Monetary and Macro-prudential Policies

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Banca d'Italia

Conference on "*The Future of Monetary Policy*"
EIEF Rome, September 30 – October 1 2010

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Outline

1. Motivation and objective
2. Model
3. Macroprudential and monetary policies
4. Interaction
5. Results
6. Robustness
7. Conclusions

1. Motivation and objective

- Financial crisis has prompted an intense debate on role of macroprudential (MP) policy
- Structural reform has followed (ESRB and FSOC)
- Agreement that MP policy should tackle systemic risk
- No agreement on how to conduct MP policy.
  Main reason: systemic risk very hard to (i) model in macro framework (ii) measure and (iii) forecast

1. Motivation and objective (cont'd)

- Paper studies interaction between MP and monetary policies in a model with financial frictions and a banking sector
- Focus on *countercyclical* MP policy (*leaning against financial cycle*), closely related to monetary policy
  - Both MP policy and monetary policy aim at moderating business cycle fluctuations
  - MP and monetary policies influence each other through their effects on credit and asset prices

1. Motivation and objective (cont'd)

Key questions:

- Could macroprudential policy usefully co-operate with monetary policy? In which circumstances?
- Or, would macroprudential policy be redundant?
- Could there be a conflict between the two policies?

2. Model

- New Keynesian core with real and nominal frictions
- Financial frictions and heterogeneous agents
- Housing as collateral for loans by households, physical capital for loans to entrepreneurs
- Monopolistic competition in banking sector
- Banks raise deposits and grant loans; bank capital affects supply of loans

See Gerali *et al.* (2010) "*Credit and Banking in a DSGE Model of the euro area*"

2. Model (cont'd)

Gerali *et al.* (2010): $$a\left(\frac{K_t^b}{L_t}-\nu\right)^2$$

This paper: $$a\left(\frac{K_t^b}{w_t^F L_t^F + w_t^H L_t^H}-\nu_t\right)^2$$

Basel II weights

Time-varying capital requirement

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3. How to model MP policy?

- Modeling MP policy (objectives and instruments) is no easy task:
  - Systemic risk is an elusive concept, hard to model and measure. Which objective in practice?
  - Choice of instrument depends on type of shock
  - So far, no theory and little practical experience

- Our approach: "revealed preferences". Rely on goals stated and actions planned or taken by policy-makers

3. MP policy: objectives

- BoE (2009): MP policy should ensure "*the stable provision of financial intermediation services to the wider economy, [avoiding] the boom and bust cycle in the supply of credit …*"
- Assume MP policy stabilizes credit/output ratio (**L/Y**)
- Empirical and theoretical justification:
  - Abnormal credit expansions lead financial crises (Borio and Drehmann, 2009)
  - Credit externalities may induce private agents to over borrow (e.g. Bianchi, 2010, Benigno *et al.*, 2010 and Jeanne and Korinek, 2010)

3. MP policy: objectives (cont'd)

- CGFS (2010): MP policy should aim at mitigating the "*...risk of a disruption of financial services that .... has the potential to have serious negative consequences for the real economy*"
- Assume that MP policy stabilizes output (**Y**)
- Hence, assume following loss for MP authority

$$L^{mp} = \sigma^2_{L/y} + k_{y,mp}\sigma^2_Y + k_\nu \sigma^2_{d\nu}$$

3. MP policy: instruments

- Assume instrument of MP policy is bank capital requirement

$$\nu_t = (1-\rho_\nu)\bar{\nu} + (1-\rho_\nu)\chi_\nu X_t + \rho_\nu \nu_{t-1}$$

  - Systemic crises affect bank capital and credit supply
  - Wide agreement in policy debate (Basel III)
  - Similar tools used in practice (Spain, dynamic provisioning)

- Exercises replicated using loan-to-value (LTV) ratio as instrument

3. Monetary policy

- Central bank sets interest rate:

$$R_t = (1-\rho_R)\bar{R} + (1-\rho_R)\left[\chi_\pi(\pi_t - \bar{\pi}) + \chi_y(y_t - y_{t-1})\right] + \rho_R R_{t-1}$$

- Central bank aims at stabilizing output and inflation:

$$L^{cb} = \sigma_\pi^2 + k_{y,cb}\sigma_y^2 + k_r\sigma_{\Delta r}^2$$

4. Interaction

- Interaction between monetary and macro-prudential policies is studied in:
  - Cooperative case → a single policymaker has two instruments, policy rate and capital requirements (or LTV)
  - Non-cooperative case → each policymaker has her own instrument and objective

See Petit (1989) and Dixit and Lambertini (2003)

4. Interaction (cont'd)

- Cooperative case: responsibility for macro-prudential policy is assigned to central bank
- Parameters of two policy rules are chosen as to minimize:

$$L = L^{cb} + L^{mp} = \sigma_{\pi}^2 + \sigma_{l/y}^2 + \left(k_{y,cb} + k_{y,mp}\right)\sigma_y^2 + k_r\sigma_{\Delta r}^2 + k_v\sigma_{dv}^2$$

4. Interaction (cont'd)

- Non-cooperative case: each policy-maker minimizes her loss function taking rule of other as given

$$(\rho_R^{n*}, \chi_\pi^{n*}, \chi_y^{n*}) = \text{argmin } L^{cb}(\rho_R, \chi_\pi, \chi_y; \rho_v^{n*}, \chi_v^{n*})$$

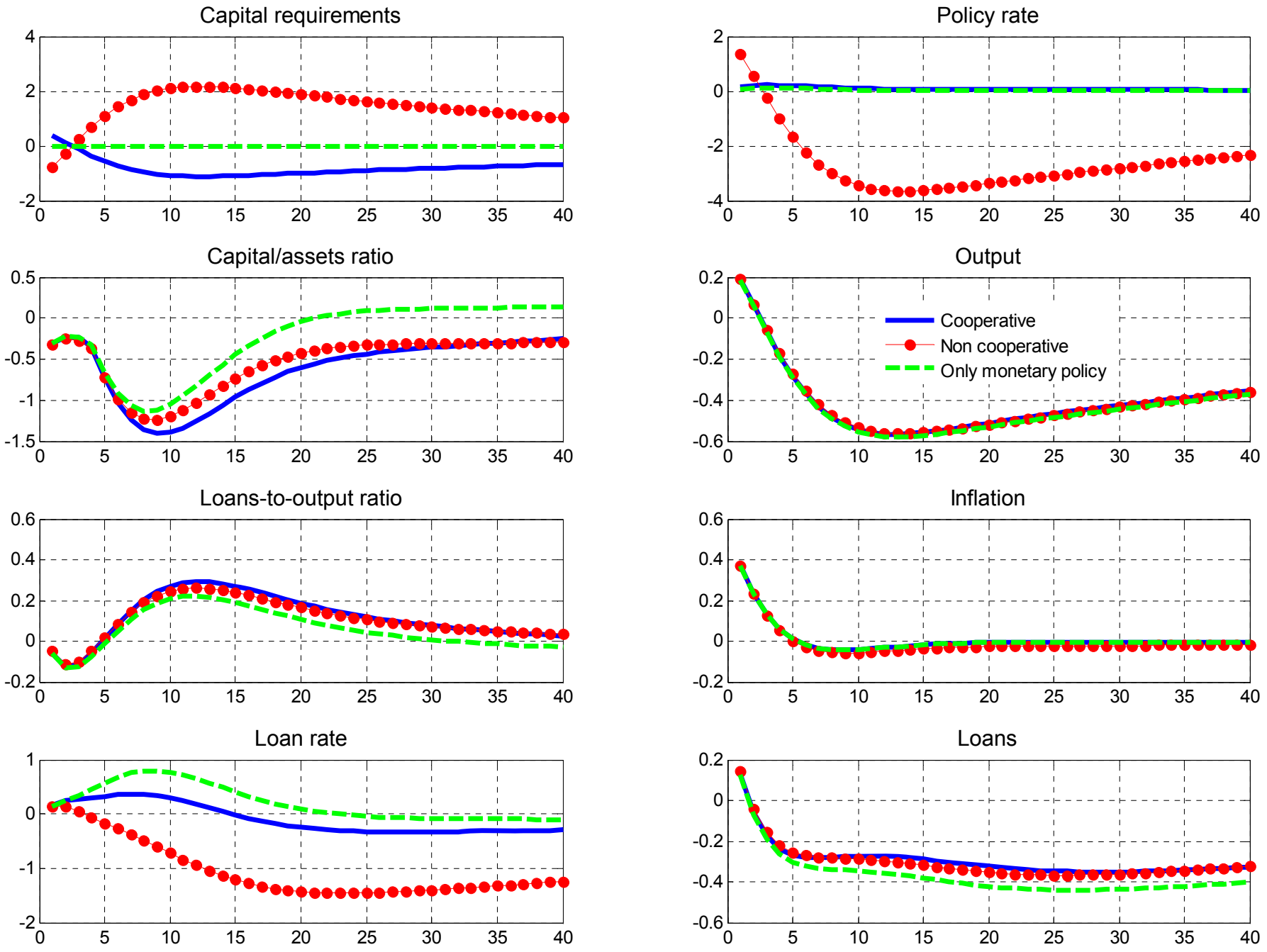
$$(\rho_v^{n*}, \chi_v^{n*}) = \text{argmin } L^{mp}(\rho_R^{n*}, \chi_\pi^{n*}, \chi_y^{n*}; \rho_v, \chi_v)$$

5. Results: technology shocks

- Cooperative case: monetary and MP policies are countercyclical
- Non-cooperative case: MP is procyclical, monetary policy countercyclical
- Non-cooperative solution may generate coordination problems $\longrightarrow$ inefficient fluctuations in policy rate

5. Results: technology shocks (cont'd)

- Differences (between two cases) in volatilities of target variables are small; large differences in volatility of policy instruments
- Usefulness of MP policy is negligible, relative to case in which there is only monetary policy
- In "normal times' monetary policy alone is sufficient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Policy rate
Capital/assets ratio
Output
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Inflation
Loan rate
Loans
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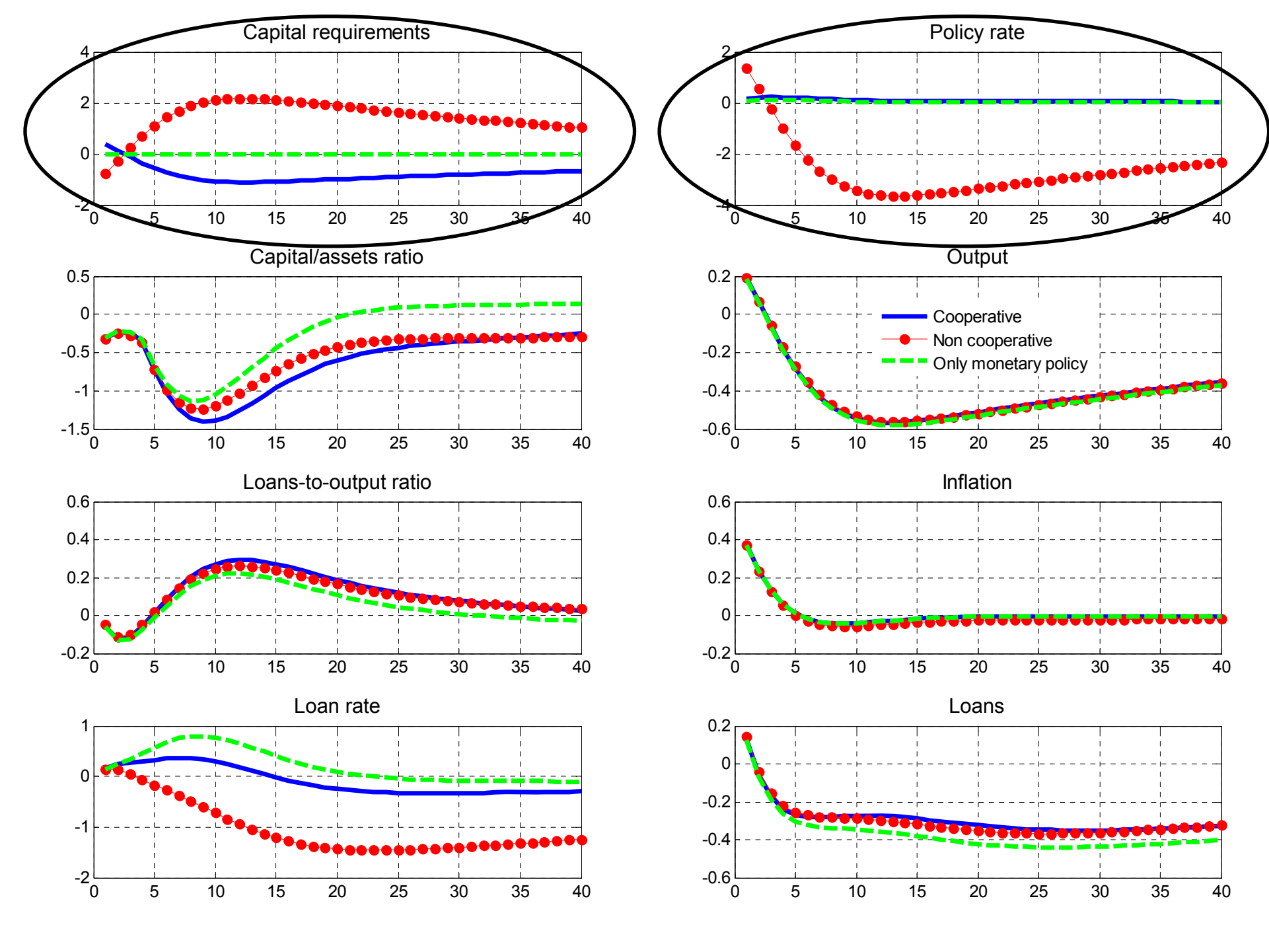
Non cooperative
Only monetary policy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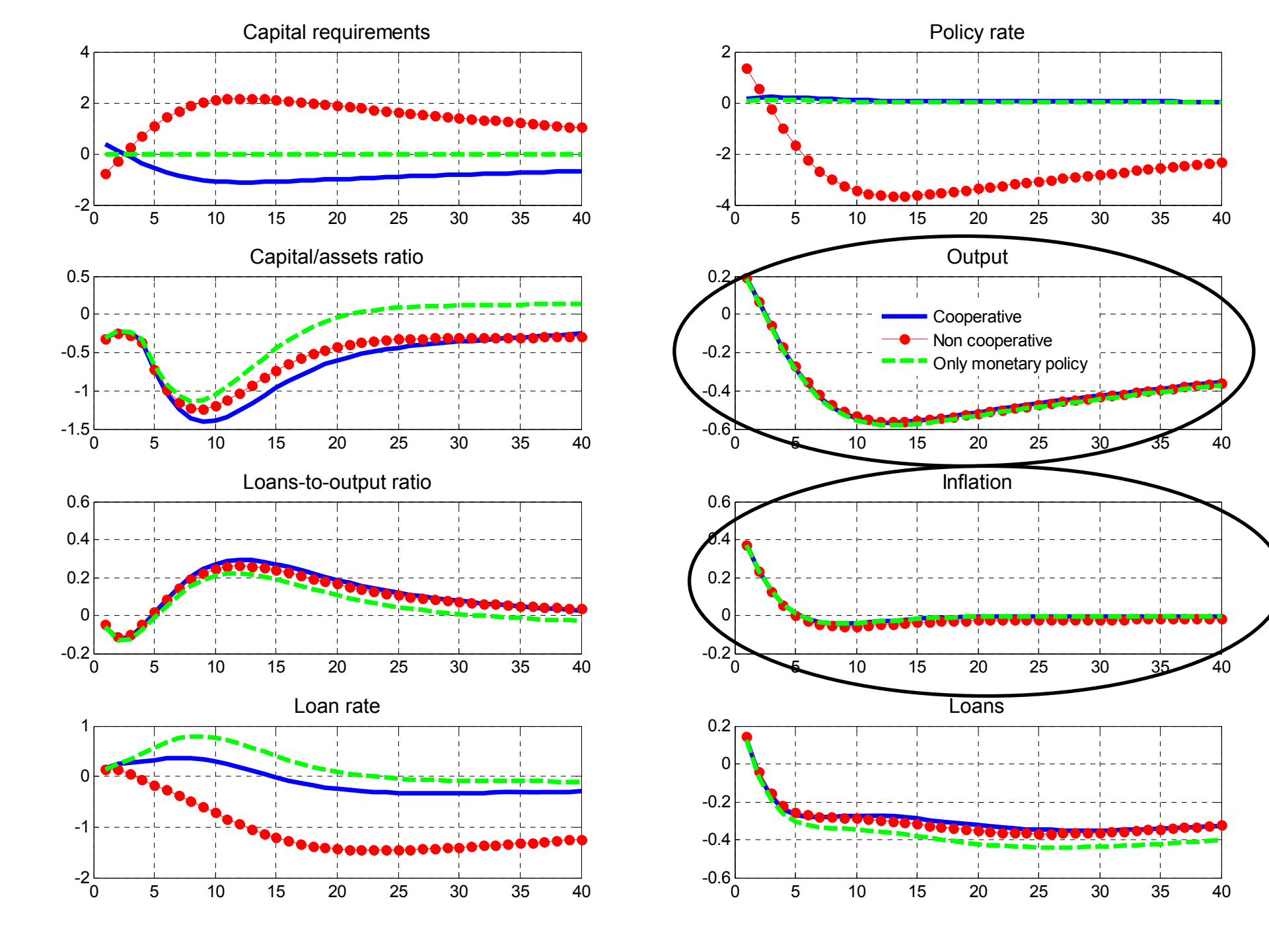
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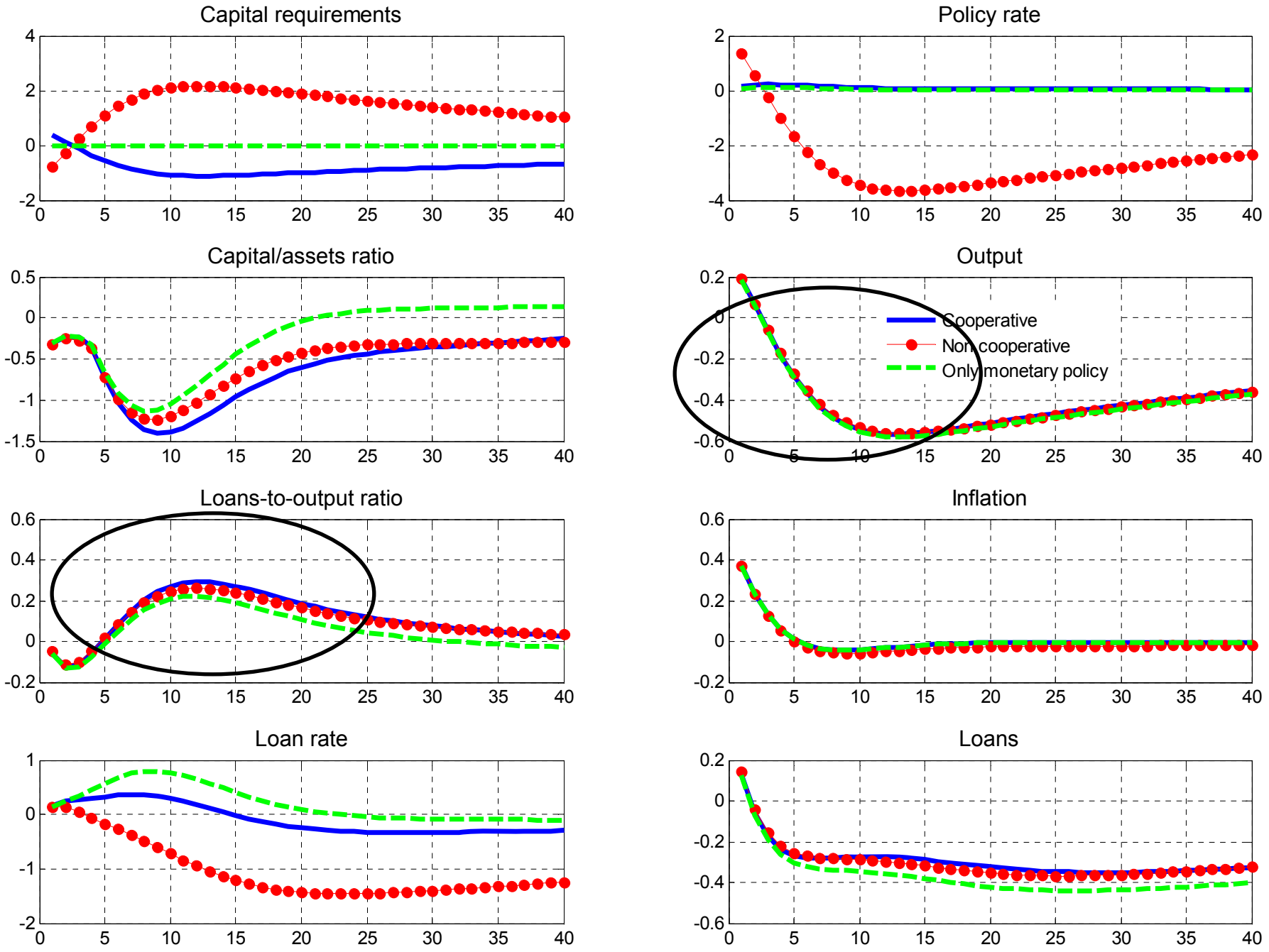
5. Results: technology shocks (cont'd)

- Why does "conflict" arise?
- Switch in MP policy (from countercyclical to procyclical; "conflict") is due to **Y** and **L/Y** moving in opposite directions
- Direct consequences of specification of loss function
- Conflict does not take place under shocks that move **Y** and **L/Y** in same direction or when objectives of MP and monetary policy are well aligned
- But conflict may always arise as long as financial stability is an objective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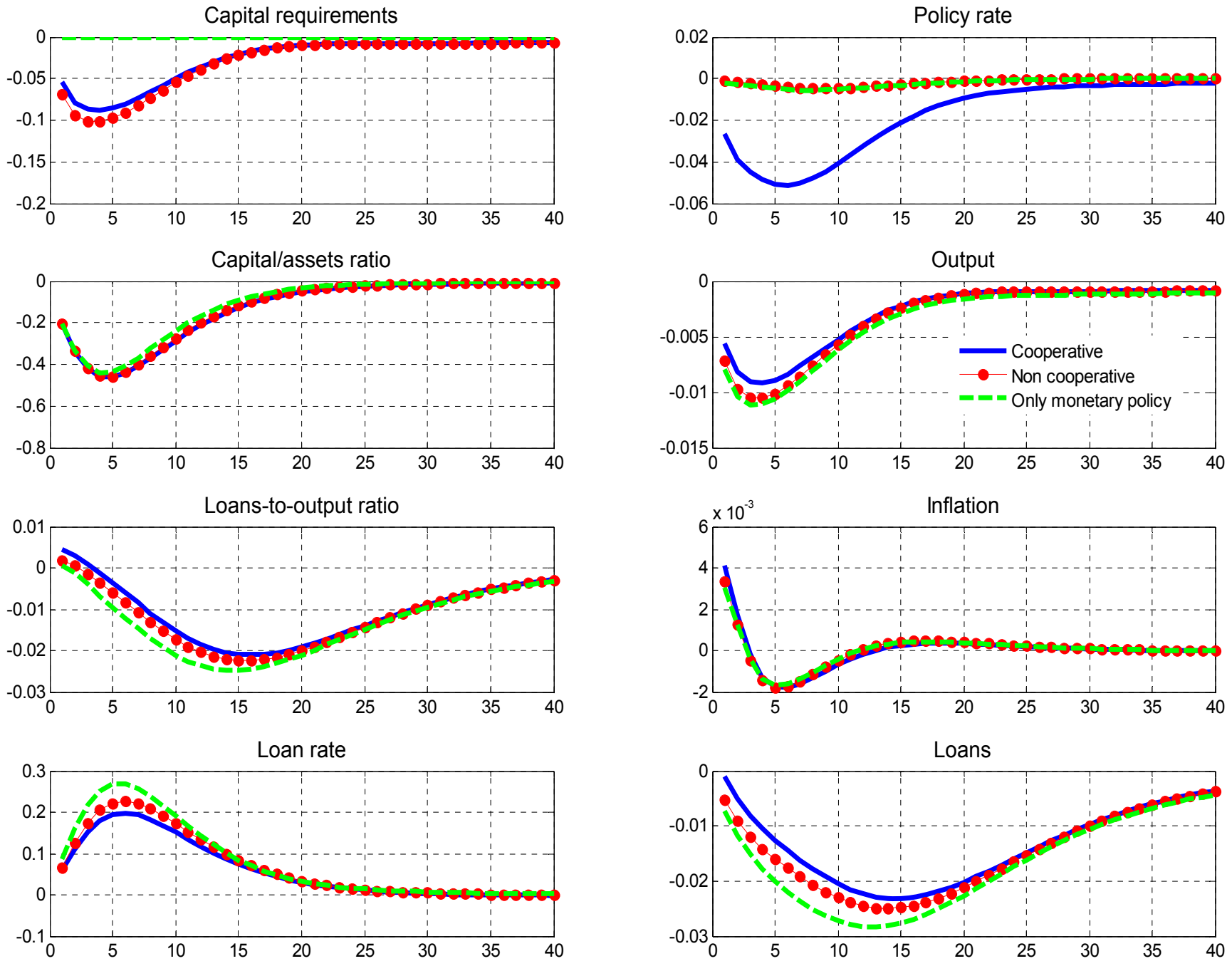
5. Results: financial shocks

- We also consider financial shocks modeled as an exogenous destruction of bank capital
- These shocks have a significant impact on real economy through their effect on supply of loans and on bank rates
- We complement financial shocks with a shock to households' preferences, to capture decline in consumers' confidence that characterized financial crisis

5. Results: financial shocks (cont'd)

- MP authority gains from cooperation, central bank loses
- Central bank deviates from strict adherence to her objectives to "lend a hand" to financial stability
- Cooperation leads to lower volatility of output (10%) and of loans-to-output ratio (5%), "paid for" with a much larger volatility of policy rate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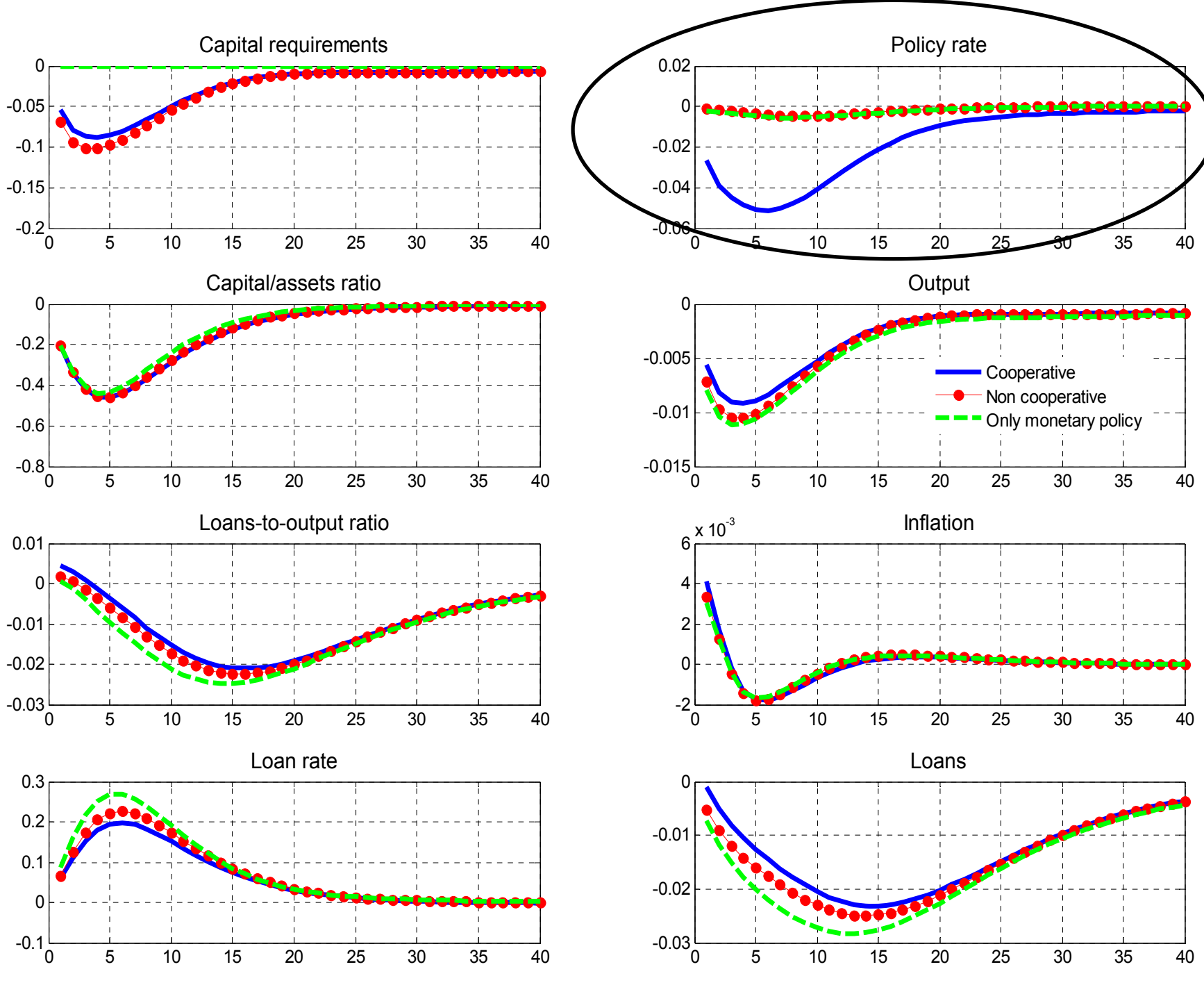
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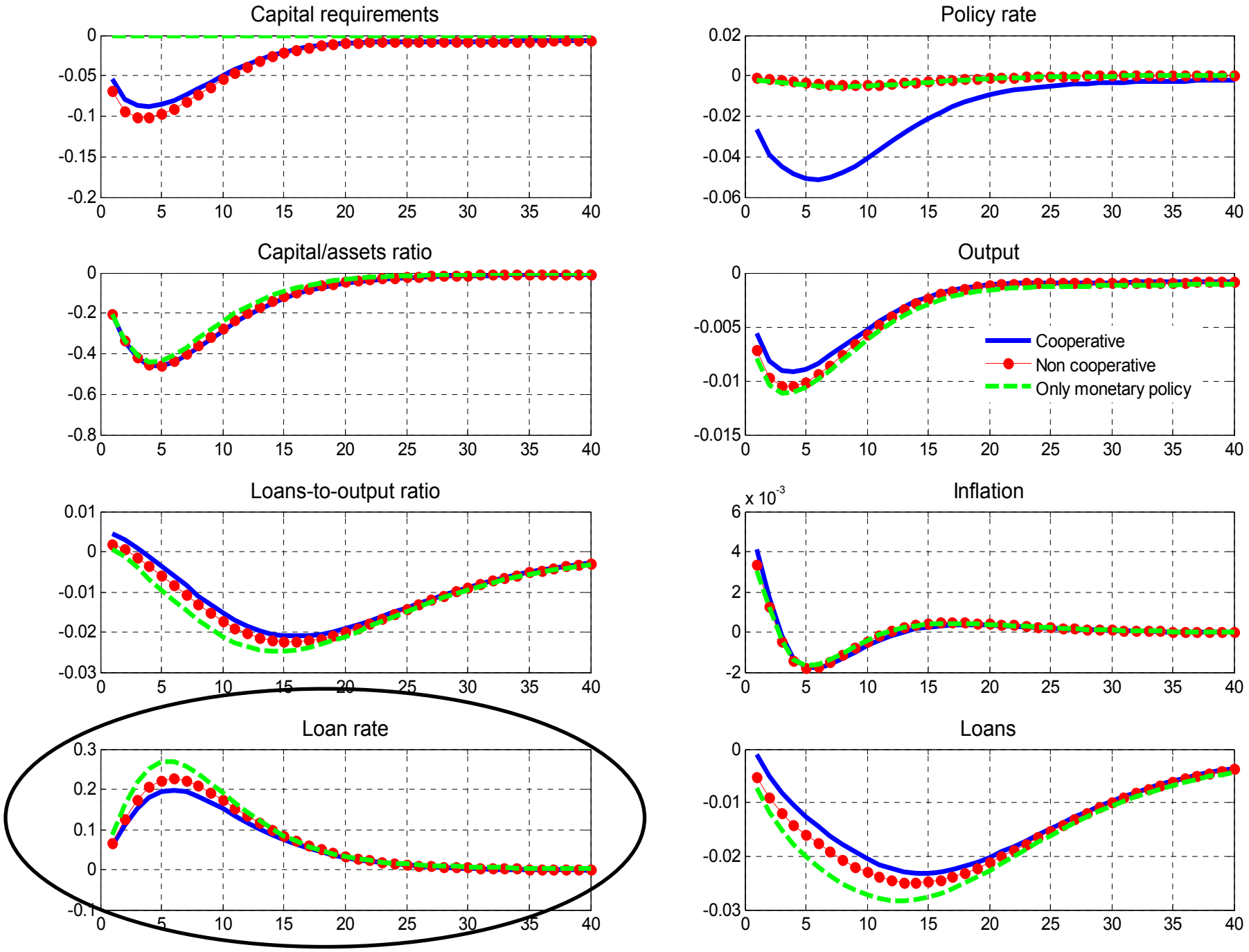
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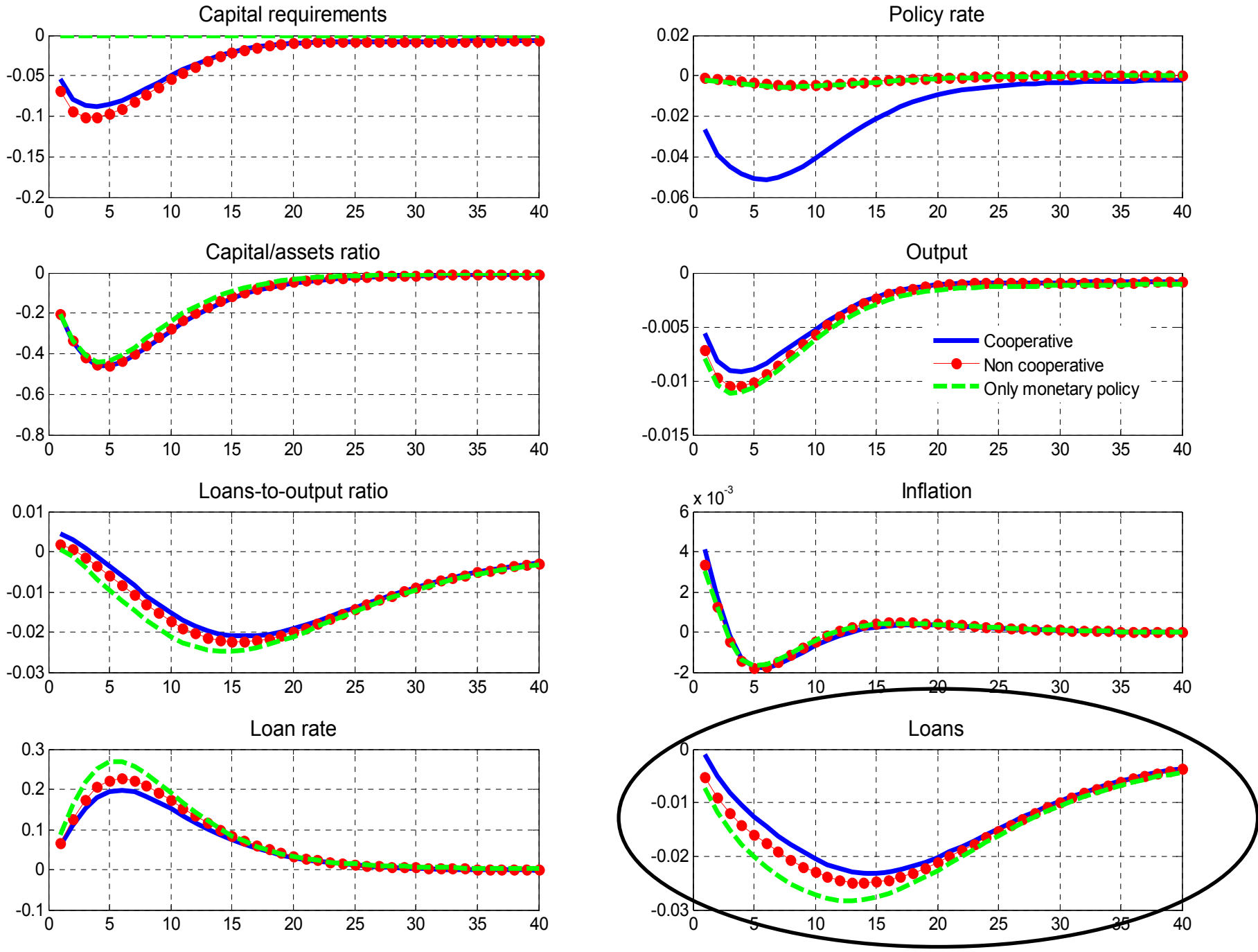
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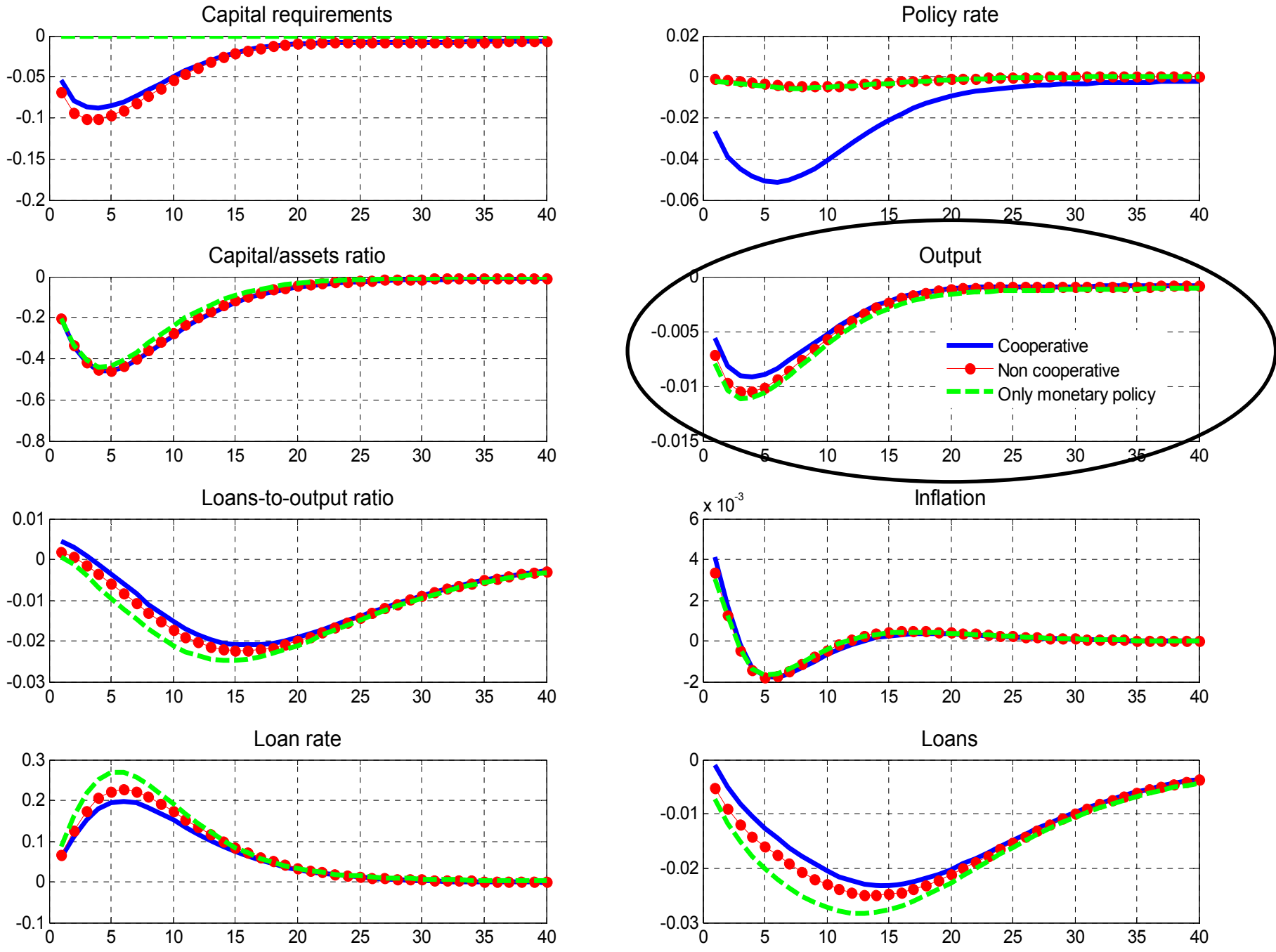
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6. Robustness

- Robustness of results has been tested along several dimensions:
  - alternative tool: LTV ratios on loans to households with housing demand shocks
  - parameterizations of loss functions
  - specifications of loss functions
  - specifications for macroprudential policy rule
  - alternative shocks: demand and all shocks

7. Conclusions

- Paper represents an attempt at organizing discussion on counter-cyclical macroprudential (MP) policies, focusing on interaction between monetary and macroprudential policies
- Two cases: cooperative and non-cooperative
- Considers also case with only monetary policy

7. Conclusions (cont'd)

- In "normal times", for example, when economic cycle is driven by supply shocks:
  - Usefulness of MP policy is limited, relative to a monetary policy-only scenario
  - Non-cooperative solution might generate substantial coordination problems with inefficient fluctuations in policy instruments
  - ✓ European framework (ESRB) well-suited to address this problem

7. Conclusions (cont'd)

- In "exceptional times" (financial shocks, or sectoral shocks, i.e. to housing market)
  - Usefulness of MP policy becomes significant, relative to monetary policy-only case
  - Two policies, if properly coordinated, can attain sizeable benefits in terms of stabilization of economy

Thank you

2. Model (cont'd)

- Varying capital-to-assets ratio is costly
- Quadratic term captures (in a reduced form, ad hoc way) trade-offs involved with holding bank capital

$$R_t = r_t - \kappa^b \left(\frac{K_t^b}{L_t} - \nu \right) \left(\frac{K_t^b}{L_t} \right)^2 + mkp_t$$

r policy rate, K^b bank capital, L total loans, ν capital requirement

- The lower the capital asset ratio, the higher the interest rate charged on loans

1. Motivation and objective (cont'd)

- Systemic risk is "*a risk of disruption to financial services that is caused by an impairment of all or parts of the financial system and has the potential to have serious negative consequences for the real economy*" (definition adopted by G20)
- Definition is vague and dependent on time- and economy-specific circumstances
- Hard to model in a macroeconomic framework

Table 1 – Interaction between monetary and macro-prudential policies: technology shocks

	Cooperative equilibrium	Non-cooperative equilibrium	Monetary policy only (no macroprudential policy)
Monetary policy			
ρ_R	0.998	0.999	0.999
χ_π	1.777	1.709	1.709
χ_y	0.924	64.765	1.212
Macroprudential			
ρ_v	0.999	0.993	0
χ_v	1.979	-4.038	0
Joint loss	0.1204	0.1253 (4.1)	0.1235 (2.5)

$$R_t = \rho_R R_{t-1} + (1-\rho_R)[\chi_\pi \pi_t + \chi_y (y_t - y_{t-1})]$$

$$v_t = (1-\rho_v)\bar{v} + (1-\rho_v)\chi_v X_t + \rho_v v_{t-1}$$

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