Switching to Exchange Rate Flexibility? The Case of Central and Eastern European Inflation Targeters

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Outline

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Motivation

- Inflation targeting replaced exchange rate targeting as policy strategy in the Czech Republic (1998), Hungary (2001), and Poland (1999)
- In the Czech Republic:
  - Abandonment of peg after not being able to sustain devaluation pressures
  - Move to more flexible regime classification (according to IMF)
- In Hungary and Poland:
  - Subsequent widening of exchange rate bands
  - Intentional policy change for a better fulfillment of policy objectives
- Current strategy in terms of policy responses to exchange rate movements vague for all three economies

Motivation

- How did monetary policy change following the introduction of inflation targeting?
- When did the actual monetary policy change occur?
- Did the authorities retain to the new strategy, e.g. in crises times?
- Have the central banks' policies been successful in reducing volatilities of target variables?

Motivation

- Analysis in a Markov-switching simple small open economy DSGE model
- Explicit consideration of agents' expectations allows for more detailed interpretation of shock transmissions
- Allowing for switches in the values of the policy parameters and volatilities of shocks
  - Revelation of the timing of actual regime switches and their persistence
  - Quantitative assessment of changes in the monetary policy and external disturbances
- Simulation-based evaluation of the actual policy compared to fictional scenarios
- Adds to the small but growing empirical literature employing MS-DSGE models
  - USA: Davig/Doh (2008), Bianchi (2011)
  - UK: Liu/Mumtaz (2011), Chen/Macdonald (2012)

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Model description

- Small open economy DSGE model
- Simplified version of Gali/Monacelli (2005) outlined in Lubik/Schorfheide (2007)
  - Forward-looking IS curve derived from utility maximizing households
  - Phillips-type curve (with nominal rigidities) derived from profit maximizing firms
  - Equation linking the nominal exchange rate, the terms of trade, and domestic as well as foreign inflation (under the assumption of PPP)
  - Taylor-type monetary policy rule allowing for reactions to inflation, output, and the nominal exchange rate
  - Foreign variables, global technology growth, and terms of trade as AR(1) processes

Model equations

- IS equation

$$y_t = E_t y_{t+1} - (\tau + \mu)(R_t - E_t \pi_{t+1} - E_t z_{t+1}) - \alpha(\tau + \lambda) E_t \Delta q_{t+1} + \frac{\mu}{\tau} E_t \Delta y^*_{t+1}$$

- Phillips curve

$$\pi_t = \beta E_t \pi_{t+1} + \alpha\beta E_t \Delta q_{t+1} + \frac{\kappa}{\tau + \mu} y_t + \frac{\kappa + \mu}{\tau(\tau + \mu)} y^*_t$$

- Nominal exchange rate

$$\Delta e_t = \pi_t - (1 - \alpha)\Delta q_t - \pi^*$$

with $\mu = \alpha(2 - \alpha)(1 - \tau)$ and $\kappa = (1 - \theta)(1 - \theta\beta)/\theta$.

Model equations

- Monetary policy rule

$$R_t = \rho_R R_{t-1} + (1 - \rho_R)[\phi_1 \pi_t + \phi_2 y_t + \phi_3 \Delta e_t] + \epsilon_t^R$$

- Exogenous variables

$$\begin{aligned} \Delta q_t &= \rho_q q_{t-1} + \epsilon_t^q \\ z_t &= \rho_z z_{t-1} + \epsilon_t^z \\ y_t^* &= \rho_{y^*} y_{t-1}^* + \epsilon_t^{y^*} \\ \pi_t^* &= \rho_{\pi^*} \pi_{t-1}^* + \epsilon_t^{\pi^*} \end{aligned}$$

Equation system

- Linear rational expectation system

$$\Gamma_0(\theta_{s_t})X_t = \Gamma_1(\theta_{s_t})X_{t-1} + \Psi(\theta_{s_t})Z_t + \Pi(\theta_{s_t})\eta_t$$

with

$$X_t = [y_t, \pi_t, R_t, \Delta e_t, \Delta q_t, z_t, y_t^*, \pi_t^*, E_t y_{t+1}, E_t \pi_{t+1}]'$$

- Vectors of structural parameters θ, exogenous shocks Z_t and rational expectations forecast errors η_t
- Parameter values dependent on latent state variable S_t that follows a Markov-switching process with the following transition probabilities:

$$\Pr[S_t = 1 \mid S_{t-1} = 1] = p_{11}, \Pr[S_t = 1 \mid S_{t-1} = 2] = p_{21}, \ldots$$

- Combining structural parameters and transition probabilities:

$$\bar{\Gamma}_0 X_t = \bar{\Gamma}_1 X_{t-1} + \bar{\Psi} Z_t + \bar{\Pi}\eta_t$$

- Minimum state-variable solution following Farmer et al. (2008)

Data and priors

- Quarterly time series from 1994 to 2013 (1993 to 2013 for Hungary)
  - GDP growth rate
  - CPI inflation
  - Three-month interbank rate
  - Nominal effective exchange rate appreciation/depreciation
  - Changes in the terms of trade
- Hodrick-Prescott filter applied to all series to extract their cyclical components
- Priors set following Lubik/Schorfheide (2007) and the methods described therein

Outline

Estimation results

- Time-invariant model inferior to most other specifications (based on log marginal data densities)
- Identification of regimes of high and low exchange rate responses and high and low volatility of shocks
- Economies switch to regimes of low volatility and ...

Estimation results

Monetary policy coefficients based on independent switches (M_4)

		Czech Rep.		Hungary		Poland	
		Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2
Inflation	ψ_1	1.29	1.70	0.87	2.07	1.19	2.32
Output	ψ_2	0.19	0.06	0.24	0.15	0.20	0.08
Exchange Rate	ψ_3	0.36	0.06	0.11	0.21	0.15	0.06
Smoothing	ρ_R	0.47	0.90	0.36	0.80	0.93	0.81

Estimation results

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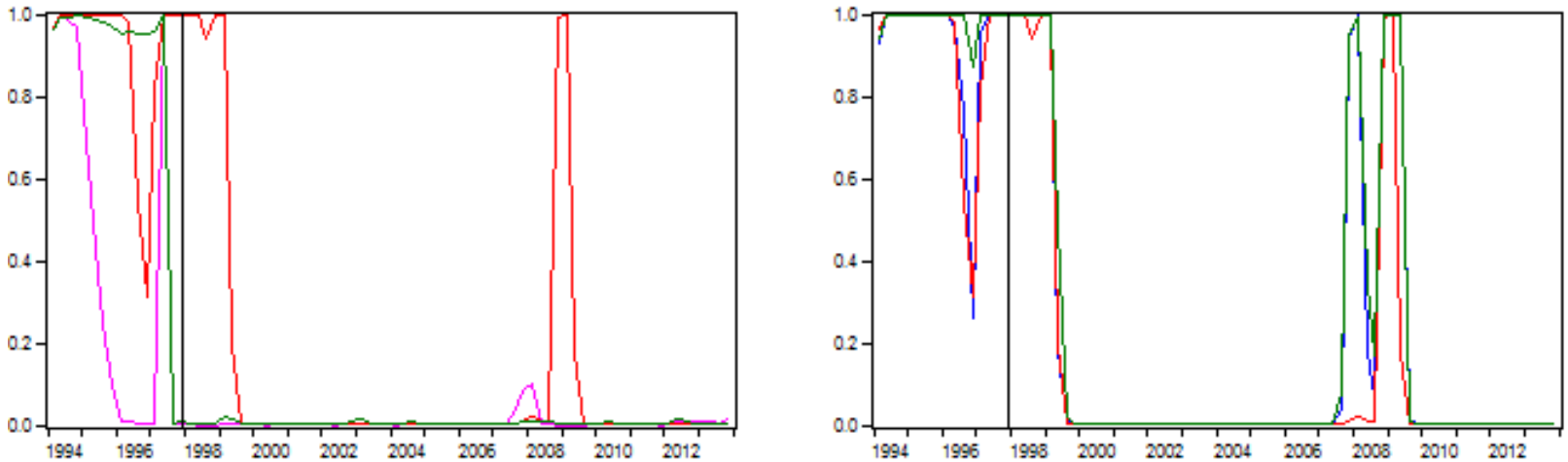
- Identification of regimes of high and low exchange rate responses and high and low volatility of shocks
- Economies switch to regimes of low volatility and higher reaction to inflation over time
- Under the new regime:
  - Lower consideration of exchange rate movements in the Czech Republic and Poland
  - Higher attention to exchange rate movements in Hungary

Regime identification

Smoothed probabilities of the high exchange rate response (left) and volatility regime (right) in the Czech Republic



M_1 (magenta), M_2 (blue), M_3 (red), and M_4 (green)

▸ Hungary/Poland

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- Inferred timing of switches in monetary policy almost coincides with the official switch from exchange rate to inflation targeting

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Policy evaluation

- Identified regime switches in policy parameters and volatilities of shocks
  - New policy strategy with more prominent consideration of inflation
  - Lower volatilities of (external) shocks (except for the period of the financial crisis)
- Over time, reduction
  - in the levels and volatilities of inflation
  - in the volatilities of output growth
- Adherence to new monetary policy regime during financial crisis

Policy evaluation

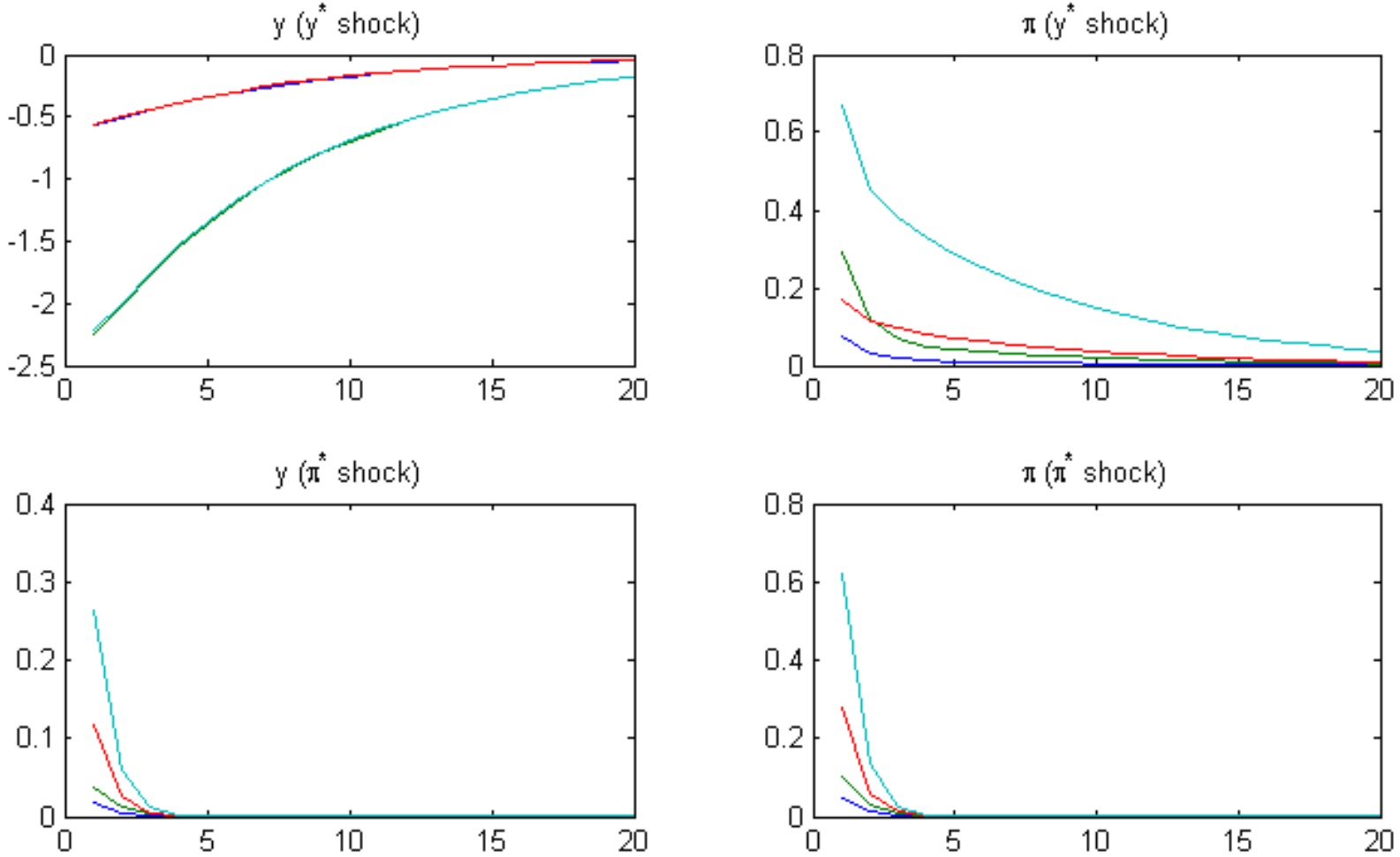
- Possible factors behind the favorable development of target variables:
  - Better performing monetary policy, higher experience and credibility of central banks ("good policy")
  - Favorable, less volatile macroeconomic environment ("good luck")
- Right decision to adhere to policy in place in turbulent period of the financial crisis?
- Simulation-based evaluation of different policy strategies in different volatility environments

Simulation setups

- Estimation reveals two different policy and two different volatility regimes respectively
- Consideration of four different settings
  - Current policy in the low volatility environment (benchmark)
  - Current policy in the high volatility environment
  - Former policy in the low volatility environment
  - Former policy in the high volatility environment
- Evidence of "good policy": shock effects under the current policy are lower than under the former regime
- Evidence of "good luck": shock effects under the former policy are at most as high as under the current strategy
- Suitable crisis policy: comparison of foreign shock transmissions under different rules in the high volatility environment

Simulation results

IRFs for one standard deviation shocks in the Czech Republic



Current policy and volatility (blue), current policy and high volatility (green), former policy and low volatility (red), and former policy and high volatility (cyan).

Interpretation

- Evidence for "good luck" in the reduction of output volatility following foreign output shocks
- Transmission of foreign output shocks on domestic output during the recent crisis could potentially have been reduced under a different strategy
- Remarkably better performance ("good policy") of the current regime in the reduction of other external shocks on target variables in the Czech Republic and Poland
- In some cases, current regime performs better in the high volatility environment than the old regime in the setup with small disturbances
- Hungarian policy in place does not outperform former strategy in the presence of equal size shocks
- No sizable increase in exchange rate volatility under the policy in place (despite lower attention to its movements)

Thank you very much for your attention!