Empowering Central Bank Asset Purchases: The Role of Financial Policies

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Outline

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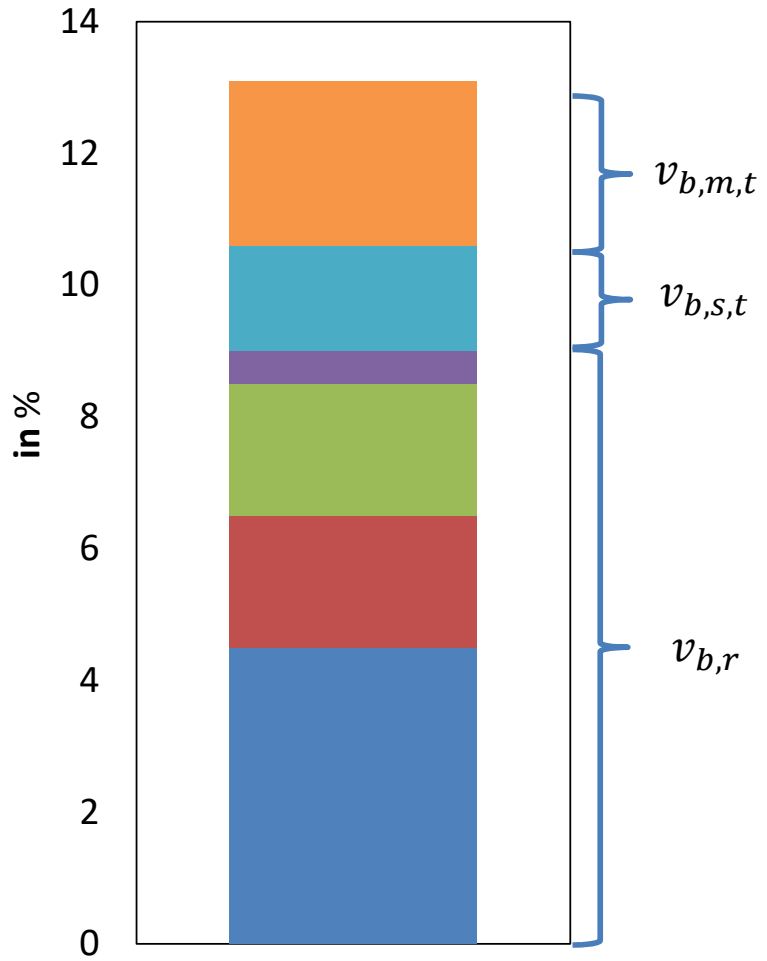
Central bank asset purchases and financial policies

- Non-standard monetary policy measures and in particular asset purchase programmes, have been an instrumental feature of central bank crisis fighting apparatus during the Great Recession (see for example ECB's expanded asset purchase programme, which mainly includes the public sector purchase programme (PSPP)).
- One specific propagation mechanism of the PSPP operates largely via the banking system: its credit easing channel puts downward pressure on bank net interest rate margins which might trigger excessive bank risk-taking.
- A comprehensive overhaul of the regulatory, supervisory and macroprudential frameworks took place through the crisis, with active preventing arms against the build-up of imbalances and financial instabilities.
- In particular, Bank capital-based financial policies have been designed to tame excessive leverage and risk shifting.
- How should financial policies best support non-standard monetary policy transmission?

Capital-based financial policies

- Countercyclical buffer (CCyB) - macroprudential
- Pillar 2 guidance (P2G) - microprudential
- Systemic risk buffer (SRB) - macroprudential
- Capital conservation buffer (CCB) - micro- and macroprudential
- Pillar 2 requirement (P2R) - microprudential
- Pillar 1 requirement (P1R) - microprudential



Regulatory policies $\nu_{b,r}$
Supervisory policies $\nu_{b,s,t}$
Macroprudential policies $\nu_{b,m,t}$
Total capital requirements: $\nu_b = \nu_{b,r} + \nu_{b,s,t} + \nu_{b,m,t}$

Main objective

- This paper contributes to the debate on the macroeconomic effectiveness and strength of expansionary non-standard monetary policy measures in a regulated banking environment.
- Our analysis is guided by the three layers of regulatory, supervisory and macroprudential standards of bank capital regulation.
- Aim:
  - ***first*** to investigate how incentives of banks to engage in risky projects affect the transmission of asset purchases and evaluates the role of minimum bank capital requirements,
  - ***second*** to shed light on the potential side effects of supervisory uncertainty/discretion on the transmission of non-standard measures, and
  - ***third*** to assess the scope for counter-cyclical financial policies to complement central bank asset purchases.

Analysis

- Analysis is performed with an estimated DSGE model for the euro area with a rich description of the banking system:
  - qualifies for analyzing the macroeconomic transmission of non-standard monetary measures through a bank credit channel that captures the impact of repricing of long-term debt on the term premium and bank portfolio rebalancing frictions.
  - includes risk-taking motives of banks and bank capital policies.

Results

- Weakly capitalised banks display excessive risk-taking which reinforces the credit easing channel of central bank asset purchases, at the cost of higher bank default probability and lasting financial stability risks.
- Sufficient bank capital provision through higher capital requirements can curtail excess credit and deter excessive risk shifting by banks.
- Uncertainty about the supervisory oversight would provide a precautionary motive for banks to build extra capital buffer which might run against the non-standard monetary policy.
- With a well-capitalised banking system, macroprudential policy should look through the effects of central bank asset purchases on bank capital position as the costs in terms of macroeconomic stabilisation seem to outweigh the marginal financial stability benefits.
- In a weakly-capitalised banking system, a countercyclical macroprudential policy in conjunction with central bank asset purchases can mitigate banks risk-taking and dampen the excessive persistence of the non-standard monetary policy impulse on the real economy.

Related Literature

Monetary policy

- Transmission of central bank asset purchases
  - Chen et al. (2012), Darracq Pariès and Kühl (2016), Carlstrom et al. (2017)
- Banks' risk-taking channel
  - Borio and Zhu (2012), de Groot (2014), Adrian and Shin (2010), Dell'Ariccia et al. (2016)

... and financial policies

- Bank capital policies
  - 3D (v1, v2 ...), Angelini et al. (2015), Döttling (2016), Beyer et al. (2017), Rubio and Carrasco-Gallego (2016)
- Macroprudential regulation
  - Benes and Kumhof (2015), Lozej et al. (2017), Tressel and Verdier (2014)
- Financial and regulatory uncertainty
  - Valencia (2016)

Outline

Model outline

- **Banking sector**
  - Risky Bankers
    limited liability under deposit insurance scheme
    regulatory bank capital and penalty costs
    portfolio rebalancing frictions
  - Retail lending branches
  - Loan officers
- **Non-financial corporate sector**
  - Risky Entrepreneurs
    limited liability
  - Capital producers
- **Households**
  portfolio adjustment frictions
- **Goods-producing firms**
  - Intermediate goods
  - Final goods
- **Intermediate labour unions and labour packers**
- **Policy authorities**
  - Government
  - **Monetary and supervisory authorities**
    - Standard monetary policy
    - Non-standard monetary policy
    - Regulatory policies
    - Supervisory policies
    - Macroprudential policies

Bankers

Banks' balance sheet:

$$L_{BE,t} + Q_{B,t}B_{B,t} = D_t + NW_{B,t}$$

where $L_{BE,t}$, $Q_{B,t}B_{B,t}$, D_t and $NW_{B,t}$ stand for the stock of loans, government bonds, deposits and bank net worth, respectively.

Banks' operating profit:

$$OP^b_{t+1}\left(\omega_{b,t+1}\right) \equiv \omega_{b,t+1} R_{BLE,t} L_{BE,t} + R_{G,t+1} Q_{B,t} B_{B,t} - \varrho_t NW_{B,t} - R_{D,t} D_{B,t} + \Pi^R_{B,t+1}$$

where $\omega_{b,t+1}$ represents an idiosyncratic return shock, ϱ_t are portfolio adjustment costs and $\Pi^R_{B,t+1}$ denote transfers from other banking segments.

Bankers

Limited liability with deposit insurance:

Individual bankers return on net worth $R^B_{N,t+1}$ may not fall below zero:

$$R^B_{N,t+1}(\omega_{b,t+1})NW_{B,t} = \widetilde{E}\left[\max\left(OP^b_{t+1}(\omega_{b,t+1}), 0\right)\right]$$

while OP^b_{t+1} denotes operating profits of the banker and $\widetilde{E}$ is the expectation operator related to the distribution of the idiosyncratic on bankers loan book return.

This gives rise to a default threshold $\overline{\omega}_{b,t+1}$ on the value of the idiosyncratic shock, below which bankers default:

$$\overline{\omega}_{b,t+1} \equiv \frac{R_{D,t}\left(\kappa^l_{B,t} + \kappa^g_{B,t} - 1\right) - R_{G,t+1}\kappa^g_{B,t} - \frac{\Pi^R_{B,t+1}}{NW_{B,t}} + \varrho_t}{\kappa^l_{B,t}R_{BLE,t}}$$

with $\kappa^g_{B,t}$ and $\kappa^l_{B,t}$ being the leverage ratio for government bonds and loans, respectively.

Bankers

Minimum capital ratio:

$$OP^{b}_{t+1} > \nu_{b,t}\left(\omega_{b,t+1} R_{BLE,t} L_{BE,t}\right) + \nu_{g}\left(R_{G,t+1} Q_{B,t} B_{B,t}\right)$$

Total bank-capital demand from financial policies $\nu_{b,t}$.

If operating profits fall below the requirement, then **regulatory penalty costs**:

$$\chi_{b}\left(L_{BE,t} + Q_{B,t} B_{B,t}\right)$$

This gives rise to a second threshold $\overline{\omega}^{\nu}_{b,t+1} > \overline{\omega}_{b,t+1}$ on the value of the idiosyncratic shock, below which the regulatory penalty is paid :

$$\overline{\omega}^{\nu}_{b,t+1} \equiv \frac{R_{D,t}\left(\kappa^{l}_{B,t} + \kappa^{g}_{B,t} - 1\right) - \left(1 - \nu_{g}\right) R_{G,t+1} \kappa^{g}_{B,t} - \frac{\Pi^{R}_{B,t+1}}{NW_{B,t}} + \varrho_{t}}{\left(1 - \nu_{b,t}\right) \kappa^{l}_{B,t} R_{BLE,t}}$$

Bankers

The representative bankers' expected return on net worth from t to $t+1$ comprises of:

1. expected return conditional on no-default

$$\widetilde{E}\left[OP^{b}_{t+1}\left(\omega_{b,t+1}\right) \mid \omega_{b,t+1} \geq \overline{\omega}_{b,t+1}\right]$$

   where $\overline{\omega}_{b,t+1}$ is the default threshold.

2. minus expected regulatory costs conditional on no-default and breach of the minimum bank capital demands

$$-\widetilde{E}\left[\chi_{b}\left(L_{BE,t}+Q_{B,t}B_{B,t}\right) \mid \overline{\omega}_{b,t+1} \leq \omega_{b,t+1} \leq \overline{\omega}^{\nu}_{b,t+1}\right]$$

   where $\overline{\omega}^{\nu}_{b,t+1}$ is the regulatory threshold.

Bankers

Bankers maximize their expected return:

$$\max_{\left\{\frac{L_{BE,t}}{NW_{B,t}}, \frac{Q_{B,t}B_{B,t}}{NW_{B,t}}\right\}} \mathbb{E}_t \left[\Xi_{t,t+1} \frac{R^B_{N,t+1} NW_{B,t}}{\gamma \pi_{t+1}}\right]$$

s.t.

$$R^B_{N,t+1} \equiv R_{BLE,t}\kappa^l_{B,t}\left[1 - \Gamma_b\left(\overline{\omega}_{b,t+1}\right)\right] - \chi_b\left(\kappa^l_{B,t} + \kappa^g_{B,t}\right)\left(F\left(\overline{\omega}^{\nu}_{b,t+1}\right) - F\left(\overline{\omega}_{b,t+1}\right)\right)$$

and the thresholds $\overline{\omega}_{b,t+1}$ and $\overline{\omega}^{\nu}_{b,t+1}$.

Banks' first order conditions

FOC for loan exposures ...

$$\frac{\partial(\cdot)}{\partial \kappa^{l}_{B,t}} = 0$$

... leads to

$$R_{BLE,t}\left(1 - \int_0^{\overline{\omega}_{b,t+1}} \omega \mathrm{d}F_b(\omega)\right) - R_{D,t}\left(1 - F_b\left(\overline{\omega}_{b,t+1}\right)\right)$$

$$-\chi_b \left[\begin{array}{c} \left(F\left(\overline{\omega}^{\nu}_{b,t+1}\right) - F\left(\overline{\omega}_{b,t+1}\right)\right) \\ +\mathcal{K}_t \frac{\mathrm{d}F_b\left(\overline{\omega}^{\nu}_{b,t+1}\right)}{(1-\nu_b)} \left(R_{D,t} - (1-\nu_b)\,\overline{\omega}^{\nu}_{b,t+1} R_{BLE,t}\right) \\ -\mathcal{K}_t \mathrm{d}F_b\left(\overline{\omega}_{b,t+1}\right)\left(R_{D,t} - \overline{\omega}_{b,t+1} R_{BLE,t}\right) \end{array} \right] = 0$$

with $\mathcal{K}_t \equiv \frac{\kappa^{l}_{B,t} + \kappa^{g}_{B,t}}{R_{BLE,t}\kappa^{l}_{B,t}}$

Banks' first order conditions

FOC for loan exposures ...

$$\frac{\partial(\cdot)}{\partial \kappa^{g}_{B,t}} = 0$$

... leads to

$$\left(R_{G,t+1} - R_{D,t} - \chi_B\left(\kappa^{g}_{B,t} - \overline{\kappa}^{g}_{B}\right)\right)\left(1 - F_b\left(\overline{\omega}_{b,t+1}\right)\right)$$

$$-\chi_b\left[\begin{array}{c}\left(F\left(\overline{\omega}^{\nu}_{b,t+1}\right) - F\left(\overline{\omega}_{b,t+1}\right)\right)\\ +\mathcal{K}_t\frac{\mathrm{d}F_b\left(\overline{\omega}^{\nu}_{b,t+1}\right)}{(1-\nu_b)}\left(R_{D,t} - (1-\nu_g)R_{G,t+1} + \chi_B\left(\kappa^{g}_{B,t} - \overline{\kappa}^{g}_{B}\right)\right)\\ -\mathcal{K}_t\mathrm{d}F_b\left(\overline{\omega}_{b,t+1}\right)\left(R_{D,t} - R_{G,t+1} + \chi_B\left(\kappa^{g}_{B,t} - \overline{\kappa}^{g}_{B}\right)\right)\end{array}\right] = 0$$

Standard monetary policy

$$\begin{aligned} \hat{R}_t &= max\left(\underline{\hat{R}}, \hat{R}_t^*\right) \\ \hat{R}_t^* &= \rho \hat{R}_{t-1} + (1-\rho)\left[r_\pi \hat{\pi}_t + r_{\Delta y}\Delta y_t\right] + r_{\Delta\pi}\Delta\pi_t + \ln\left(\varepsilon_t^r\right) \end{aligned}$$

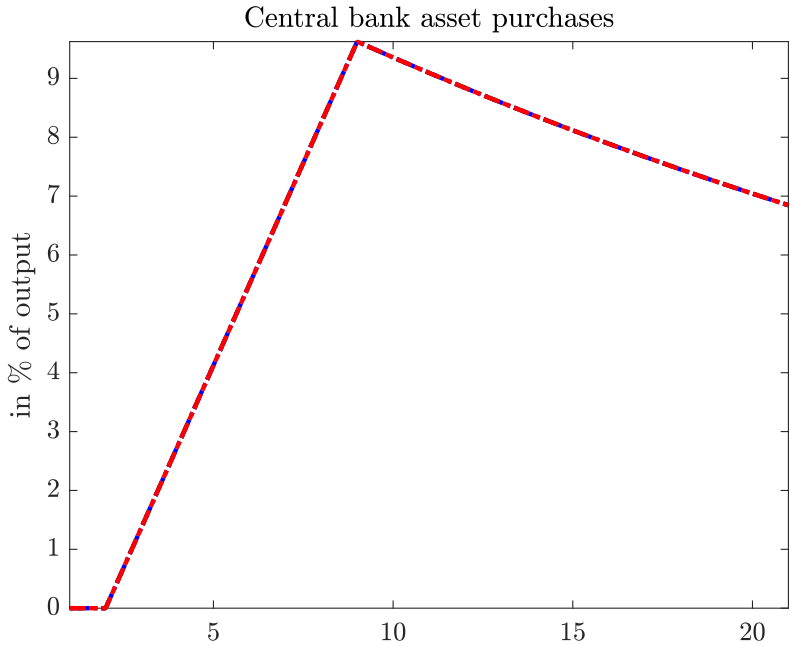
$\underline{\hat{R}}$ stands for the effective lower bound (ELB) of the deposit interest rates.

Non-standard monetary policy

$$B_{CB,t} = \rho_{B1} B_{CB,t-1} + \gamma_0 \varepsilon_{CB,t} + \gamma_1 \varepsilon_{CB,t-1} + \gamma_2 \varepsilon_{CB,t-2} + ... + \gamma_n \varepsilon_{CB,t-n}$$

where $\varepsilon_{CB,t-i}$

- represent the evolution of purchases from $i = 0, ..., n$ which are carried out in the build-up phase and
- are assumed to be communicated and known in period $t - n$.



Regulatory and Supervisory policies

Minimum regulatory capital as a steady state component of the bank capital demand:

$$\nu_{b,t} = \nu_{b,r} + \nu_{b,s,t} + \nu_{b,m,t}$$

Supervisory capital demand ...

$$\nu_{b} = \nu_{b,r} + \nu_{b,s,t} + \nu_{b,m,t}$$

... subject to transitory changes ...

$$\log \nu_{b,s,t} = \rho_{\nu} \log \nu_{b,s,t} + \epsilon_{\sigma_{\nu},t} \varepsilon_{\nu,t}$$

... and **uncertainty shock:**

$$\log \epsilon_{\sigma_{\nu},t} = \rho_{\sigma_{\nu}} \log \epsilon_{\sigma_{\nu},t-1} + \varepsilon_{\sigma_{\nu},t}$$

where $\varepsilon_{\sigma_{\nu},t} \sim \mathcal{N}(0, \sigma_{\sigma_{\nu}})$.

The uncertainty shock $\epsilon_{\sigma_{\nu},t}$ shifts up the variance of $\varepsilon_{\nu,t}$.

Macroprudential policies

Countercyclical capital buffer $\nu_b = \nu_{b,r} + \nu_{b,s,t} + \nu_{b,m,t}$

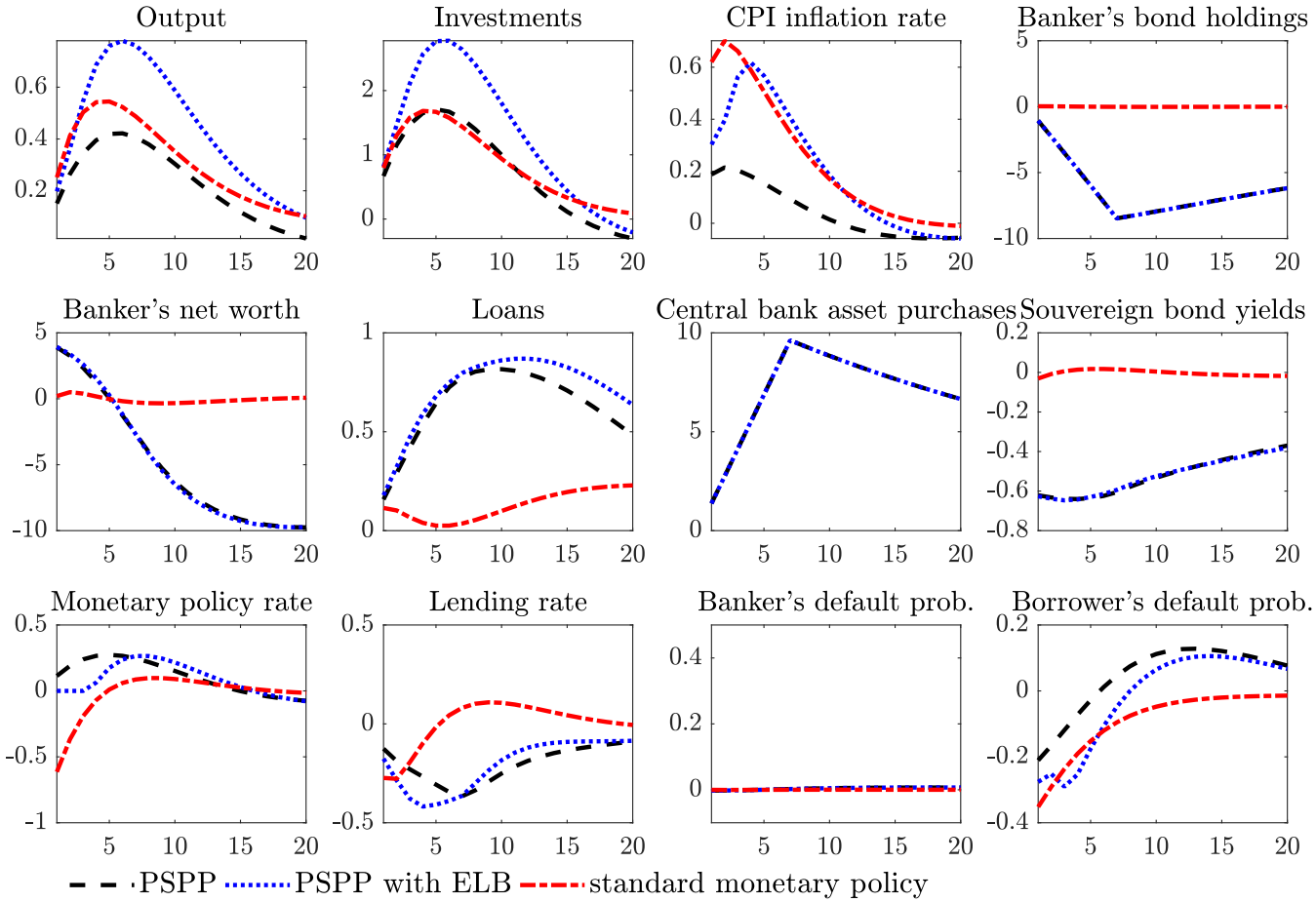
The ESRB proposes the following countercyclical rule:

$$\nu_{b,m,t} = \rho_{nu_b}\nu_{b,m} + (1 - \rho_{nu_b})\left(\phi_{\nu_b}(X_t - X) + \nu_{b,m,t-1}\right)$$

- where ϕ_{ν_b} stirs the countercyclical adjustment.
- X_t stands for the credit-to-annual GDP ratio $X_t = \frac{L_{BE,t}}{\sum_{j=0}^{3} Y_{t-j}}$.
- X denotes the steady state value, $X = \left(\frac{L_{BE}}{4 * Y}\right)$.

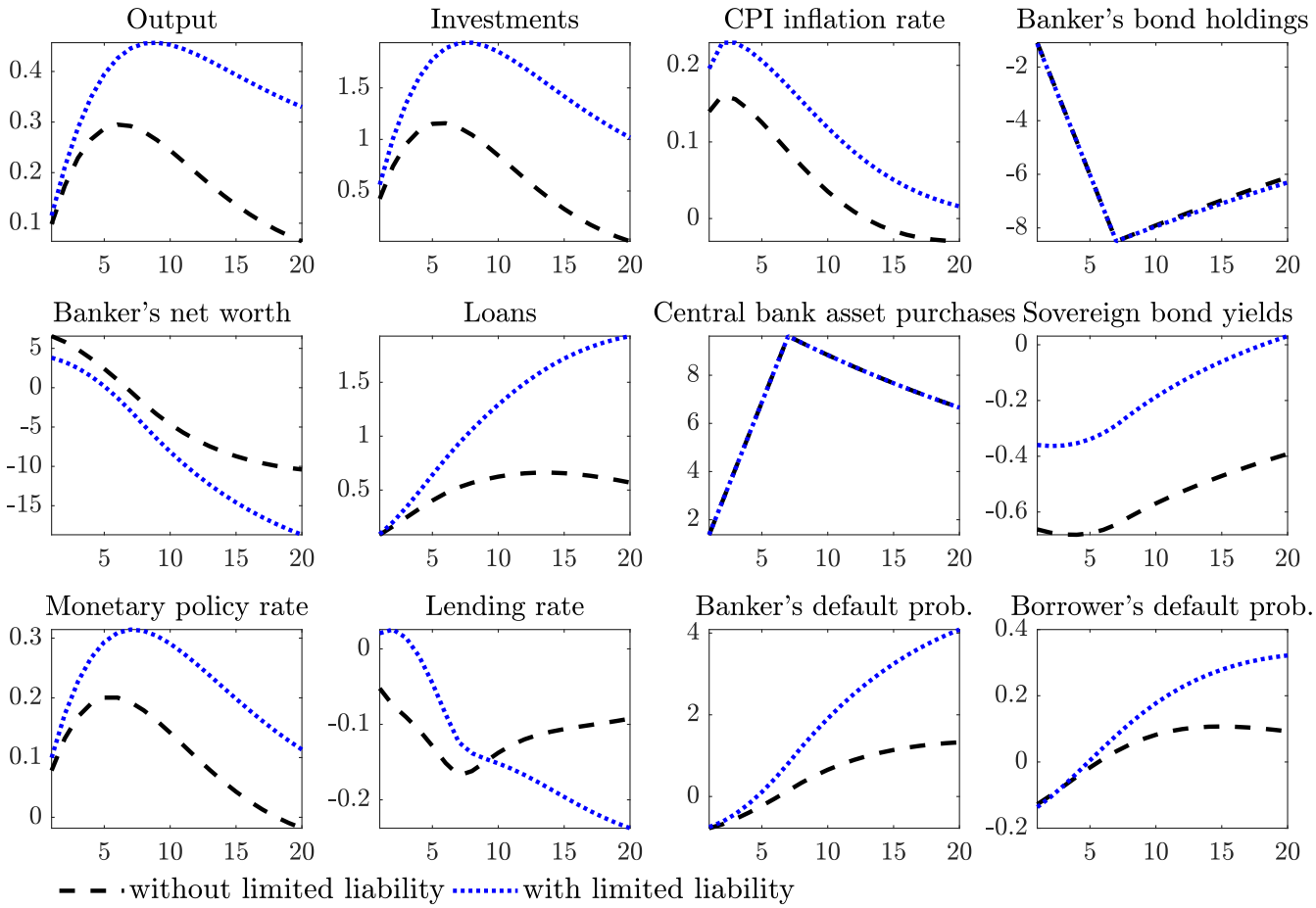
Outline

Standard and non-standard monetary policies



Standard and non-standard monetary transmission channels impact the balance sheet composition of intermediaries differently

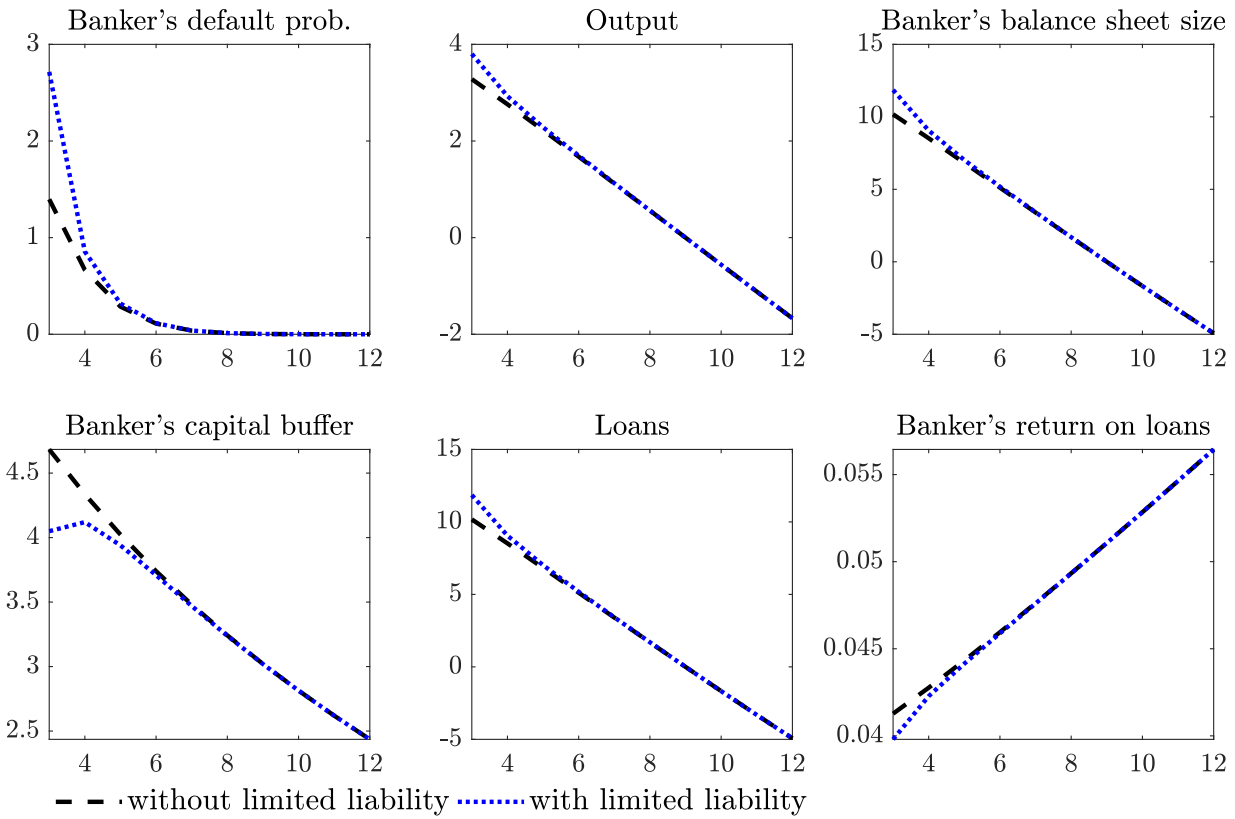
PSPP and Limited liability distortion



Risk-taking motives caused by limited liability of banks reinforce the transmission of central bank asset purchases, however at a cost of higher bank default probability.

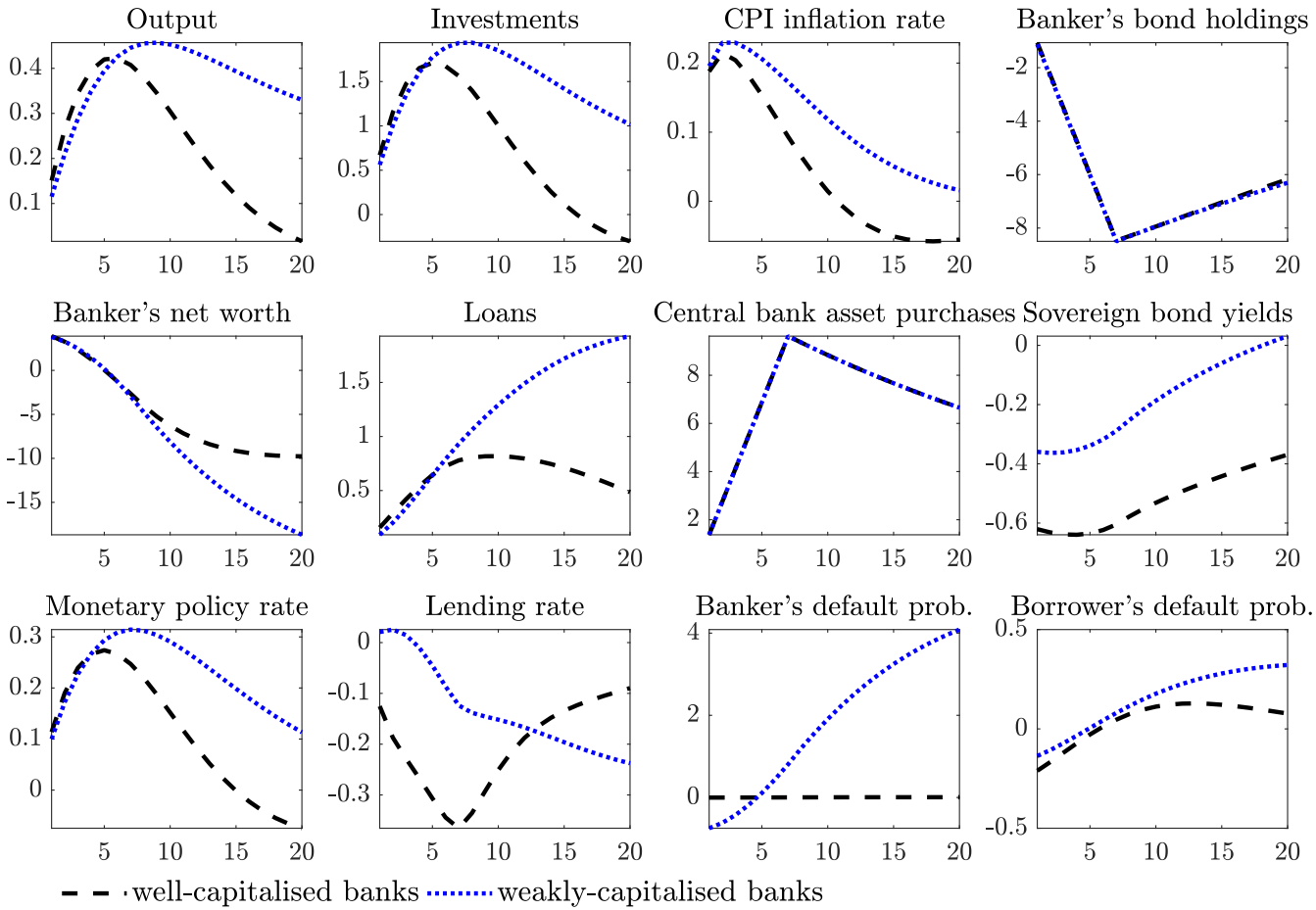
Limited liability and steady state capitalisation

Steady state allocation as a function of minimum regulatory requirement



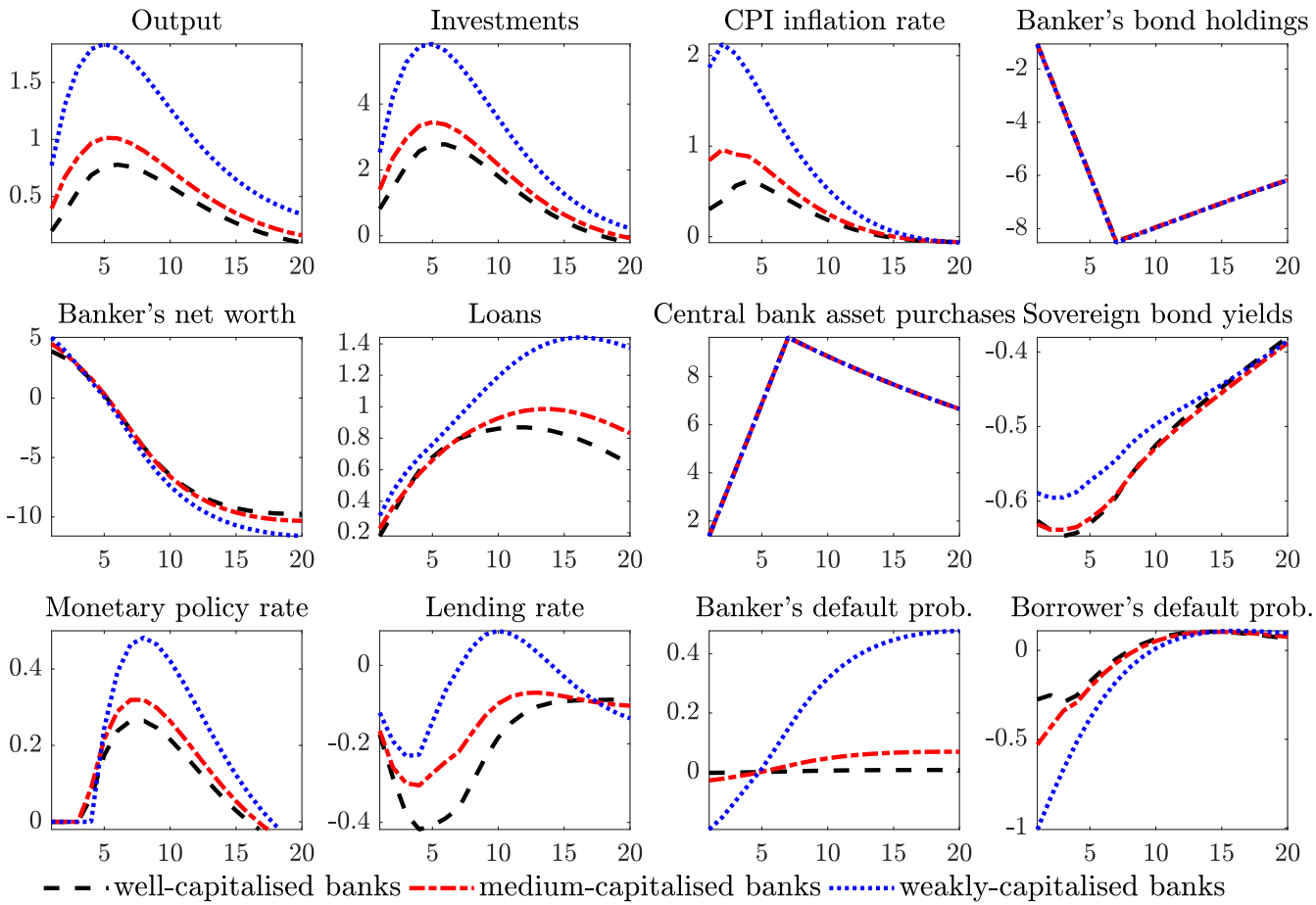
Bankers with limited liability and low capitalisation are more likely to default.

PSPP and Regulatory requirements



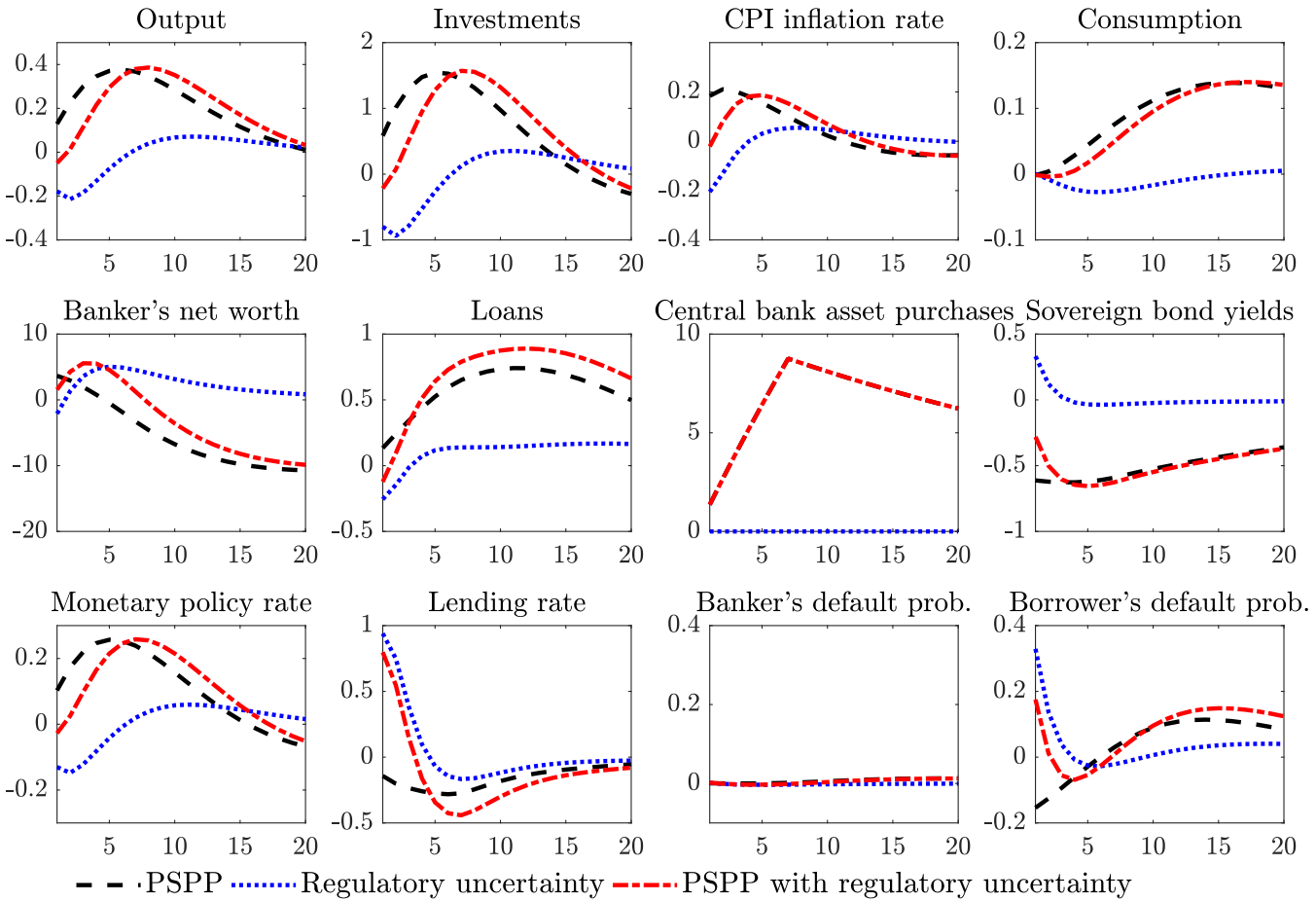
Sufficient bank capital provision through higher capital requirements can curtail excess credit and deter excessive risk shifting by banks.

PSPP and Regulatory requirements at the ELB



When monetary policy is constrained, the impact of non-standard monetary policy is more pronounced for weakly-capitalised banks.

PSPP and supervisory uncertainty

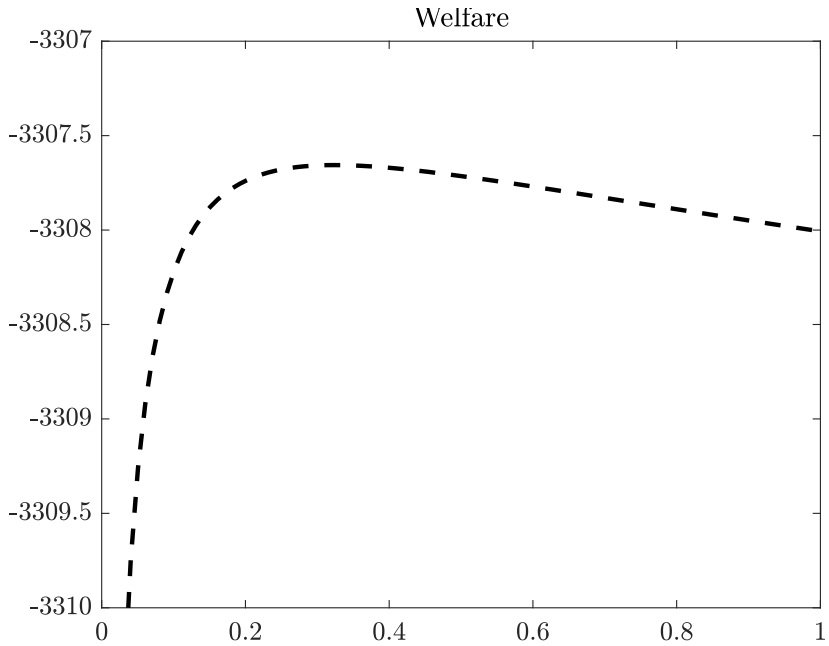


Increased uncertainty about the supervisory framework delays the transmission of asset purchases. This holds both for well- and weakly-capitalized banks.

Optimised Macroprudential rule

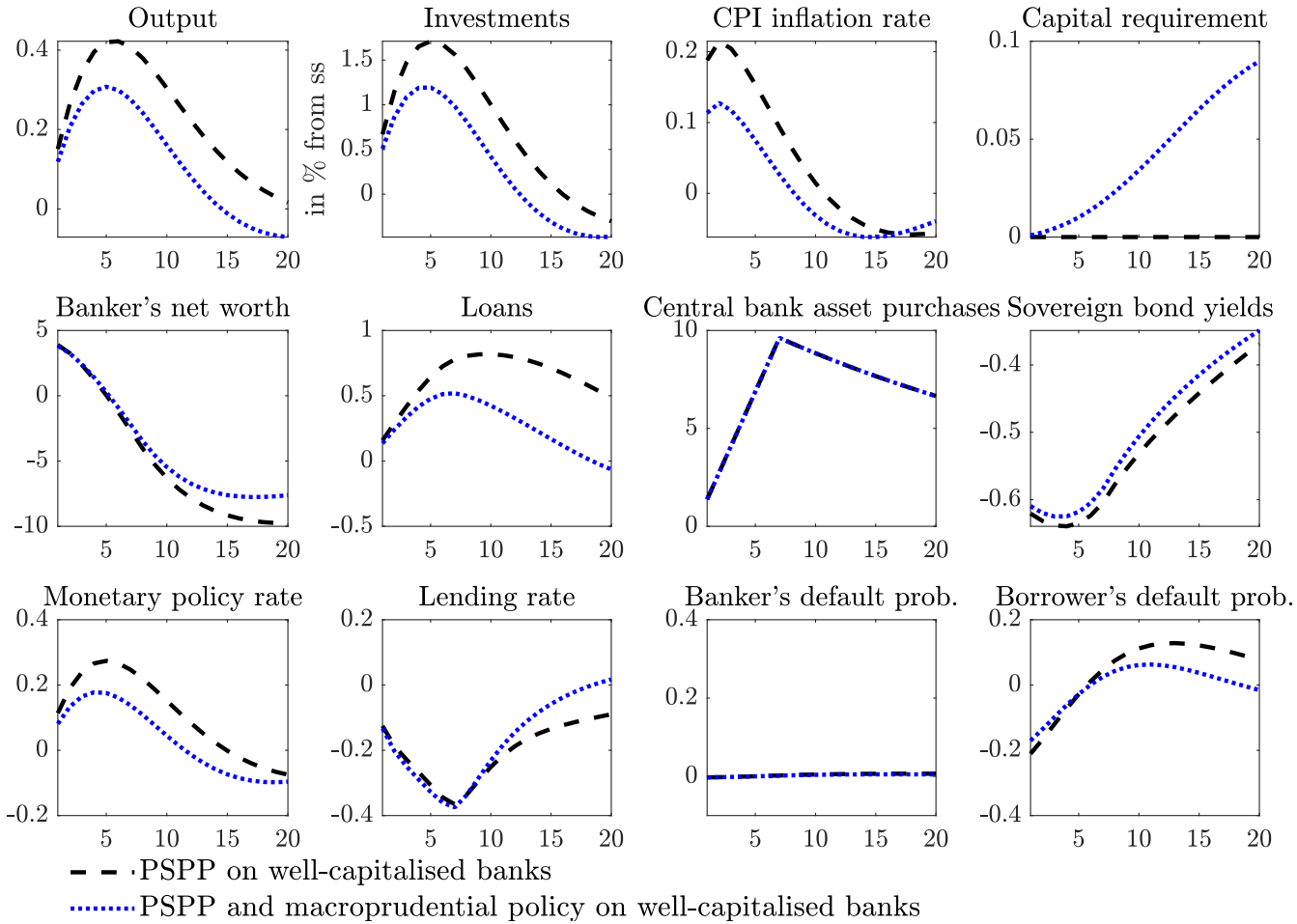
The reaction parameter ϕ_{ν_b} is chosen such that it maximizes household's life-time utility:

$$\mathcal{W}_t = \epsilon_t^b \mathcal{U}_t + \mathbb{E}_t \left(\beta \gamma^{1-\sigma}\right) \mathcal{W}_{t+1}.$$



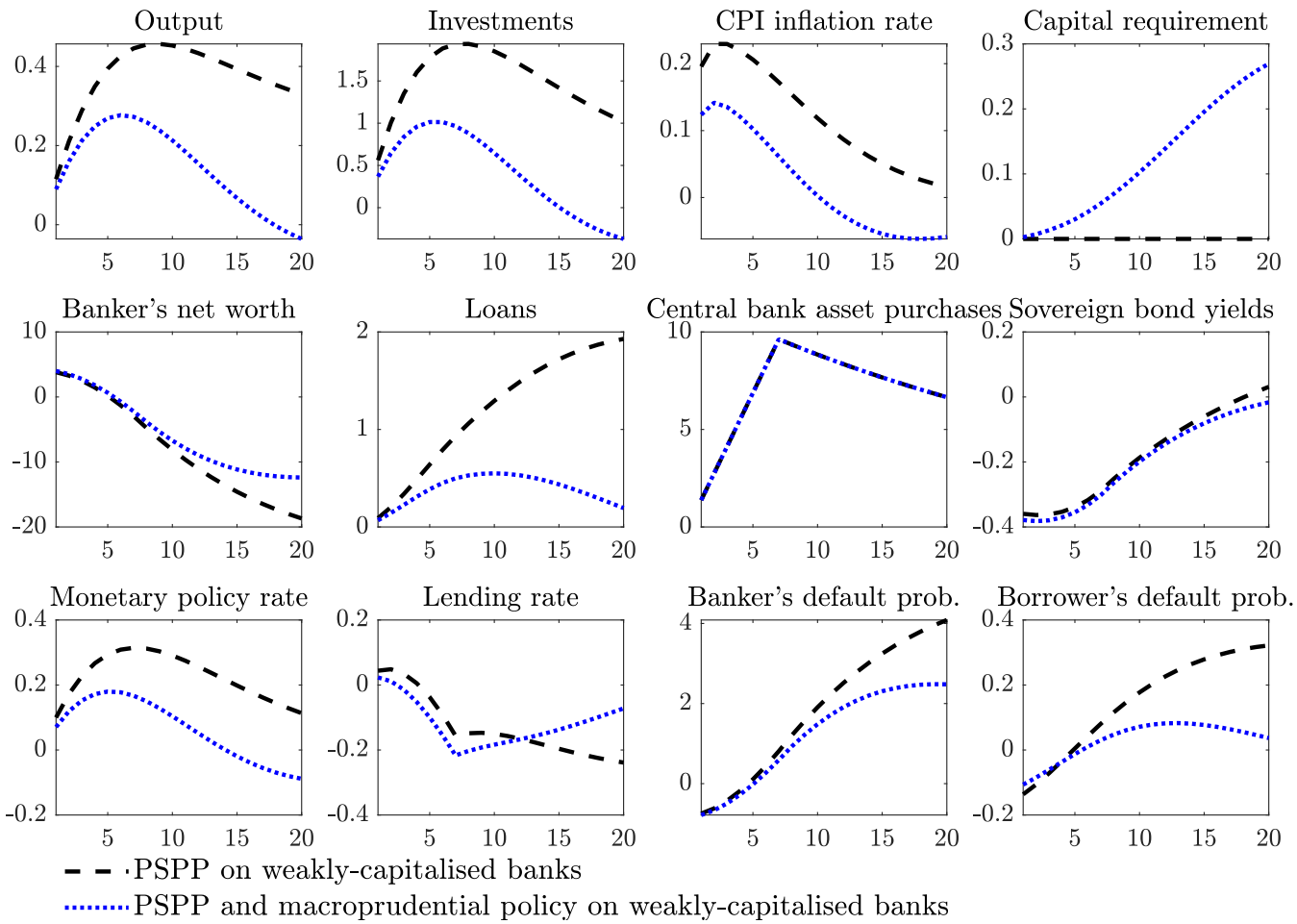
Horizontal axis: value of the reaction parameter Φ_{ν_b}

PSPP and MaPru rule for well-capitalized banks



Macroprudential regulation dampens the transmission of non-standard monetary policy without financial stability benefits.

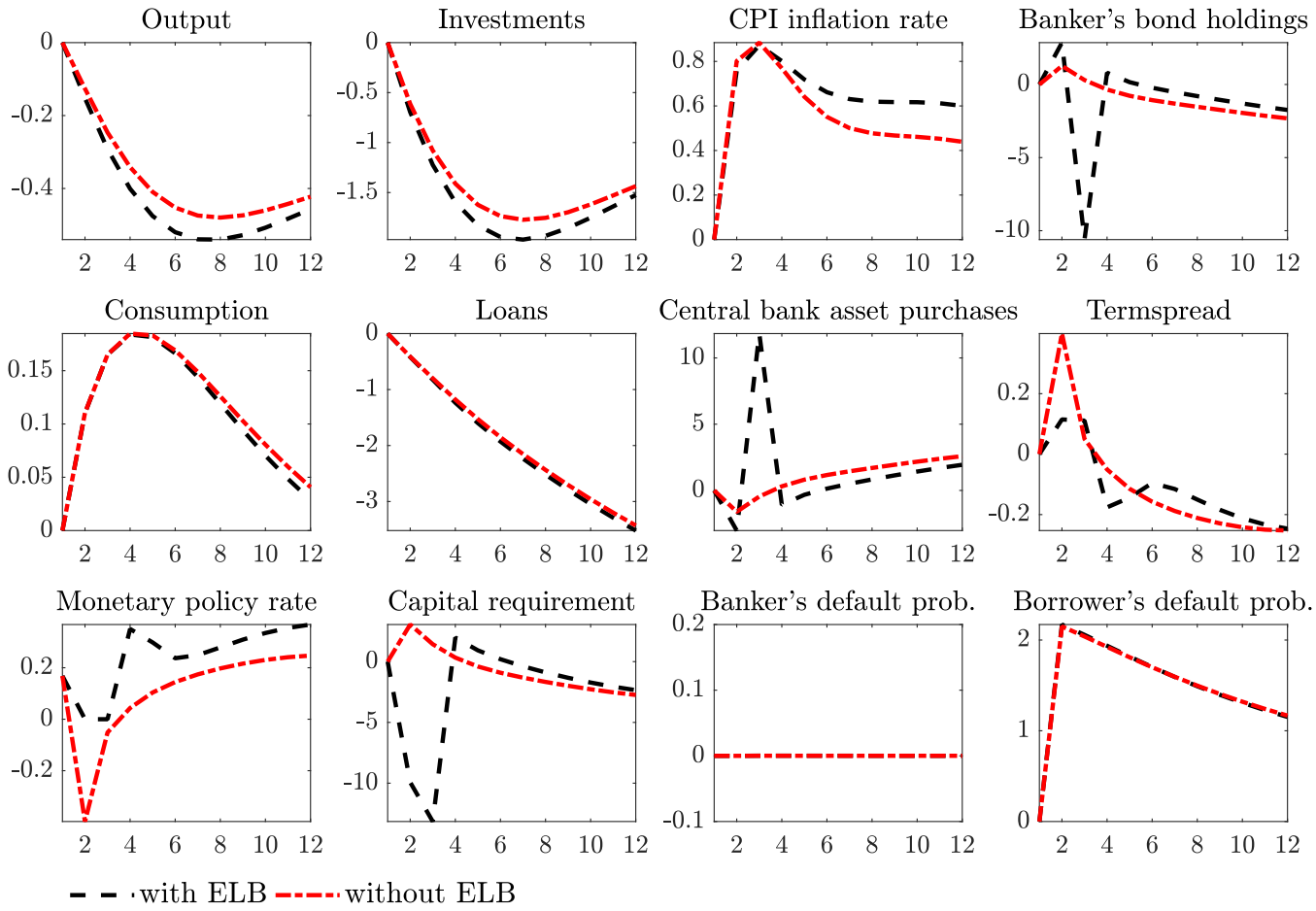
PSPP and MaPru rule for weakly-capitalized banks



Macroprudential regulation prevents excessive risk-taking if banks are weakly-capitalized.

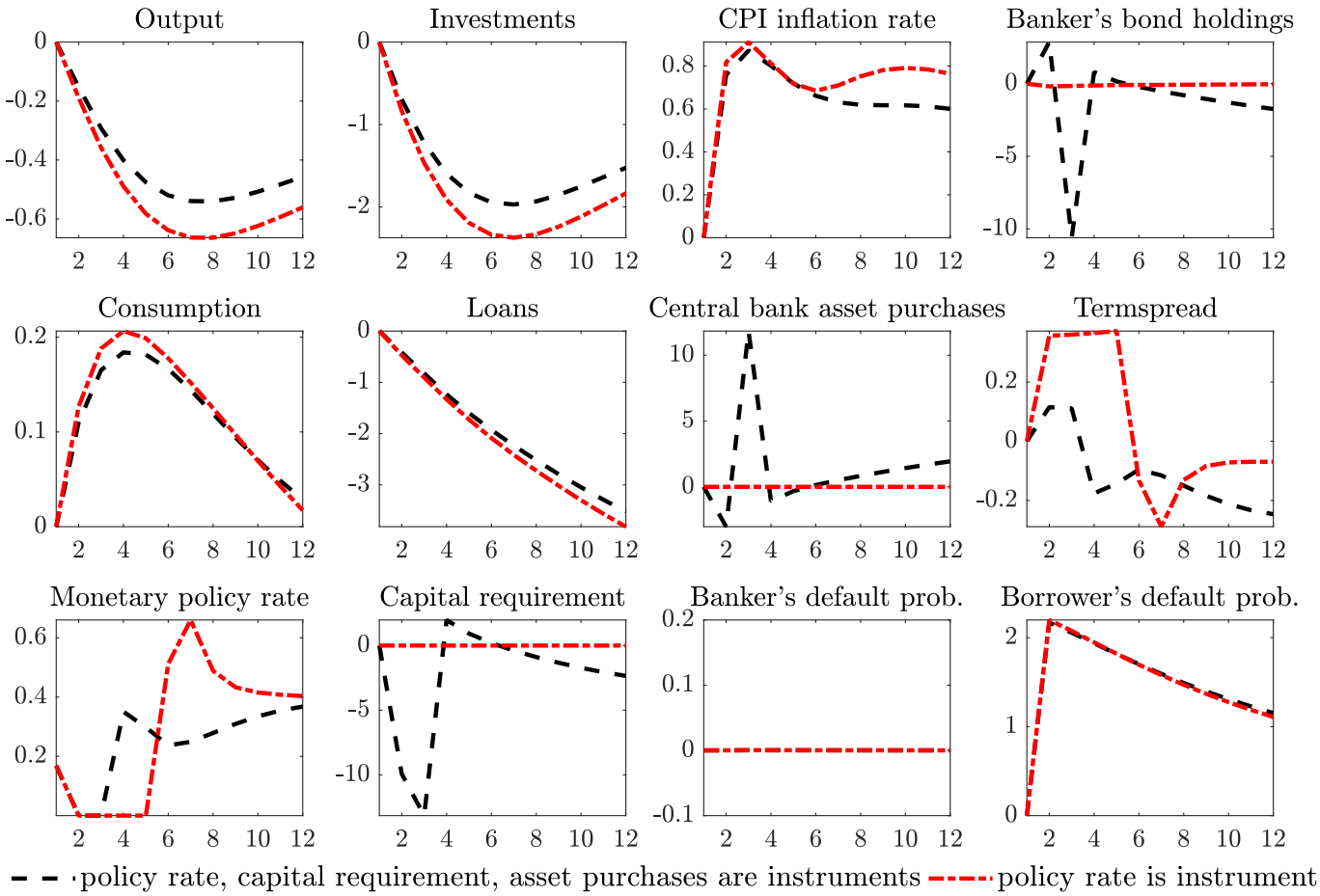
Outline

Ramsey optimal policy at the ELB



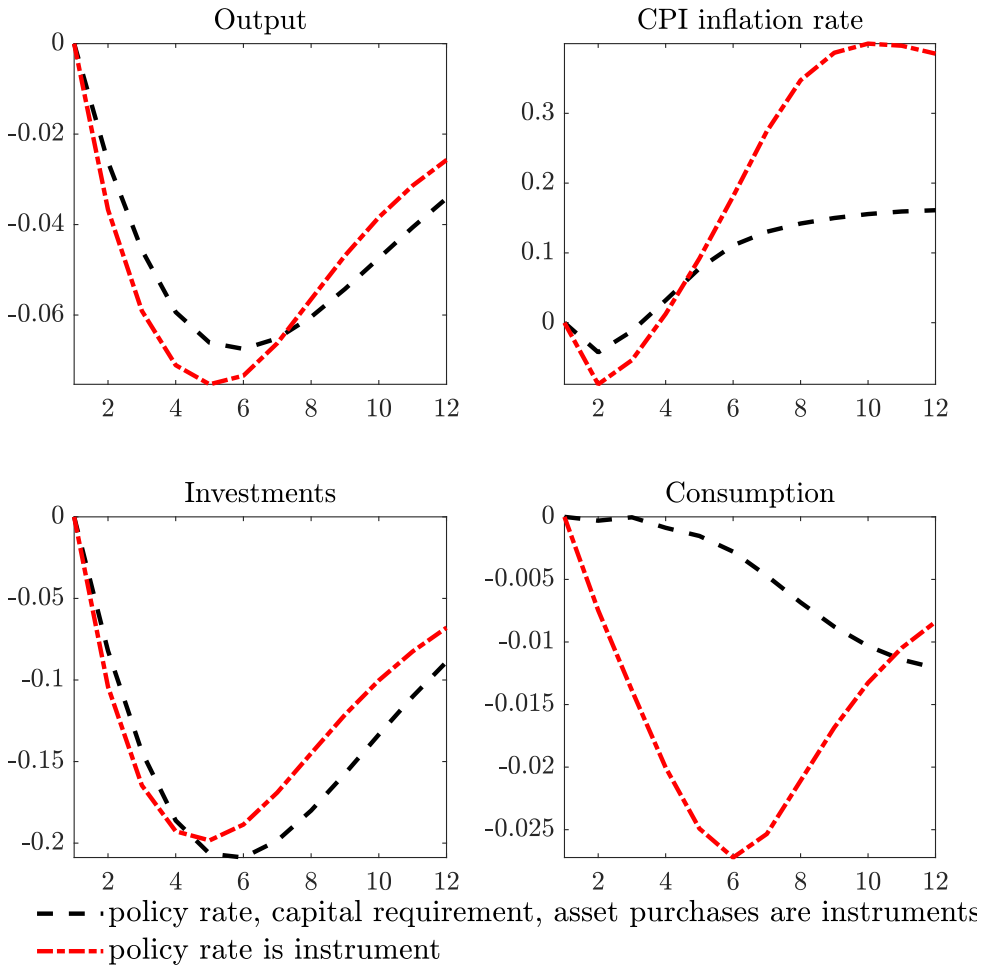
The Ramsey policy maker sets the policy rate, asset purchases and bank capital requirements. Policies on asset purchases and bank capital compensate the ineffective policy rate at the ELB.

Ramsey policy at the ELB single vs. multiple policies



Policies on asset purchases and bank capital support a earlier lift-off from the ELB relative to the situation where the policy rule is the single-instrument.

Ramsey optimal policy and costs of the ELB



Multiple policy instruments dampen the output and consumption costs accrued through the ELB.

Outline

Key messages

- Weakly capitalised banks display excessive risk-taking which reinforces the credit easing channel of central bank asset purchases, at the cost of higher bank default probability and lasting financial stability risks.
- Sufficient bank capital provision through higher capital requirements can curtail excess credit and deter excessive risk shifting by banks.
- Uncertainty about the supervisory oversight would provide a precautionary motive for banks to build extra capital buffer which might run against the non-standard monetary policy.
- With a well-capitalised banking system, macroprudential policy should look through the effects of central bank asset purchases on bank capital position as the costs in terms of macroeconomic stabilisation seem to outweigh the marginal financial stability benefits.
- In a weakly-capitalised banking system, a countercyclical macroprudential policy in conjunction with central bank asset purchases can mitigate banks risk-taking and dampen the excessive persistence of the non-standard monetary policy impulse on the real economy.

Thank you for your attention!

Outline

Banks' operating profits, limited liability and net worth

Banks' operating profits are defined as:

$$OP^{b}_{t+1}\left(\omega_{b,t+1}\right) \equiv \omega_{b,t+1} R_{BLE,t} L_{BE,t} + R_{G,t+1} Q_{B,t} B_{B,t} - \varrho_t NW_{B,t} - R_{D,t} D_{B,t}$$

where $\omega_{b,t+1}$ refers to the idiosyncratic shock and ϱ_t stands for portfolio adjustment costs of government bonds.

Banks face **limited liability** due to a deposit insurance agency, which produces deadweight losses for the economy of $\Omega_{b,t}$.

$$\Omega_{b,t} \equiv \left[\overline{\omega}_{b,t} - \Gamma_b\left(\overline{\omega}_{b,t}\right) + \mu_b \int_0^{\overline{\omega}_{b,t+1}} \omega \mathrm{d}F_b\left(\omega\right)\right] R_{BLE,t} L_{BE,t}.$$

Accordingly, the goods market clearing condition is:

$$Y_t = C_t + I_t + G^{\star}\varepsilon^{g}_{t} + \Psi\left(u_t\right) K_{t-1} / \gamma + \Omega_{e,t} + \Omega_{b,t}$$

Outline

Outline

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