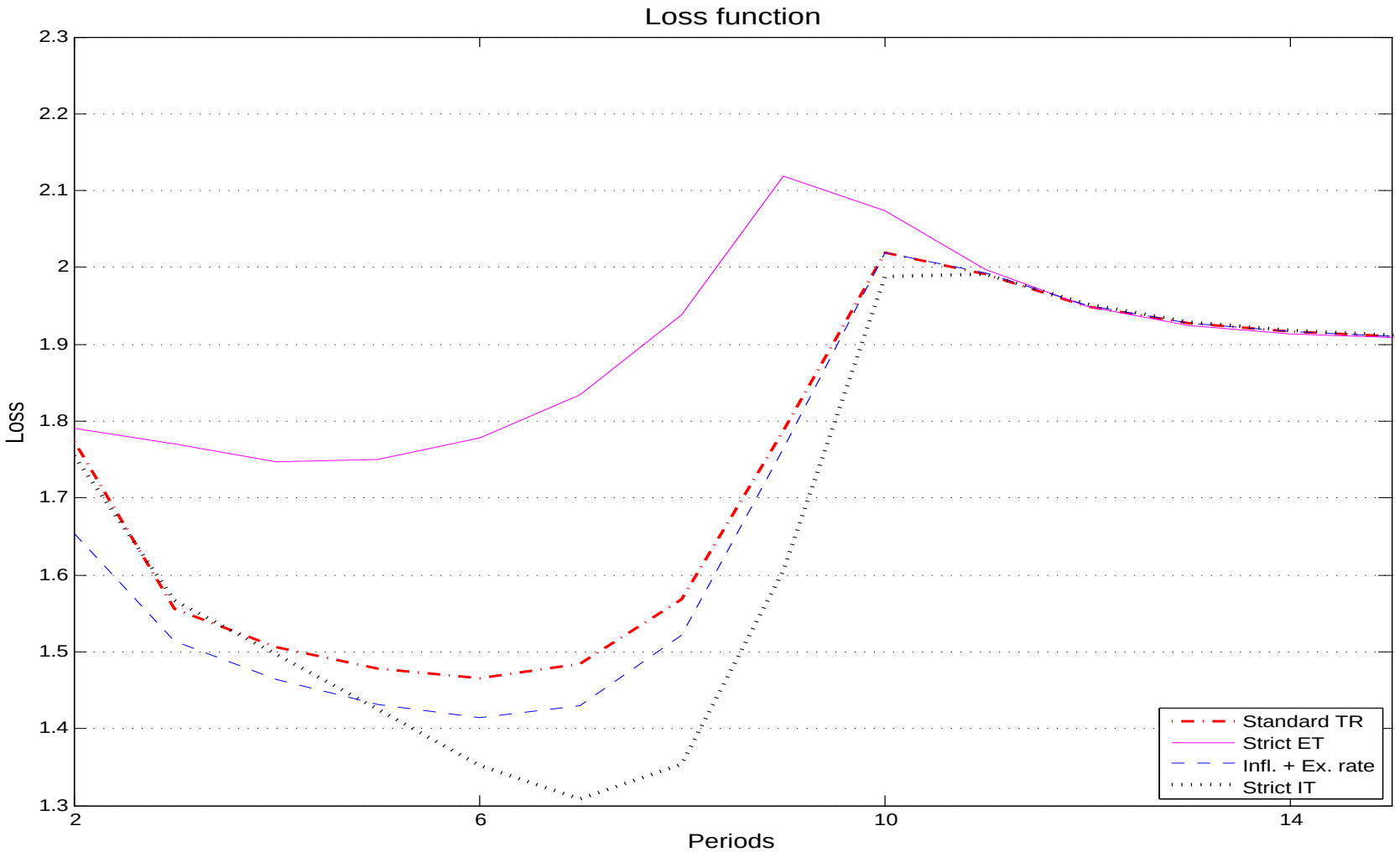
Loss function: Sancrateu (2005), $\tau = 0.8$



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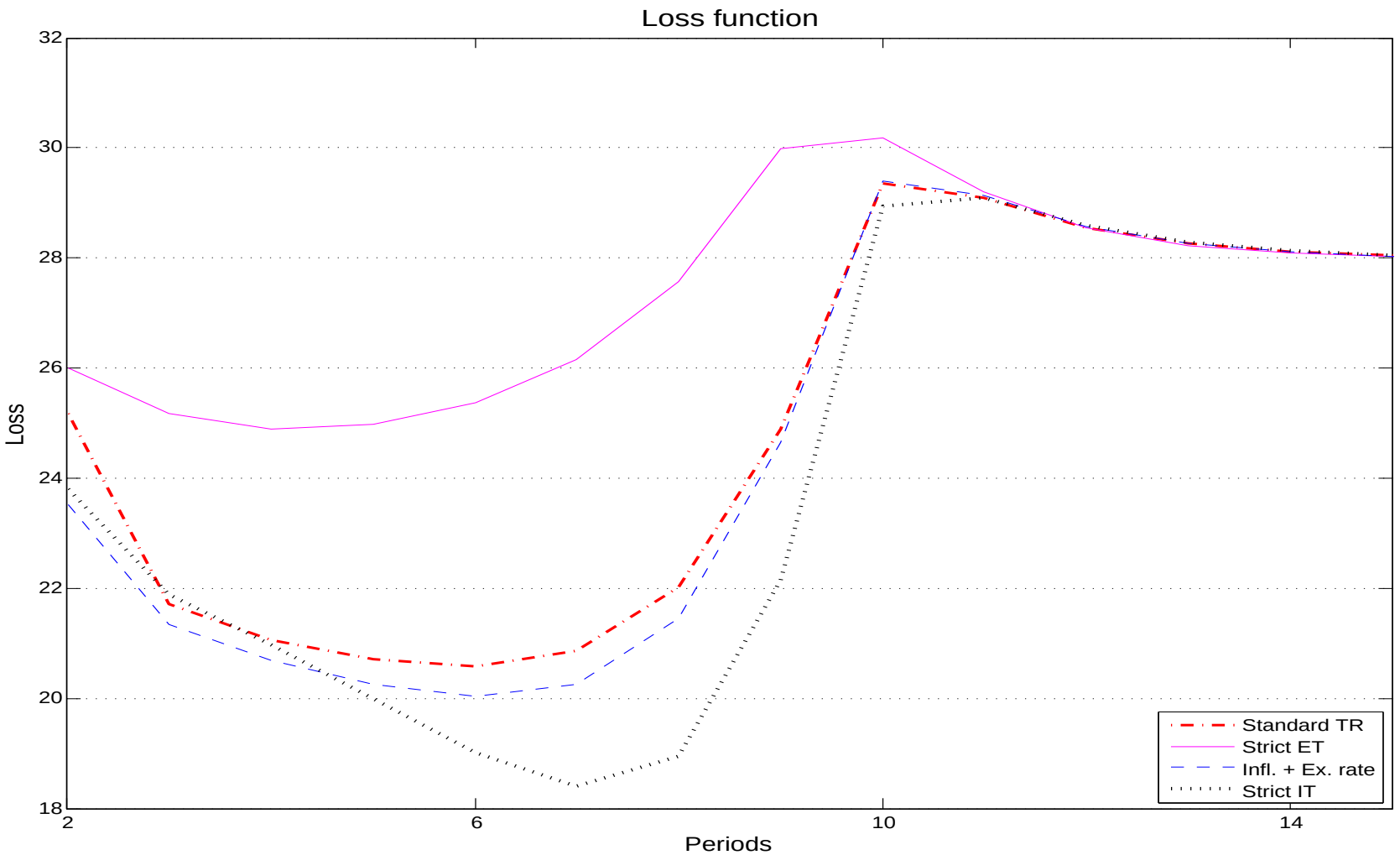
Loss function: Gali & Monacelli (2005)



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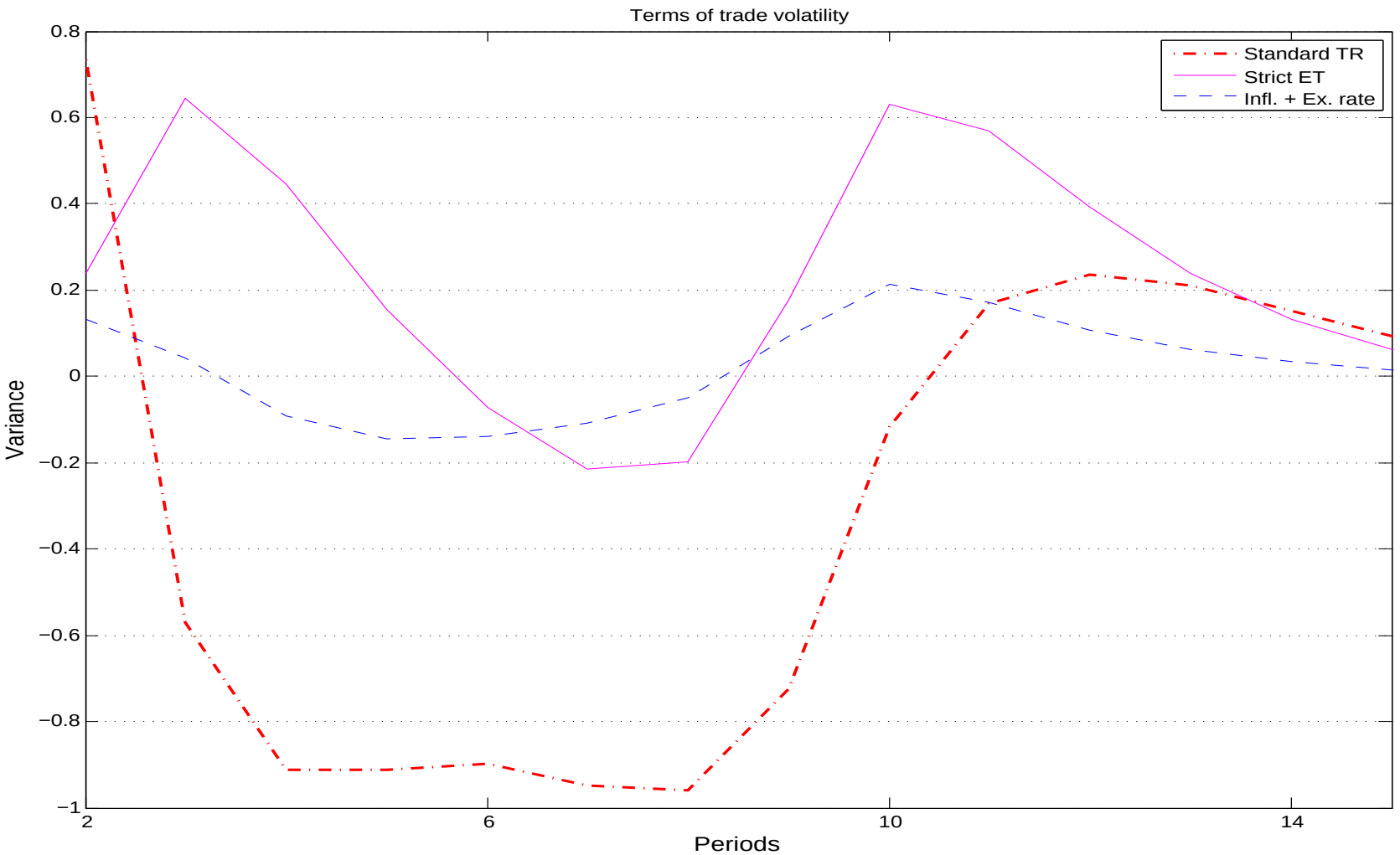
Terms of trade variance: Difference from SIT regime



Conclusion

Goals:

- Alternative approach to modeling of regime switch is presented
- Evolution of macroeconomic stability
- Strict inflation targeting regimes are preferred

Future research:

- Extended model
- Synchronization of business cycles

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