Monetary and Macroprudential Policies in Norway

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Usual disclaimer applies

NORGES BANK

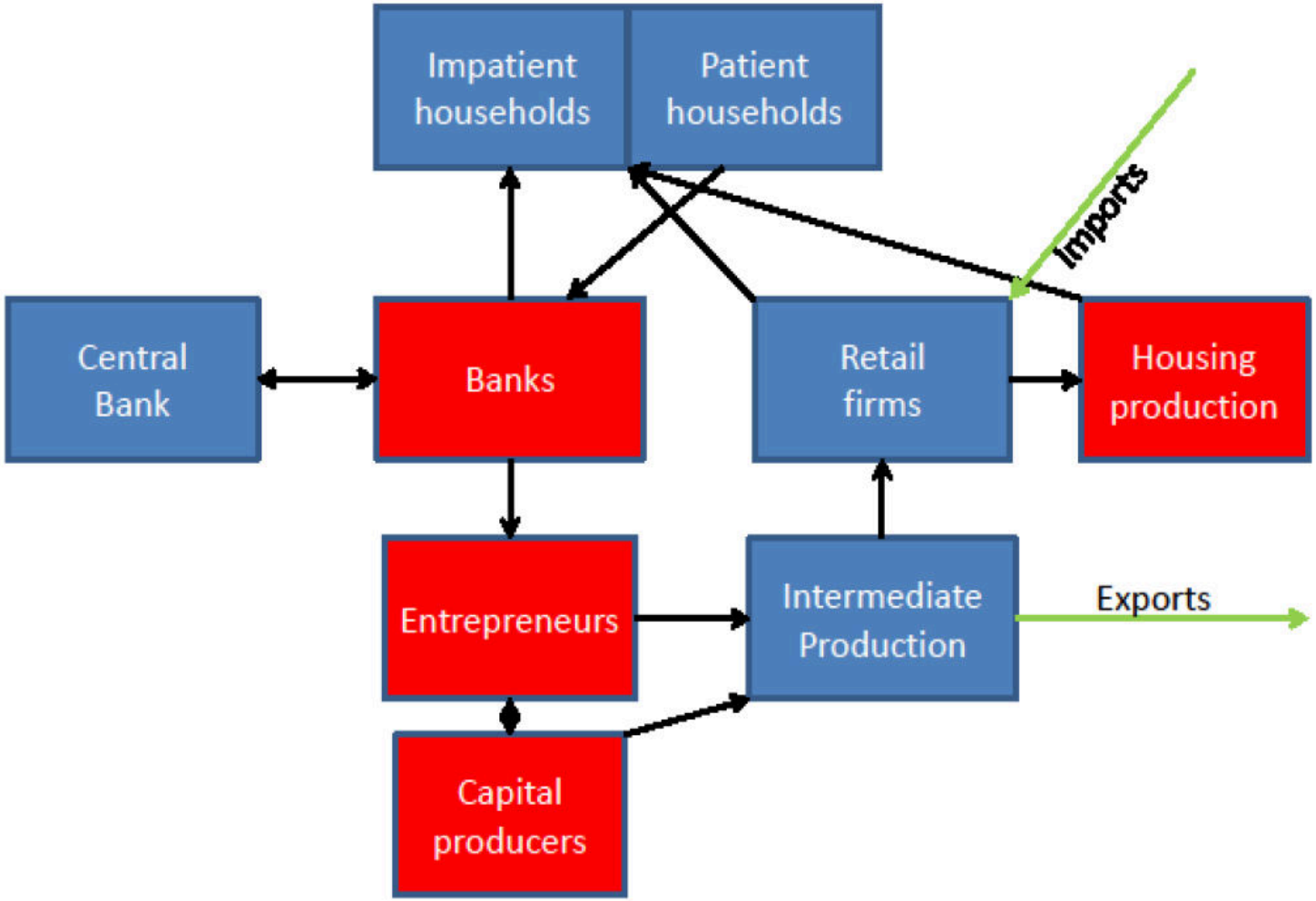
Motivations

- NB concerns for financial stability in the aftermath of the crisis
  - **Very high increase in house prices**
  - **Very high household indebtedness**
- New NB advisory role for Ministry of Finance to set bank's capital buffer
- Necessity for new model's features to address those issues (NEMO III)

Presentation Outline

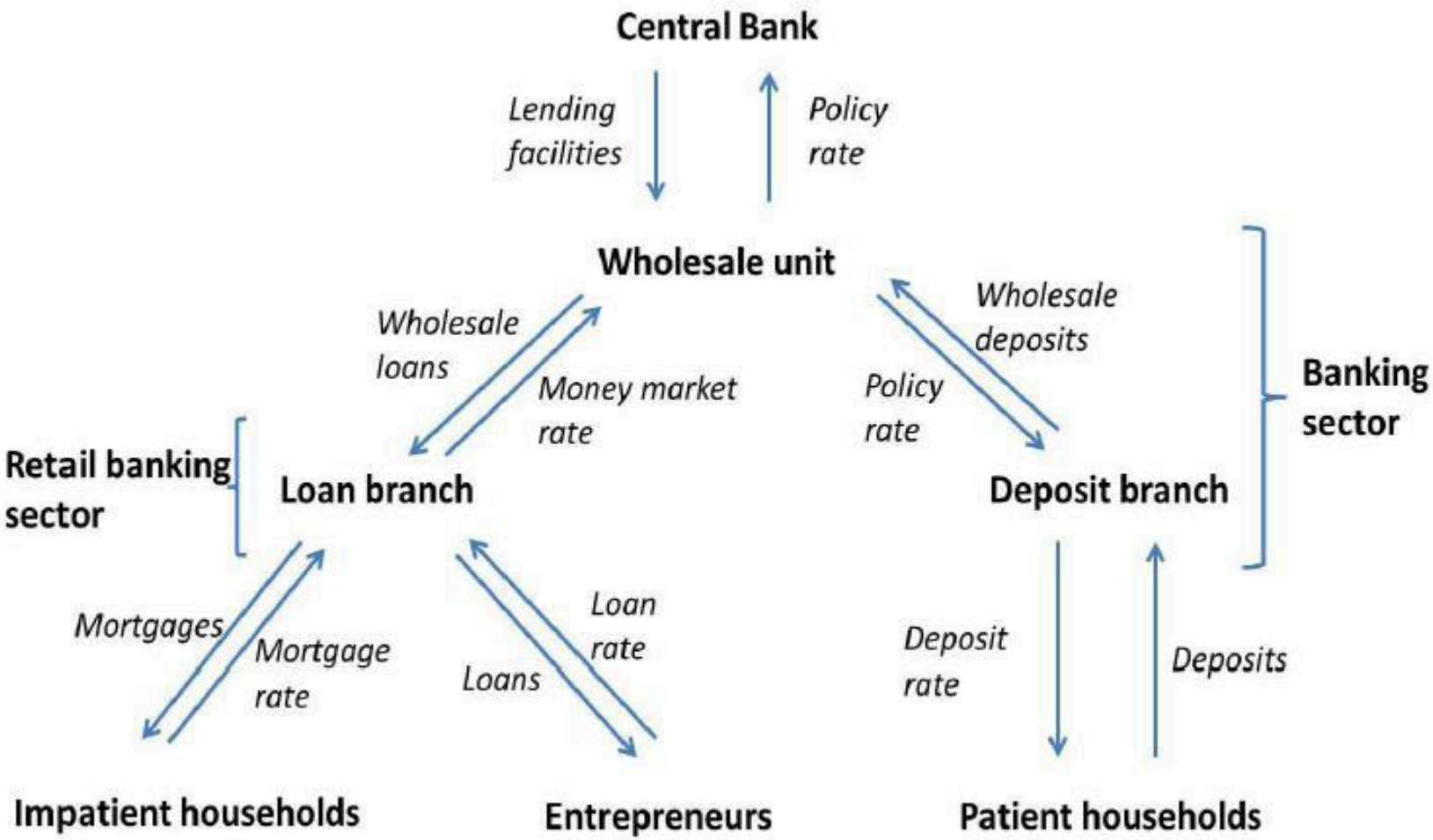
- New features of NEMO (Norwegian Economy Model)
- Fit with the data (and satellite NEMOs)
- Some old and new shocks
- Optimal monetary and macroprudential policies

The Model


Impatient households
Patient households
Imports
Central Bank
Banks
Retail firms
Housing production
Entrepreneurs
Intermediate Production
Exports
Capital producers

The Model – Banks

Gerali et al. (2010)



The Model – Wholesale Banks

Benes and Kumhof (2011)

- Overall balance sheet

$$B_t = B_t^E + B_t^{im} = K_t^b + D_t$$

- Idiosyncratic shock, $\tilde{\omega}_t$, *to average return,* R_t^A. Costs, $\varkappa^b B_t$,increase if banks breach capital requirement, γ_t:

$$\tilde{\omega}_{t+1} R_t^A B_t - \overline{R}_t^d D_t < \gamma_t \tilde{\omega}_{t+1} R_t^A B_t$$

- Cut-off:

$$\overline{\tilde{\omega}}_{t+1} = \frac{\overline{R}_t^d D_t}{(1-\gamma_t) R_t^A B_t} = \frac{\overline{R}_t^d}{(1-\gamma_t) R_t^A} \left(1 - \frac{K_t^b}{B_t}\right)$$

The Model – Wholesale Banks

Benes and Kumhof (2011)

- Maximizes

$$\max_{\{Bt,Dt\}} E_t \left[R_t^B B_t - \overline{R}_t^d D_t - \varkappa^b B_t F\left(\overline{\widetilde{\omega}}_{t+1}\right) \right]$$

- which yields:

$$R_t^B - R_t = \varkappa^b E_t \left[F\left(\overline{\widetilde{\omega}}_{t+1}\right) + f\left(\overline{\widetilde{\omega}}_{t+1}\right) \overline{\widetilde{\omega}}_{t+1} \left(1 - \iota_t\right) \right], \ \iota_t = \frac{B_t}{K_t^b}$$

The Model – Entrepreneurs
BGG (1999) and Hafstead and Smith (2012)

- Need to borrow to finance investment
- Net worth given as accumulated retained earnings
- Idiosyncratic productivity shock, some entrepreneurs go bankrupt
- Monitoring by banks is costly
- The external finance premium is a function of the leverage

$$S_t \equiv E_t\left\{\frac{R_{t+1}^k}{R_t^e}\right\} = f\left(\frac{P_t^k K_t}{N_t}\right)$$

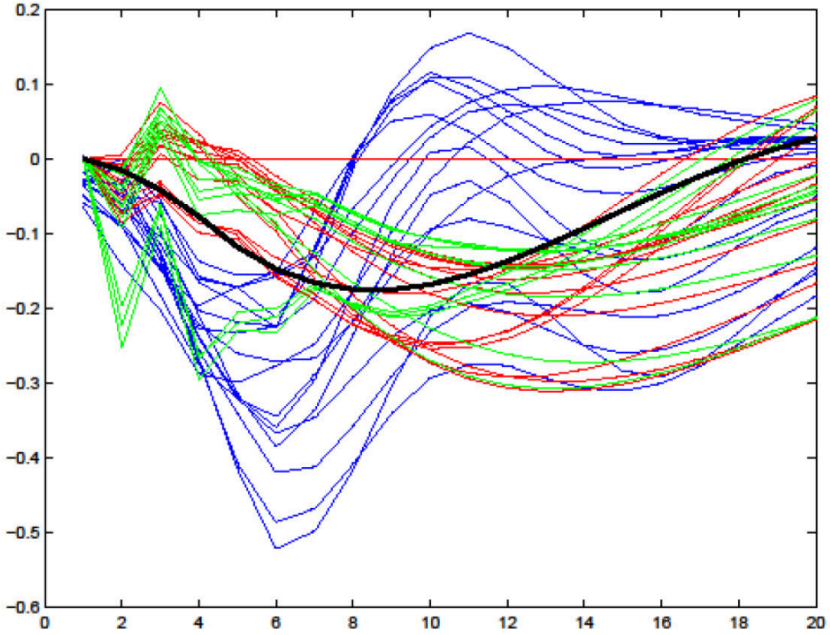
- But the marginal cost is

$$R_t^e = \frac{\theta^e}{\theta^e - 1}\overline{R}_t^e - \frac{(1-\mu)\,\overline{\phi}_t^y}{\theta^e B_t^u}$$

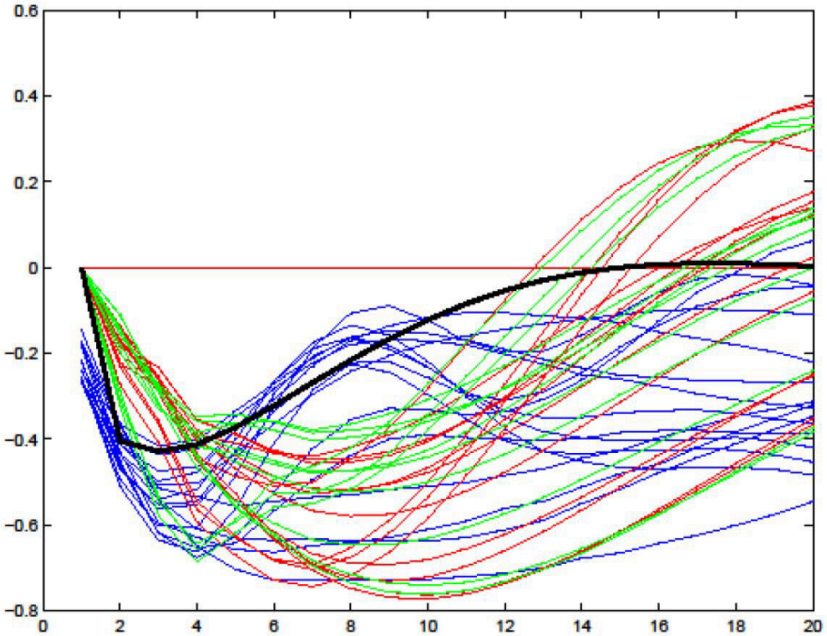
Model Fit – VAR Evidence

- Monetary policy shock

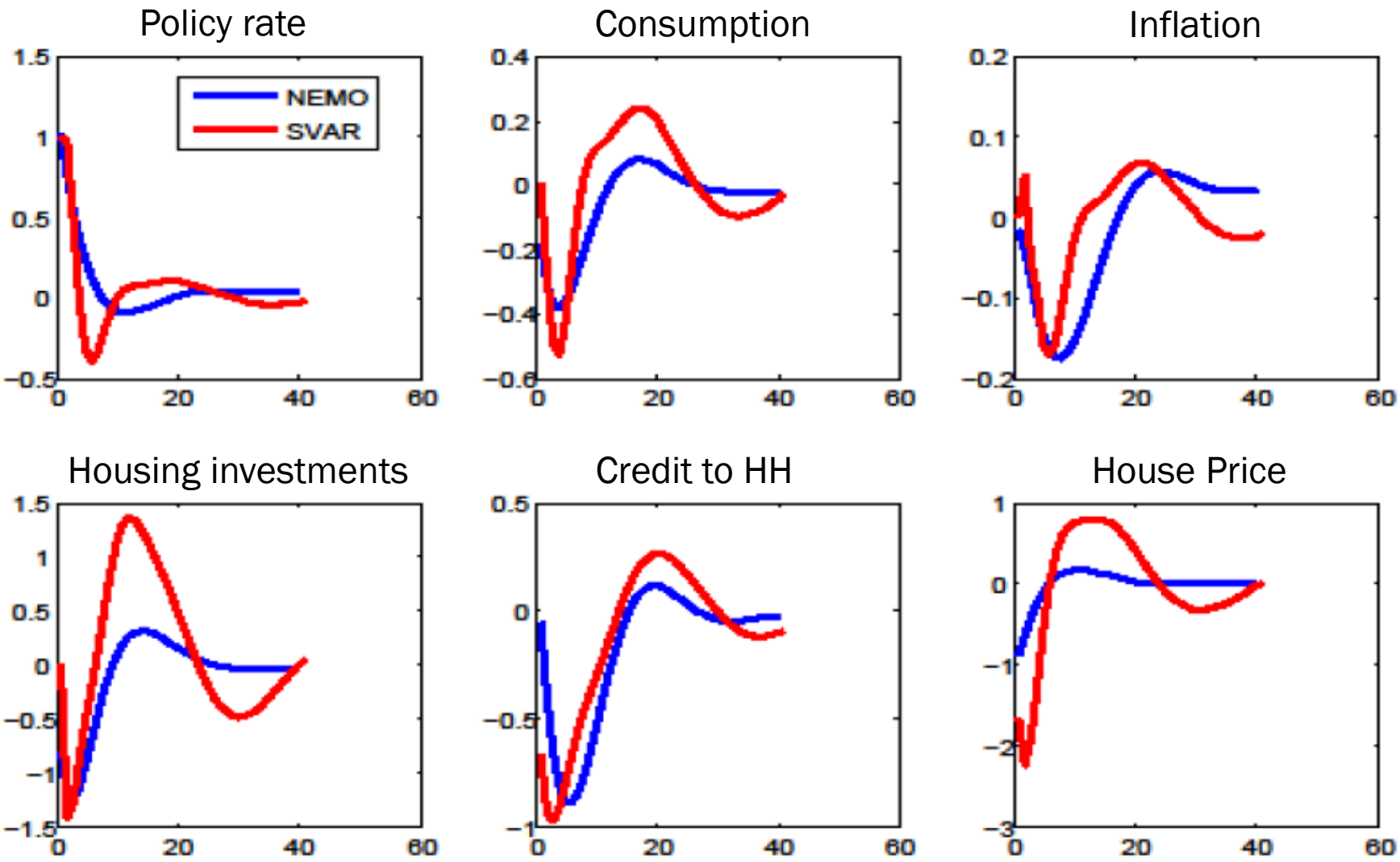
Inflation



Output



Model Fit – SVAR Evidence



House Prices Dynamics

- Based on Gelain, Lansing, Mendicino IJCB (2013)
  - **Standard DSGE models with housing fail to match house prices dynamics**
  - **Eventually matched via housing preference shock, i.e. an exogenous determinant**
  - **Better to rely on endogenous mechanism, i.e. expectation formation**
  - **Adaptive expectation better fit house price dynamics**

Adaptive Expectations in a Nutshell

- Forecast is a moving-average of past values

$$F_t X_{t+1}^j = \lambda_j X_t^j + (1-\lambda_j) F_{t-1} X_t^j$$

$$F_{t-1} X_t^j + \lambda_j \left[X_t^j - F_{t-1} X_t^j \right]$$

$$\lambda_j \left[X_t^j + (1-\lambda_j) X_{t-1}^j + (1-\lambda_j)^2 X_{t-2}^j \cdots \right]$$

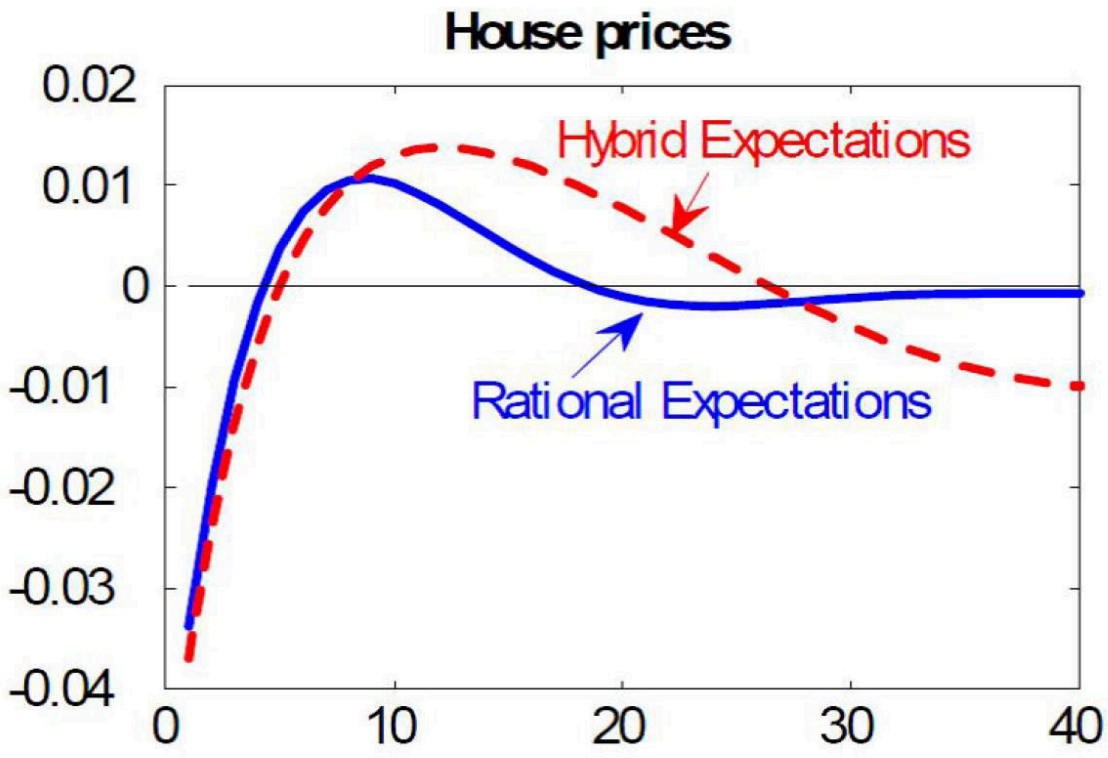
where λ = weight on recent data in moving-average

$$\hat{E}_t X_{t+1}^j = \omega F_t X_{t+1}^j + (1-\omega) E_t X_{t+1}^j$$

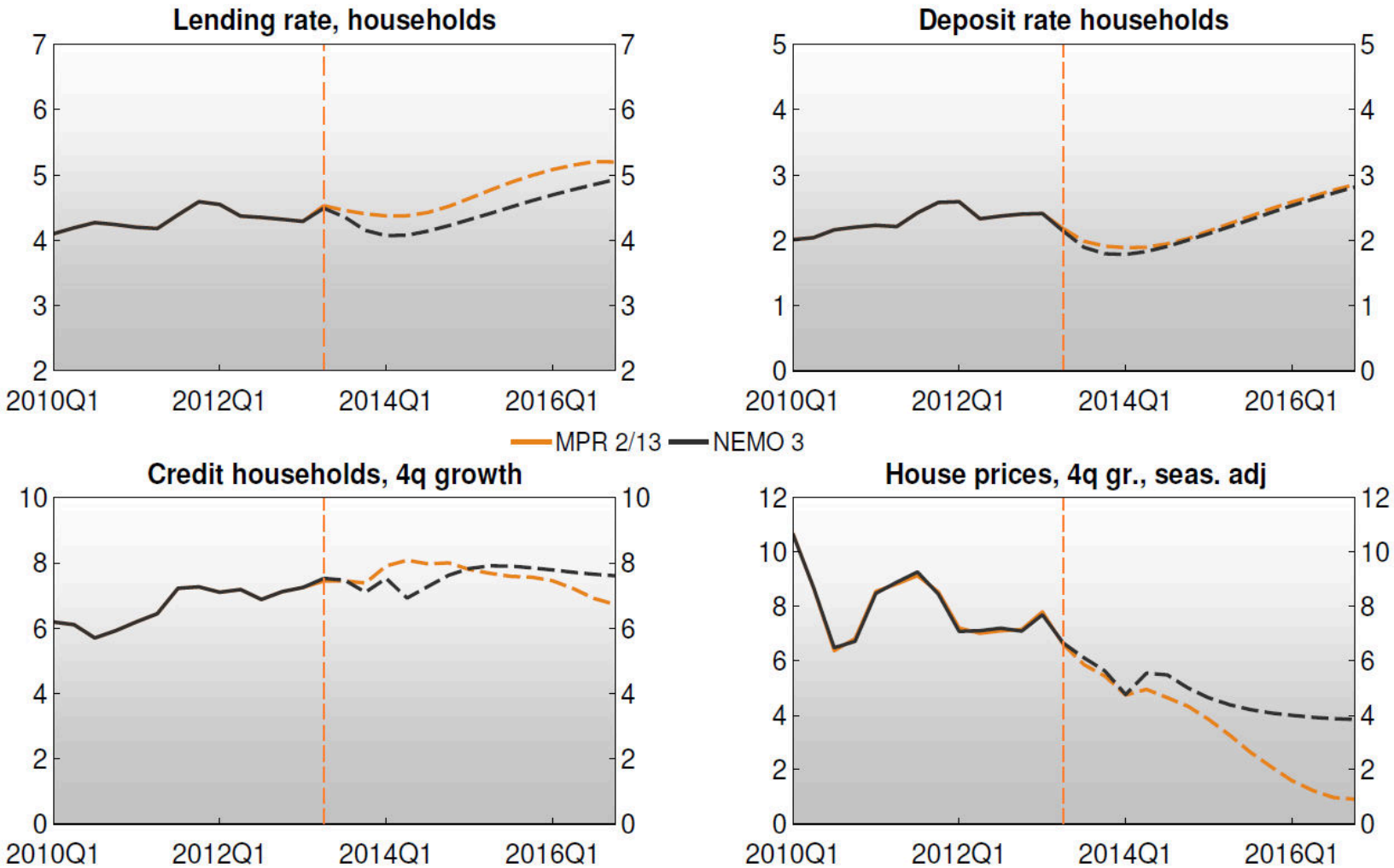
where ω = fraction who employ moving-average forecast rule. Resulting model is labelled as "HYBRID" with no trade.

House Prices Dynamics

- Monetary policy shock in NEMO under different expectations assumption

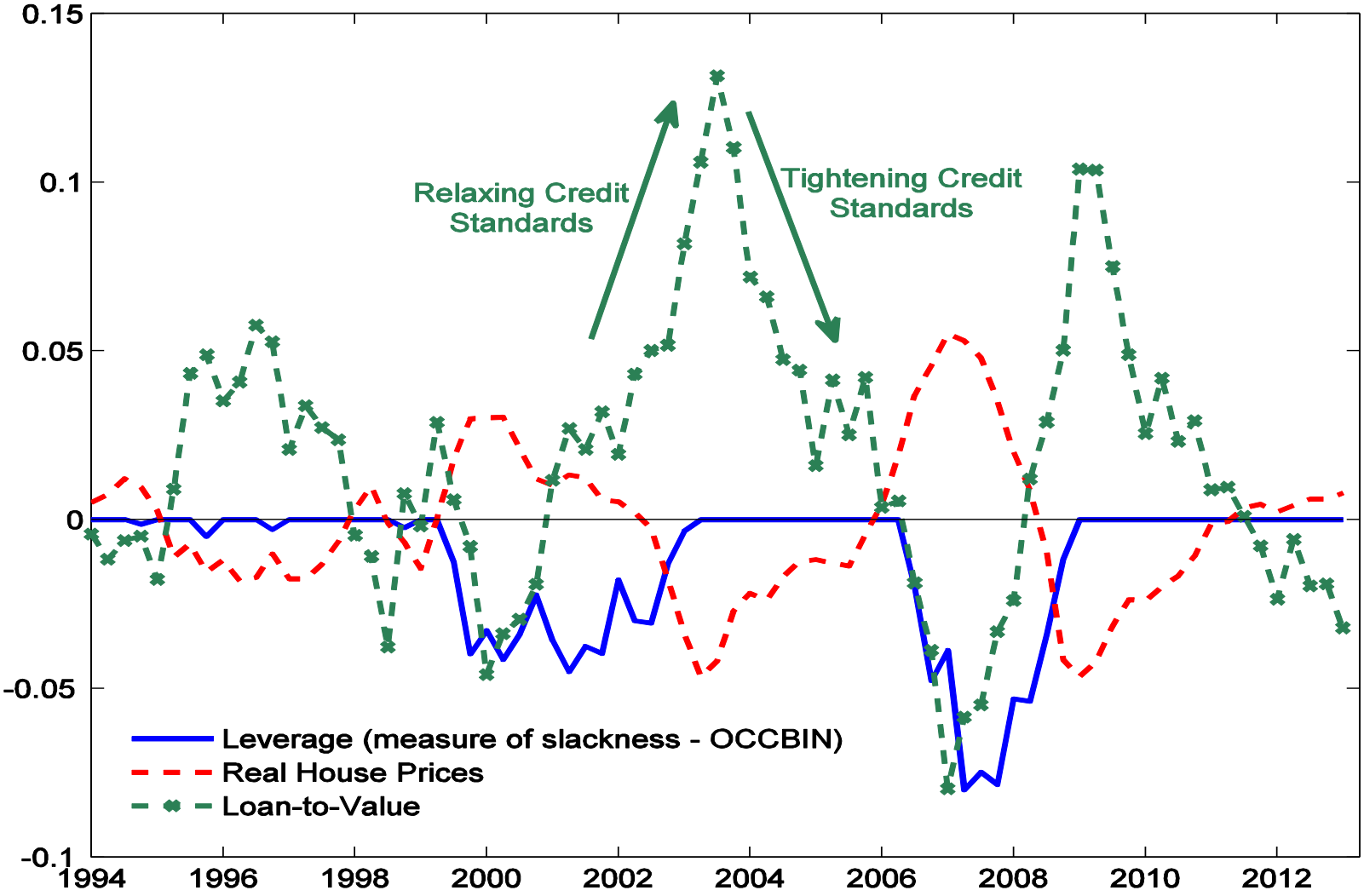


Model Fit – Forecast

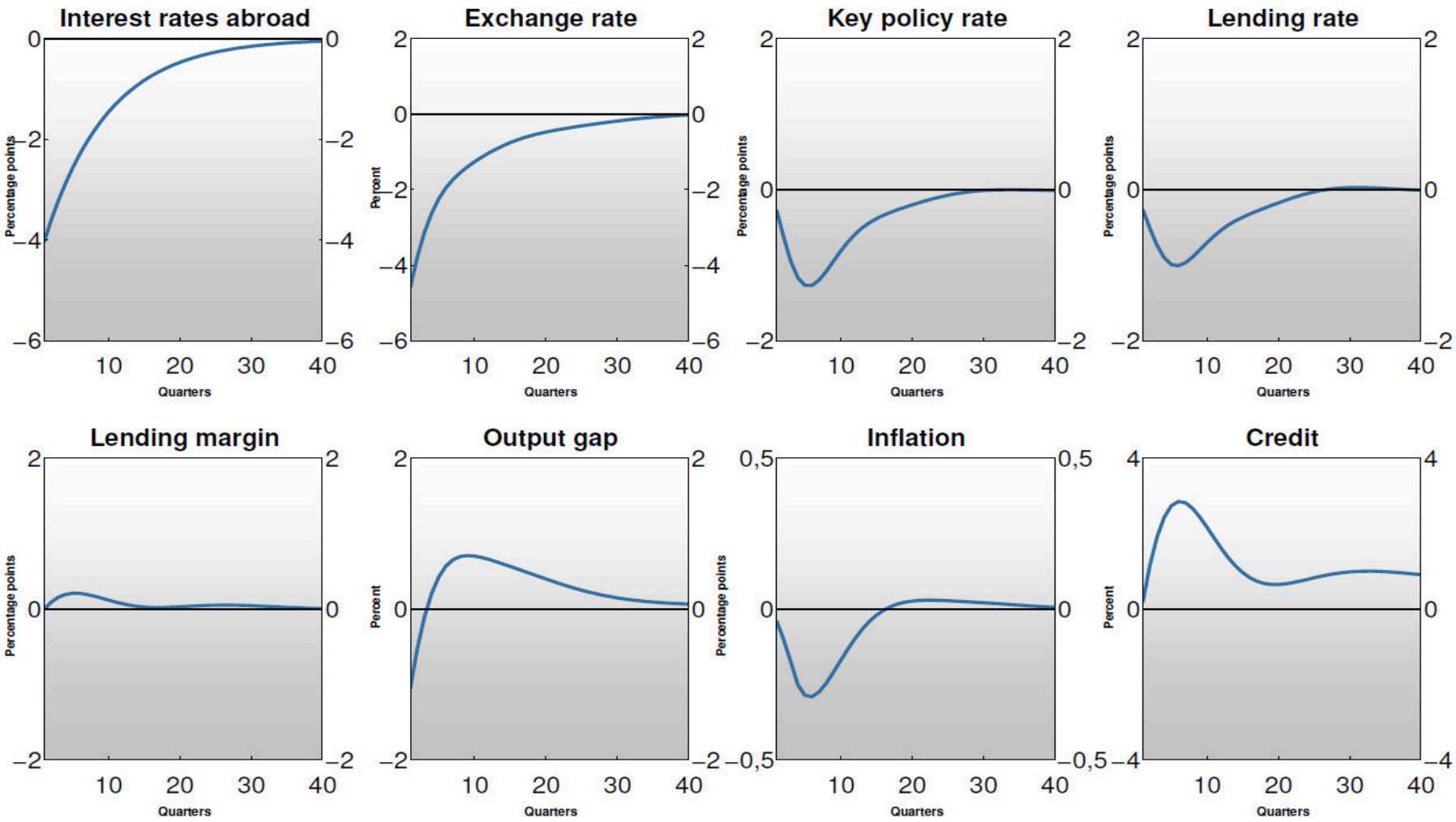


Kilder : Norges Bank og SSB

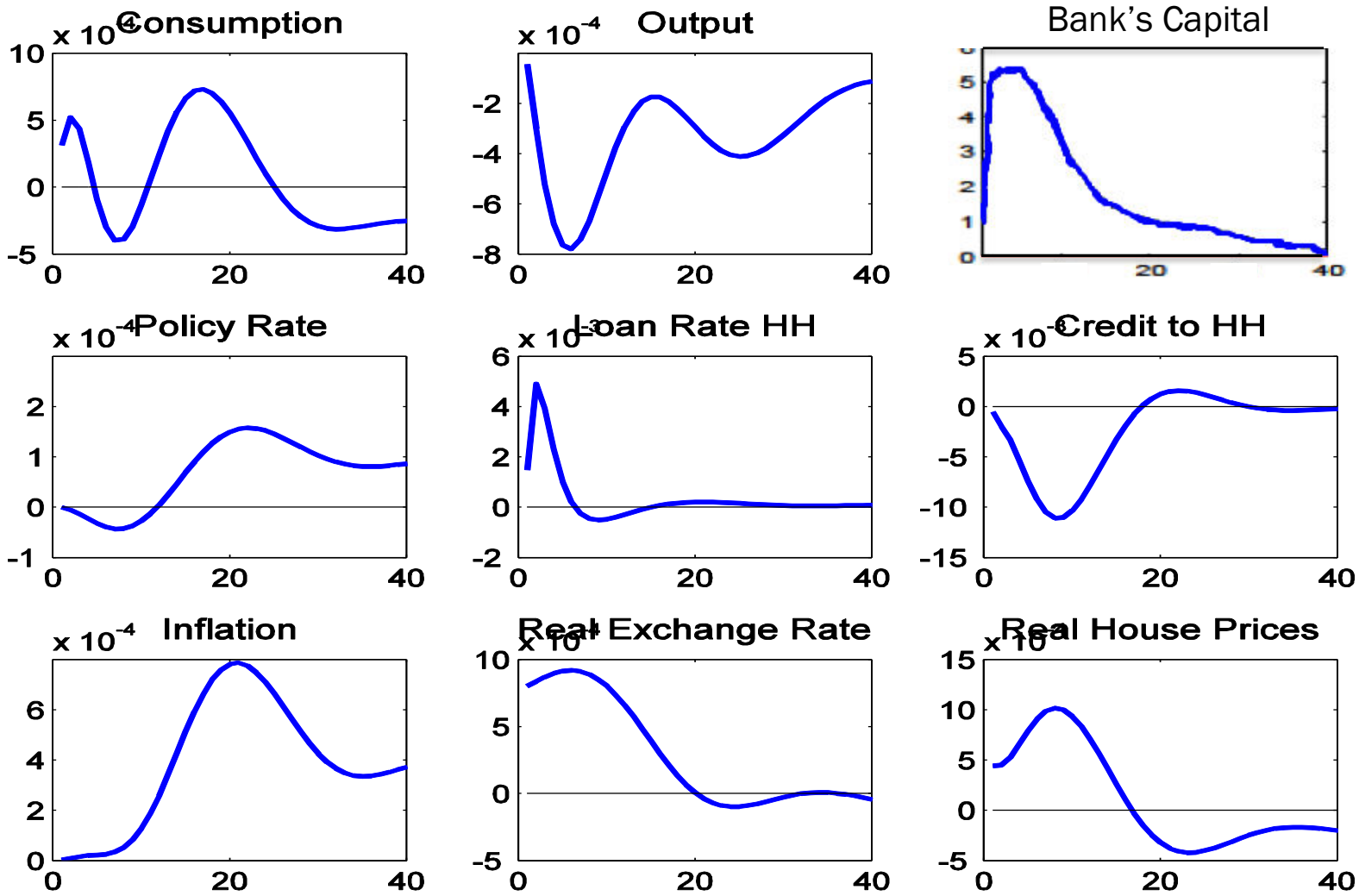
Model Fit – Counterfactual



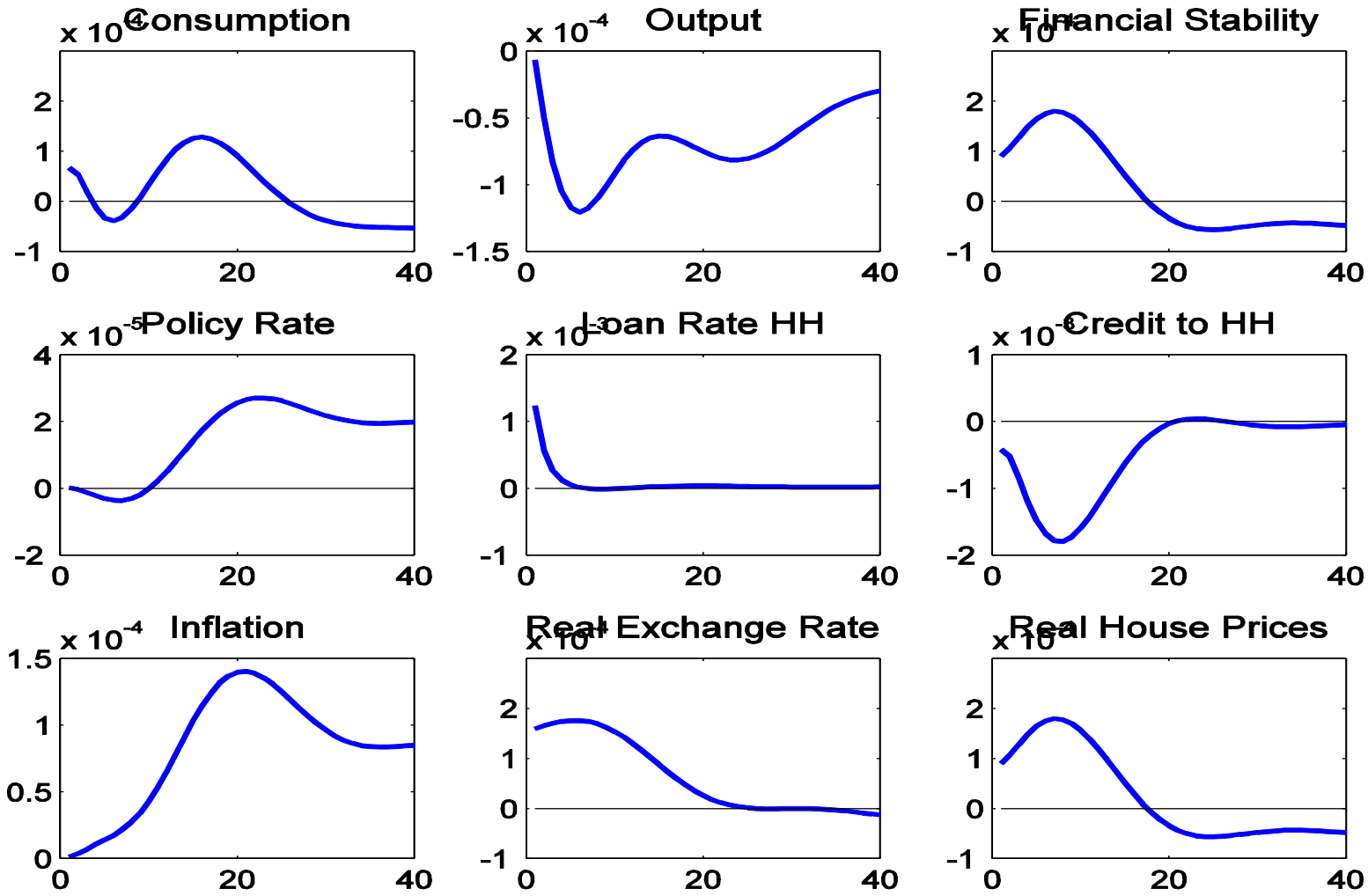
Shock to Foreign Interest Rate



Shock to Banks' Return



Shock to Banks' Capital Requirement



Optimal Monetary Policy

- Monetary policy objective is to minimize expected loss given model equations
  - **Aim: medium term forecast**
  - **Model medium term forecast is conditional to short term forecast from different sources (SAM, sector expertise, etc.)**

- How to take financial stability issues into account within the framework of monetary policy
  - **Assessment outside model**
  - **Assessment within NEMO I**
  - **Assessment with NEMO III**

- Advisory role for Ministry of Finance to set bank's capital buffer

Optimal Monetary Policy

- Monetary policy objective is to minimize expected loss given model equations

$$\mathcal{L}_t = E \sum_{i=0}^{\infty} \beta^i \left(x'_{t+i} \Lambda x_{t+i} \right)$$

- Period loss function

$$L_t = \widehat{\pi}_t^2 + \lambda_y \widehat{y}_t^2 + \lambda_r \widehat{f}_t^2 + \lambda_{\Delta r} \left(\Delta r_t \right)^2$$

where $\hat{f}_t$ has taken different meaning over time

Optimal Monetary Policy

- Assessment outside model
  - $\hat{f}_t$ **is not defined**

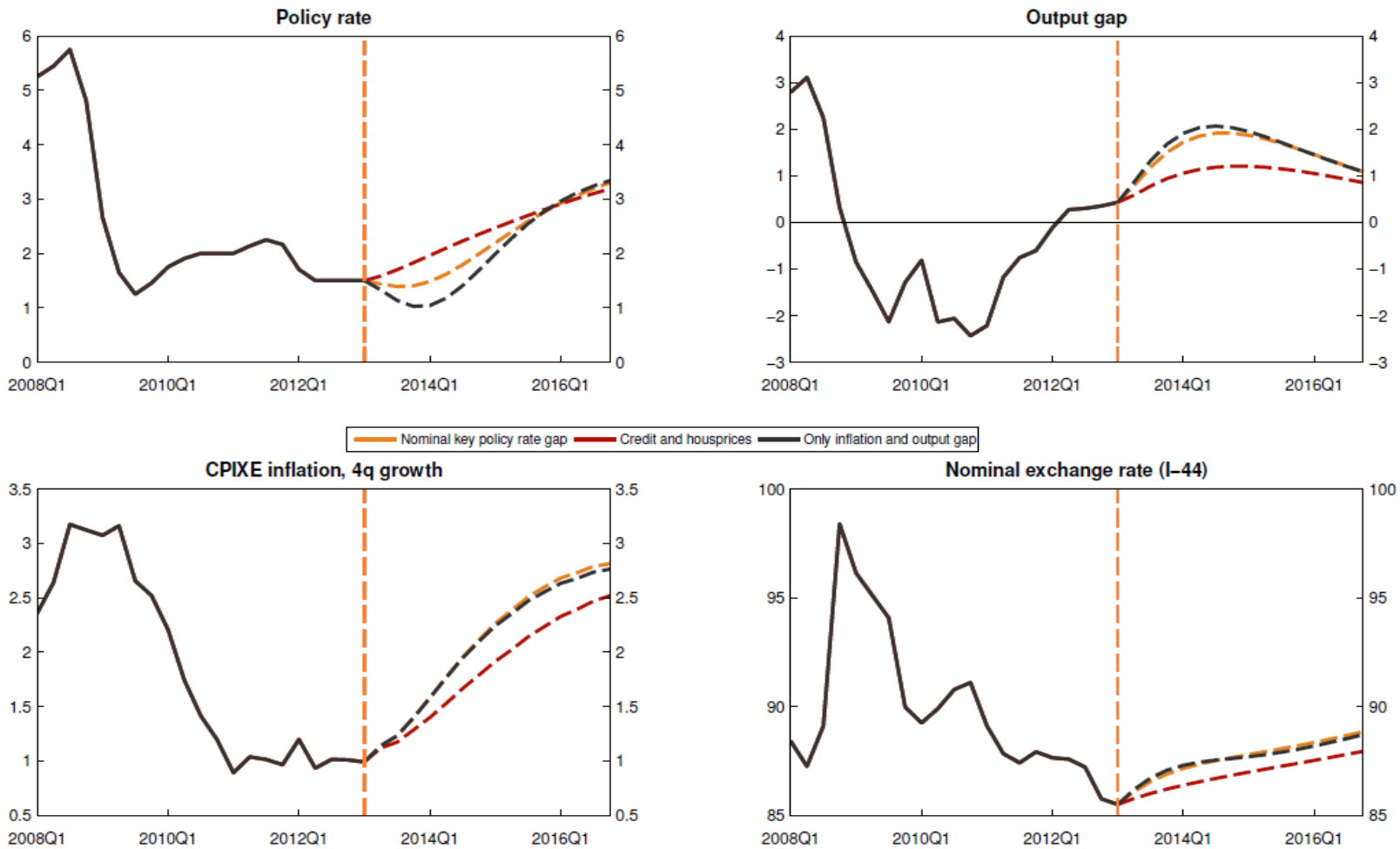
- Assessment within NEMO I
  - **Increased weight on output stabilization**
  - **Deviation of policy rate from normal level**

$$\hat{f}_t = i_t - i_t^*$$

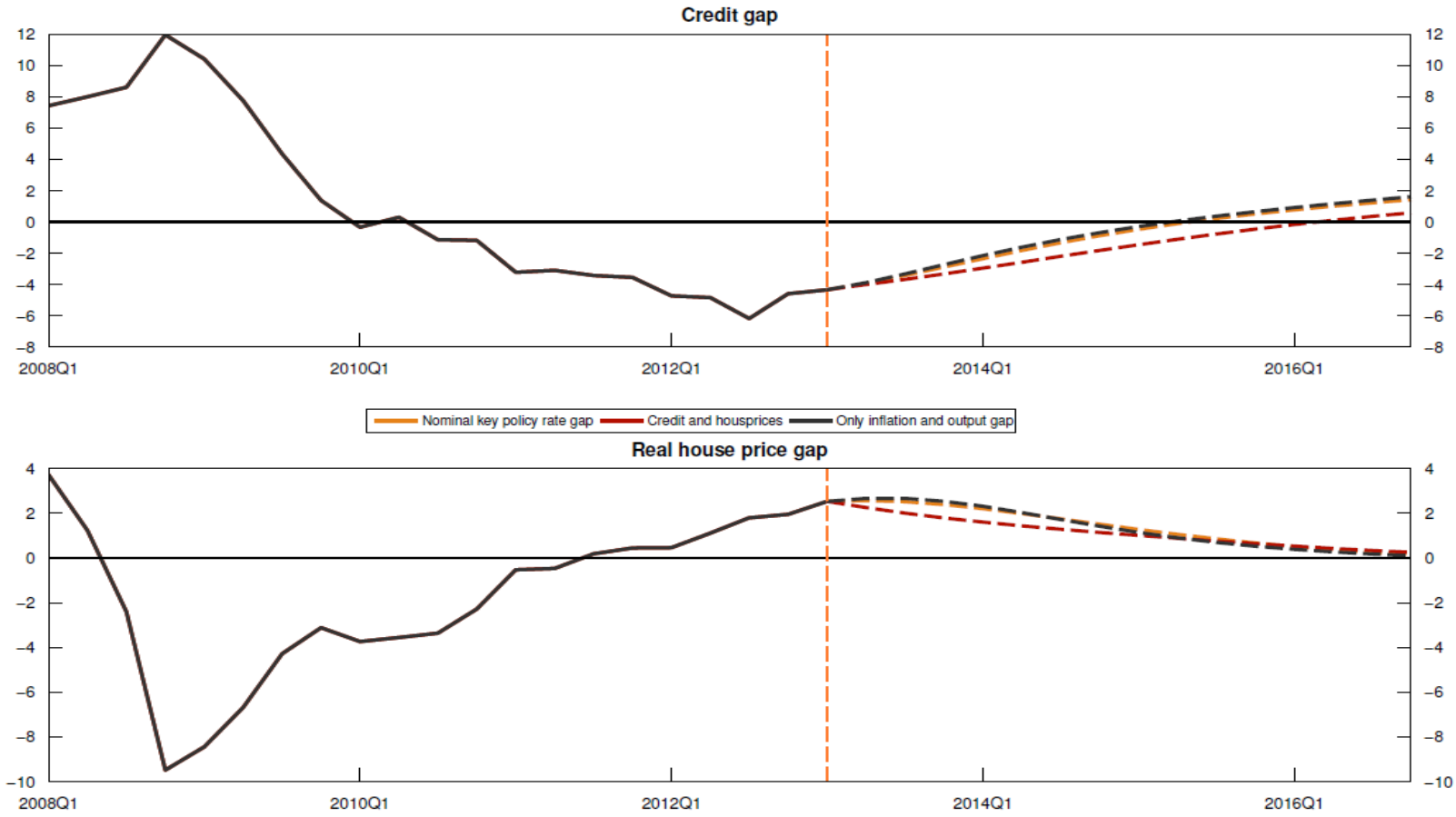
- Assessment within NEMO III
  - **Financial imbalances index**

$$\hat{f}_t = \alpha \hat{b}_t + (1-\alpha)\,\hat{p}_t^H + z_t^f$$

Effects of Different Loss Functions on Forecast



Effects of Different Loss Functions on Forecast



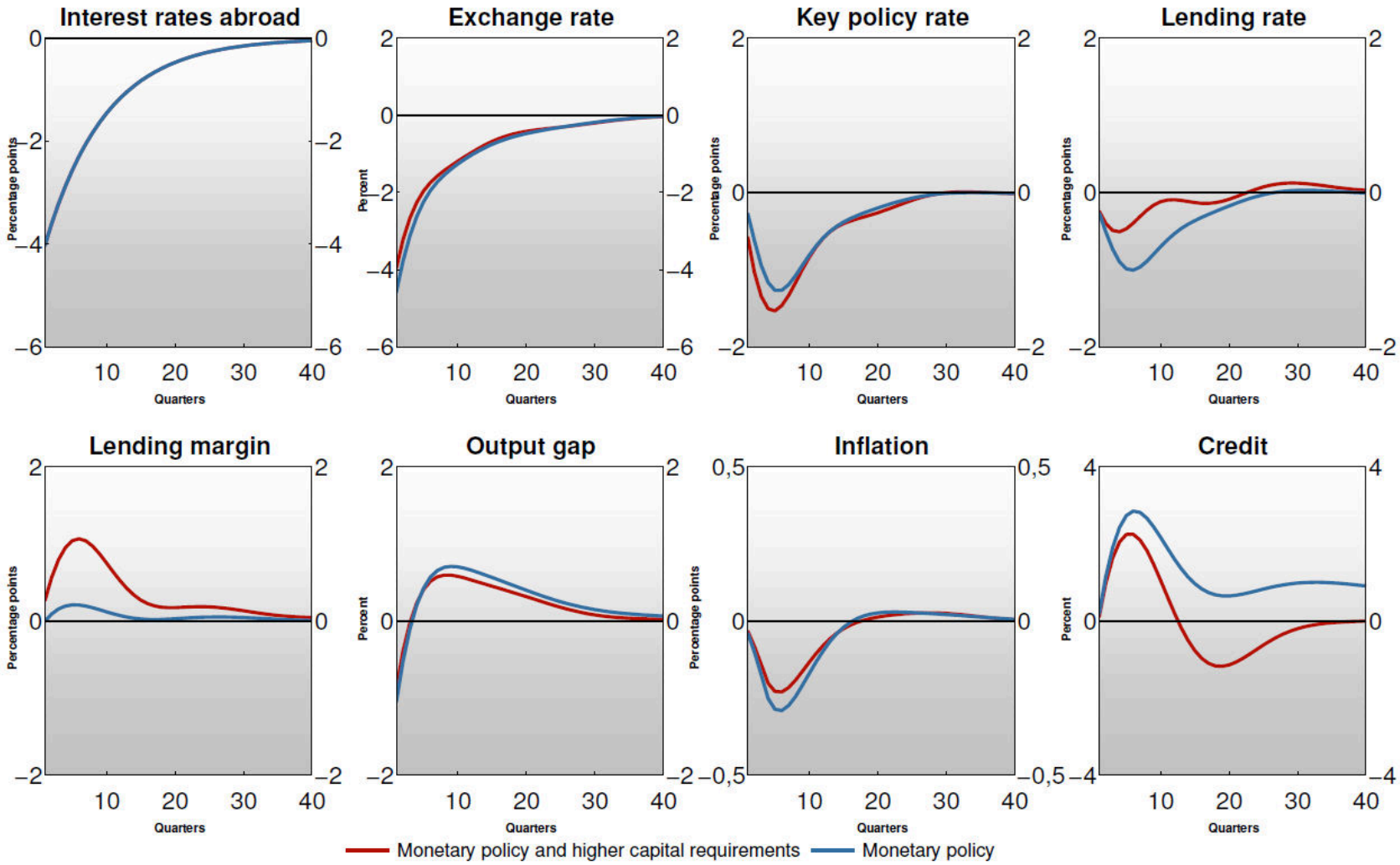
Macroprudential Policy
Countercyclical capital buffer

- The countercyclical capital buffer should satisfy the following criteria:
  - **Banks should become more resilient during an upturn**
  - **The size of the buffer should be viewed in light of other requirements applying to banks**
  - **Stress in the financial system should be alleviated**
- Further aim: curb high credit growth

Macroprudential Policy
Countercyclical capital buffer

- The advise will be based on 4 main indicators:
  - **Ratio of total credit to GDP**
  - **Wholesale funding ratio of credit institutions**
  - **Ratio of house prices to household disposable income**
  - **Commercial property prices**

Two Instruments – Shock to Foreign Interest Rate



Thank you.