System-wide Dividend Restrictions: Evidence and Theory

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Overview

1. Motivation and main contributions
2. Empirical study
3. General equilibrium analysis
4. Conclusions

Overview

1. **Motivation and main contributions**
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Motivation

- **March 2020:** ECB SSM Recommendation and many other central banks and international organizations making similar recommendations (BoE, BIS, IMF, Eurogroup, etc)
  - Objective: "to ensure that banks can continue to fulfil their role to fund households and corporations amid the COVID 19 crisis"

- Rationale: Sustain lending without inducing certain stigma effects

  Gambacorta, Oliviero and Shin (2020)

- Main critiques
  - Negative impact on bank valuations
  - Negative impact on dividends
  - Negligible/non-existent impact on bank lending
  - Requires international coordination

✓ *Future studies further supporting the issues related with the design of Basel III and the effectiveness of SWDR may favour such reform at the international level*

Motivation (Cont'd I)

- Why were central banks "forced" to adopt this measure?

Dividend's trilemma in the (euro area) banking sector

- **Pronounced dividend smoothing in the banking sector** (Acharya et al. 2009; Muñoz 2021)
  - *Banks meet capital requirements via deleveraging in bad times*
  - *Adjustments borne by retained earnings: i.e., bank lending volatility*
- **Effective use of capital buffers** (in bad times)
  - *Berrospide et al. 2021; ECB (FSR) 2021; IMF GFSR Apr 2021; Abad and García Pascual (2022).*
- **MDA** (i.e., microprudential dividend restriction)
  - *Goodhart et al. (2010) and Acharya, Le and Shin (2017)*

- COVID-19 Recommendation vs Dynamic Dividend Recommendation?

Motivation (Cont'd II)

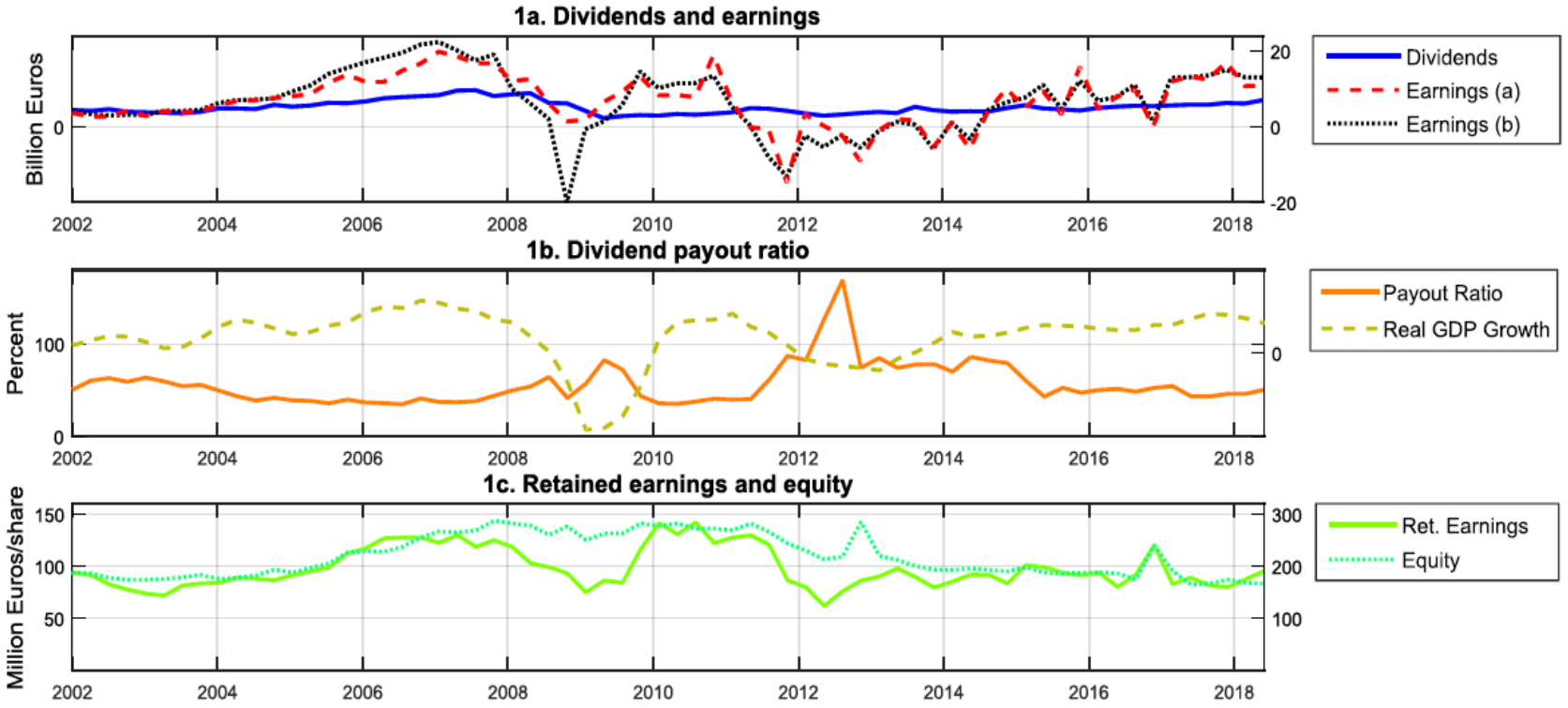
- **2018:** Publication of the first paper formally proposing and studying SWDRs for banks:

M. A. Muñoz, 2021. "**Rethinking Capital Regulation: The Case for a Dividend Prudential Target**," International Journal of Central Banking, 17(3), 271-336.

  - Evidence on patterns of bank dividends in the euro area
  - Develop euro area quantitative DSGE model to study:
    - *Transmission and effectiveness of SWDRs*
    - *Effects of optimal SWDRs*
      - *Operate through the entire cycle*
      - *Induce significant welfare gains by stabilizing retained earnings and lending*
        - ***Welfare benefits (credit smoothing) > welfare costs (dividend volatility)***
      - ***Do not affect long run dividends (i.e., cyclical compensation)***

Motivation (Cont'd III)

Figure 1: Bank dividends and earnings in the euro area (SX7E). 2002:I - 2018:II



Sources: Muñoz (2021)

Main Contributions

- Empirical evidence on aggregate effects of (ECB) dividend recommendation (bank-level and loan-level data) on:
  - Bank lending, valuations and (actual & expected) dividends
  - Directly relates to the main costs and benefits of SWDRs
- Propose a quantitative DSGE model and analysis that:
  - Allows to study the macro and welfare effects of different types of system-wide bank dividend regulation/recommendations
  - Compares: COVID-19 recommendation vs dynamic dividend recommendation

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Empirical evidence

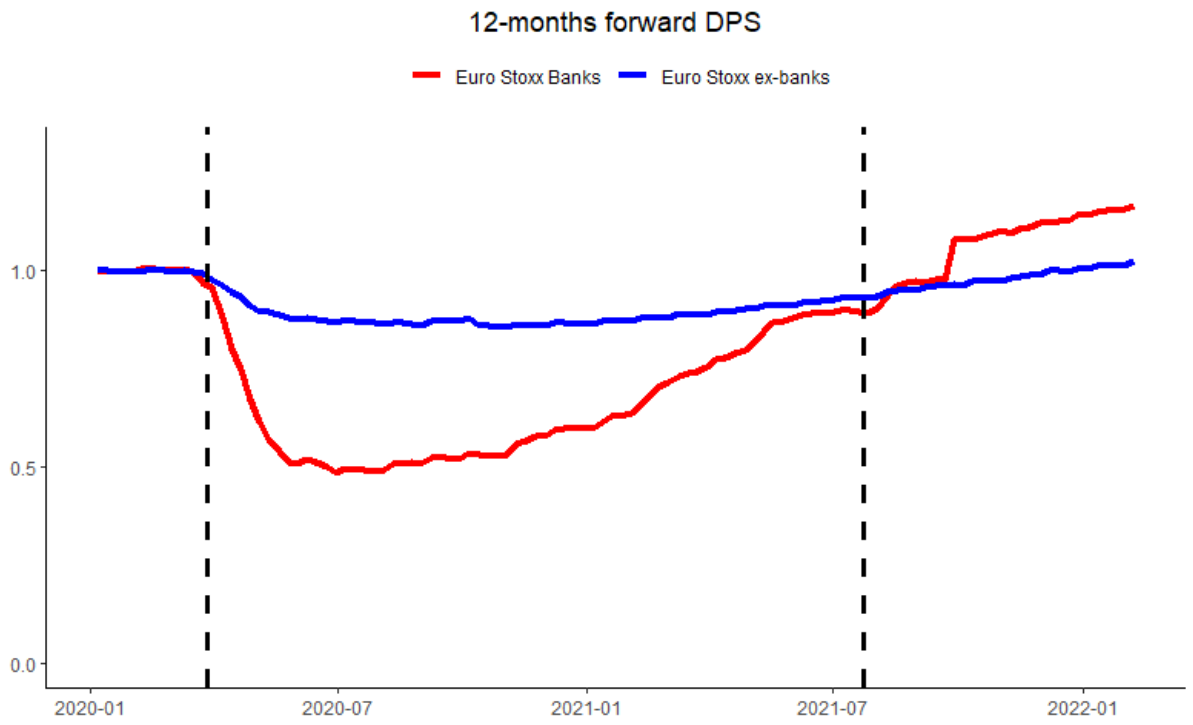
- Impact on future dividends
  - Do banks “compensate” once the restriction is lifted?

- Impact on bank equity values
  - Theory: change in stream of future dividends and change in risk premium
  - MP bulletin 06/21: bank share prices fall by 7% with respect to NFCs

- Impact on lending
  - Theory: part of the rationale for the measure
  - Martínez-Miera and Vegas (2020), MP bulletin 06/21

Impact on future dividends

- Rebound in bank dividends after a period of restricted distribution



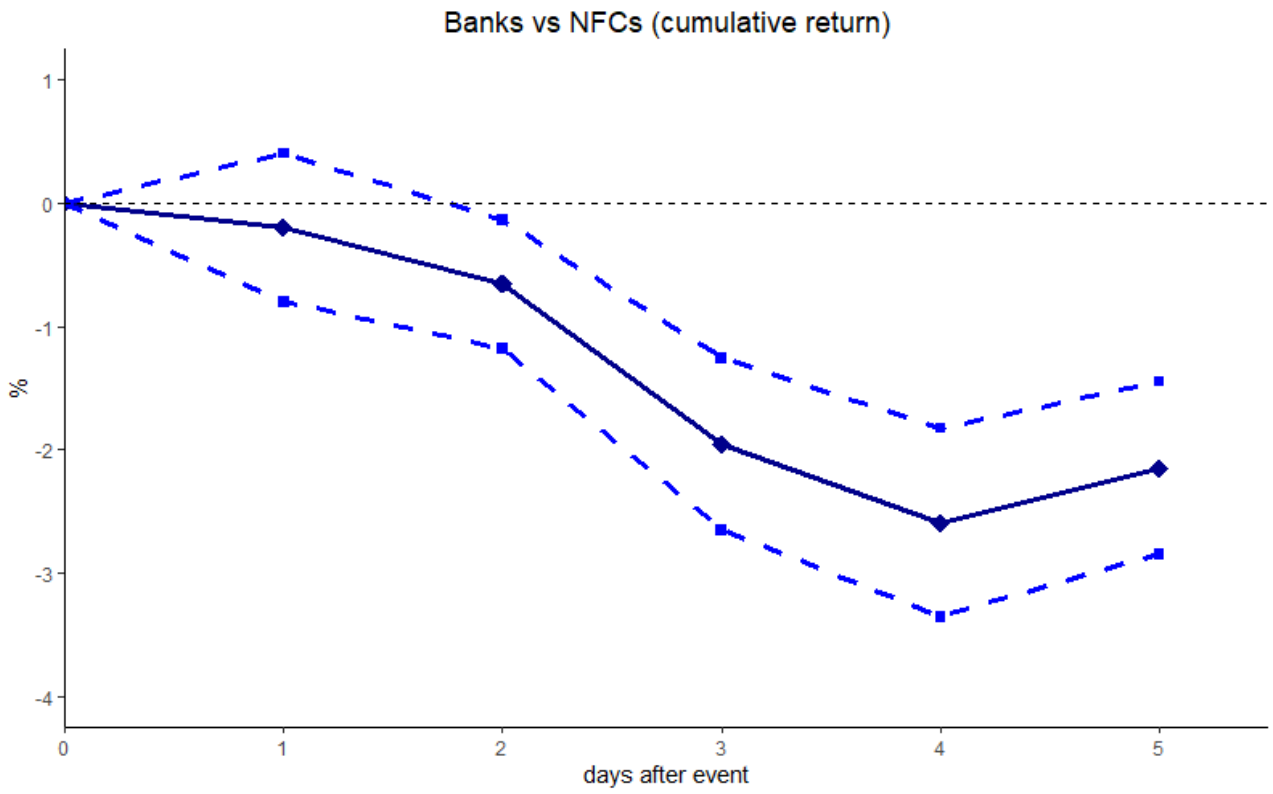
Impact on bank equity values

- Diff-in-diff using announcement dates of restriction (27/03/20) and lift-off (23/07/21)
  - Lift-off not unexpected and thus partially incorporated in prices
- Control group is NFCs
- Extend window up to 5 days (unusual announcement)

$$R_{it} = \alpha + \beta_0 Bank_i + \beta_1 Post_t + \beta_2 Bank_i * Post_t + \mu_i + \vartheta_t + \varepsilon_{it}$$

Impact on bank equity values

- Negative effect on stock prices of around 2-3%.



Impact on lending

- Diff-in-diff identification (some banks had already approved distribution).
- Use Anacredit to control for demand effects.
- Robustness: controls and fixed effects.

$$\Delta lending_{bft} = \alpha + \beta_0 Treated_b + \beta_1 Post_t + \beta_2 Treated * Post_{bt} + \beta_3 X_{bt-1} + \mu_b + \vartheta_{ft} + \varepsilon_{bft}$$

Impact on bank lending

Dependent variable: Growth rate of loans	(1)	(2)	(3)	(4)
Treated*post	0.0582*	0.0486**	0.0376	0.0523***
	(0.0311)	(0.018)	(0.0229)	(0.0158)
Treated	-0.0130		-0.0392***	
	(0.0302)		(0.0107)	
Post	-0.3778***	0.027**		
	(0.0118)	(0.0114)		
Constant	0.6743***	0.3250***	0.2138	0.5574***
	(0.0271)	(0.1035)	(0.0084)	(0.1588)
Bank controls	NO	YES	YES	YES
Bank FE	NO	YES	NO	YES
Firm-time FE	NO	NO	YES	YES
Observations	19,566,008	16,575,211	5,516,661	5,516,661
Number of banks	86	86	86	86
Number of firms	2,339,109	2,171,884	367,813	367,813
R-squared	0.025	0.030	0.482	0.486

Notes: Dependent variable is the quarterly growth rate in loans. Treated banks are those which reduced their dividend payment following the ECB recommendation. Bank controls include total assets, total equity and total deposits, all lagged by one quarter. Standard errors clustered at the bank level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Impact on bank lending: timing of effects

Dependent variable: Growth rate of loans	(1)	(2)
Treated	-0.0384***	
	(0.0102)	
Treated*post*2020Q2	0.1140**	0.0953**
	(0.0440)	(0.0389)
Treated*post*2020Q3	0.0336	0.0210
	(0.0219)	(0.0231)
Treated*post*2020Q4	-0.0023	0.0024
	(0.0382)	(0.0258)
Constant	0.2135***	0.4794***
	(0.0086)	(0.1409)
Bank controls	YES	YES
Bank FE	NO	YES
Firm-time FE	YES	YES
Observations	5,516,661	5,516,661
Number of banks	86	86
Number of firms	367,813	367,813
R-squared	0.482	0.486

Notes: Dependent variable is the quarterly growth rate in loans. Treated banks are those which reduced their dividend payment following the ECB recommendation. Bank controls include total assets, total equity and total deposits, all lagged by one quarter. Standard errors clustered at the bank level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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DSGE Analysis: What´s New?

- Muñoz (2021)
  - One contribution: Modeling proposal allows to replicate patterns of bank dividends
  - Caveat: Specification of bank and firms' objective function

This paper extends and improves analysis in Muñoz (2021) along various dimensions:

- **The model:** Objective function of firms (NFCs) and banks
  - Improved specification
  - Allows for calibration and welfare analysis with simplified model

- **Quantitative analysis**
  - Study of COVID-19 type of dividend recommendations (Occbin)
  - Comparison between COVID-19 recommendation and optimal recommendation
  - Welfare analysis: Degree of countercyclical responsiveness and **degree of enforcement**

The Environment

- Real, closed, time-discrete, decentralized economy.

- **Households**

- **Firms (NFCs)**
  - Housing collateral constraint (Iacoviello, 2005)

- **Banks**
  - Intermediate between savers and borrowers (deposits – loans)
  - Capital requirements
- Capital Goods Producers

- **Prudential authority**

Households

- The representative household seeks to maximize

$$E_0 \sum_{t=0}^{\infty} \beta_h^t \left[\frac{1}{1-\sigma_h} \left(C_{h,t} - \frac{N_{h,t}^{1+\phi}}{(1+\phi)} \right)^{1-\sigma_h} + \varepsilon_t^h j \log H_{h,t} \right]$$

- Subject to

$$C_{h,t} + D_t + q_t(H_{h,t} - H_{h,t-1}) = R_{h,t-1} D_{h,t-1} + W_t N_{h,t} + d_{e,t} + d_{b,t} + T(d_{b,t}, d_t^*)$$

- The representative bank manager seeks to maximize

$$E_0 \sum_{t=0}^{\infty} \left[(1-\omega)\, \Lambda_{t,t+1} d_{b,t} + \omega \beta_b^t \, \frac{1}{(1-\frac{1}{\sigma})} d_{b,t}^{(1-\frac{1}{\sigma})} \right]$$

- Subject to

$$B_{b,t} = E_{b,t} + D_{b,t},$$

$$D_{b,t} \leq \phi B_{b,t},$$

$$d_{b,t} + E_{b,t} - (1-\delta) E_{b,t-1} = r_{e,t} B_{b,t-1} - r_{h,t-1} D_{b,t-1} - T(d_{b,t}, d_t^*).$$

- Law of motion for bank equity

$$E_{b,t} = J_{b,t} - \; d_{b,t} + \; (1-\delta) E_{b,t-1},$$

$$J_{b,t} = \underbrace{\underbrace{(E_{b,t} - E_{b,t-1})}_{\text{reinvested profits}} + \underbrace{\delta^e E_{b,t-1}}_{\text{eroded equity}}}_{\text{retained earnings}} + \underbrace{d_{b,t}}_{\text{distributed earnings}}$$

Firms (NFCs)

- The representative entrepreneur seeks to maximize

$$E_0 \sum_{t=0}^{\infty} \left[(1-\omega)\, \Lambda_{t,t+1} d_{e,t} + \omega \beta_e^t \, \frac{1}{(1-\frac{1}{\sigma})} d_{e,t}^{(1-\frac{1}{\sigma})} \right]$$

- Subject to

$$d_{e,t} + R_{e,t} B_{e,t-1} + q_t^k \left[K_{e,t} - (1-\delta_t^k) K_{e,t-1} \right] + q_t (H_{e,t} - H_{e,t-1}) + W_t N_{e,t} = Y_t + B_{e,t},$$

$$Y_t = A_t (u_t K_{e,t-1})^{\alpha} H_{e,t-1}^{\eta} N_{e,t}^{(1-\alpha-\eta)},$$

$$B_{e,t} \leq m_{e,t} E_t \left(\frac{q_{t+1}}{R_{e,t+1}} H_{e,t} \right).$$

System-wide Dividend Restriction (or Recommendation)

- Modeling Device: Dividend Prudential Target (Muñoz 2021)

$$T(d_{b,t}, d_t^*) = \frac{\kappa}{2}(d_{b,t} - d_t^*)^2$$

- Scenarios
  - Baseline

$$\kappa > 0, \quad \forall\ t = 0, 1, 2, ...$$

  - COVID-19 Dividend Recommendation : Occasionally binding constraint (**New!!)**
    - *Regime A: Normal times*

$$\gamma_{y,t} \geq \overline{\gamma}_{y,t} \quad \rightarrow \quad d_t^* = d_{b,t} \quad \rightarrow \quad \kappa = 0$$

    - *Regime B: Covid-19*

$$\gamma_{y,t} < \overline{\gamma}_{y,t} \quad \rightarrow \quad d_t^* = \overline{d_b} \quad \rightarrow \quad \kappa > 0$$

  - Optimal Dividend Recommendation: Dynamic constraint

$$d_t^* = d_b^{ss} + \rho_\chi(\frac{x_t}{x^{ss}} - 1), \qquad \kappa > 0, \quad \forall\ t = 0, 1, 2, ...$$

Calibration: Parameter Values and Calibration Targets

Table 1: Baseline parameter values

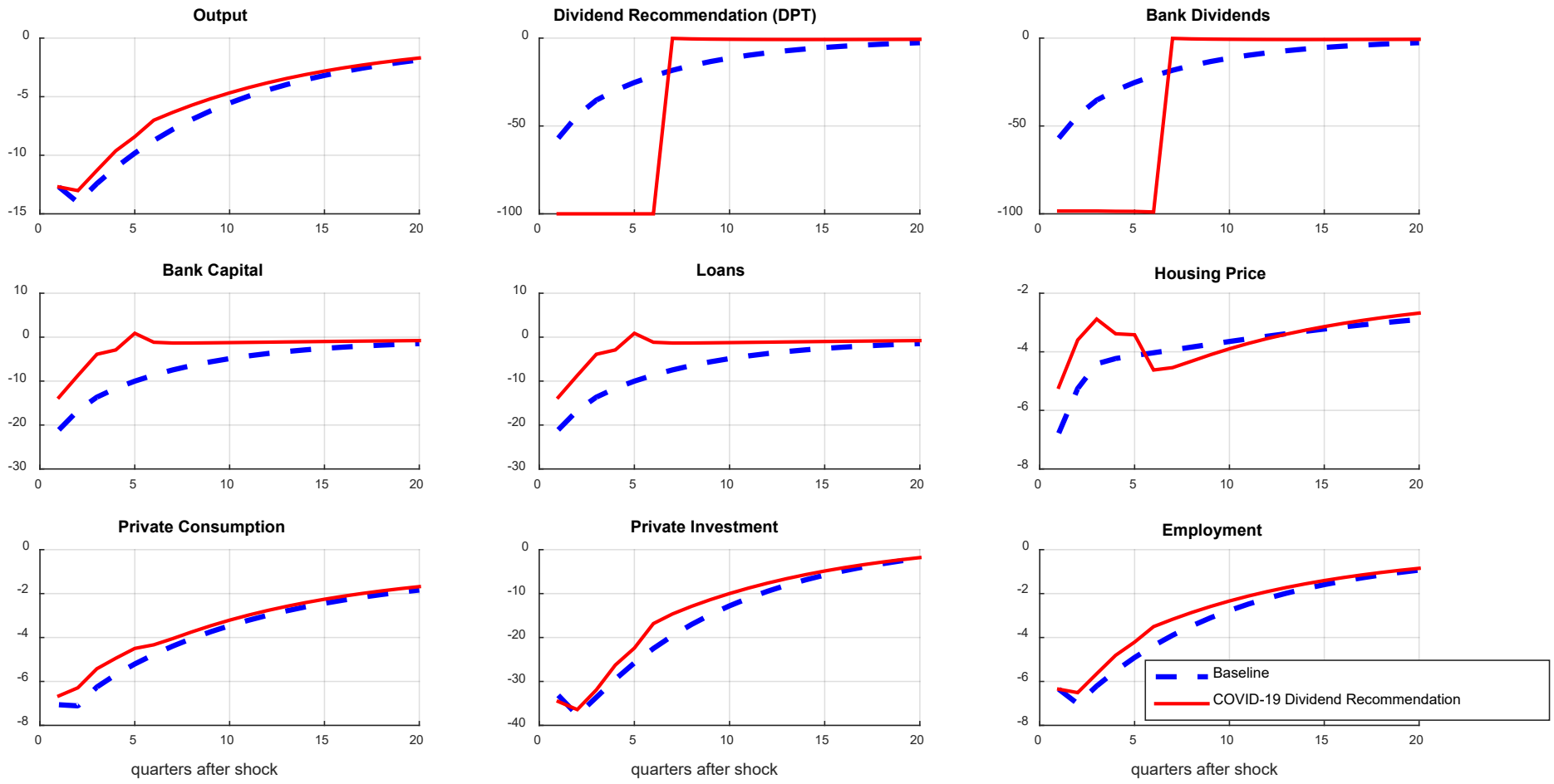
Parameter	Description	Value	Source/Calibration target
(A) Pre-set params			
φ	Inverse of the Frisch elasticity	1	Standard
σ_h	HH Risk aversion param	2	Standard
m_e	LTV ratio on housing collateral	0.8	Standard
$\delta_1^k; \delta_2^k$	Endogenous capital depr. rate params	$r_{k_e}^{ss}; 0.1 * r_{k_e}^{ss}$	Standard
ω	Manager´s weight in NFC & bank obj.	0.39	Wu (2018)
(B) First moments			
β_h	Households' discount factor	0.9943	$R_h^{ss} = (1.023)^{1/4}$
β_b	Bankers' discount factor	0.9345	$(r_b^{ss} - r_d^{ss})400 = 3.4$
β_e	Entrepreneurs' discount factor	0.9650	$B^{ss}/(Y^{ss}) = 3.8933$
j_p	Savers' housing weight	0.0481	$(q^{ss}H_h^{ss})/(4Y^{ss}) = 1.6128$
α	Capital share in production	0.3470	$I^{ss}/Y^{ss} = 0.2119$
δ^k	Depreciation rate of physical capital	0.0330	$C^{ss}/Y^{ss} = 0.7607$
η	Real estate share in production	0.0710	$(q^{ss}H^{ss})/(4Y^{ss}) = 2.802$
γ	Debt-to-assets, HH risk-adjusted	0.9295	$E_b^{ss}/B_b^{ss} = 0.105$
δ^e	Erosion rate of bank capital	0.0341	$d_b^{ss}/J_b^{ss} = 0.5625$
(C) Second moments			
ψ	Investment adj. cost param	0.092	$\sigma_I/\sigma_Y = 2.642$
σ	Banker EIS	3.200	$\sigma_{d_b}/\sigma_Y = 15.050$
σ_h	Std. housing pref. shock	0.1980	$\sigma_B/\sigma_Y = 6.473$
σ_{m_e}	Std. housing collateral shock	0.0148	$\sigma_C/\sigma_Y = 0.748$
σ_A	Std. productivity shock	0.0008	$\sigma_Y = 2.138$

Calibration: Model Fit

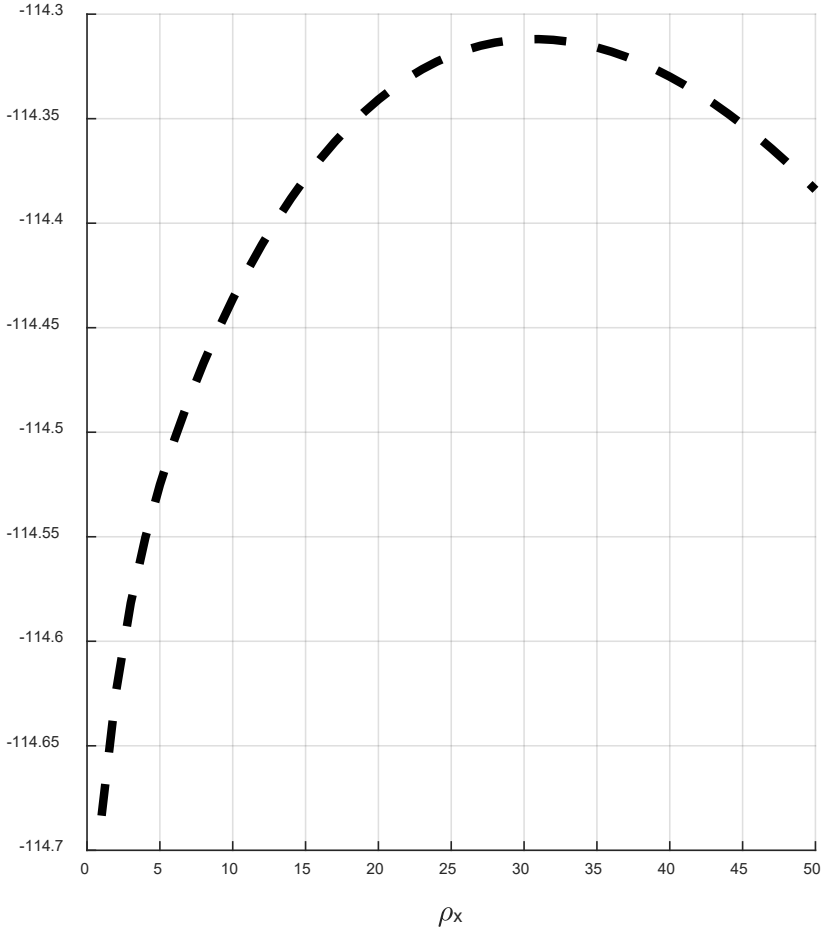
Table 2: Model fit

Variable	Description	Model	Data
(A) First moments			
C^{ss}/Y^{ss}	Total consumption-to-GDP ratio	0.7661	0.7607
I^{ss}/Y^{ss}	Gross fixed capital formation-to-GDP ratio	0.2200	0.2119
K_b^{ss}/B_b^{ss}	Regulatory bank capital ratio	0.1050	0.1050
$B_b^{ss}/(Y^{ss})$	Bank loans-to-GDP ratio	3.8615	3.8933
d_b^{ss}/J_b^{ss}	Bank dividend payout-ratio	0.5622	0.5625
$(q^{ss}H_h^{ss})/(4Y^{ss})$	Residential housing wealth-to-GDP ratio	1.6111	1.6128
$(q^{ss}H^{ss})/(4Y^{ss})$	Housing wealth-to-GDP ratio	2.8339	2.8018
$400 \times r_e^{ss}$	Annualized bank rate on loans (percent)	5.3237	5.6
$400 \times r_h^{ss}$	Annualized bank rate on deposits (percent)	2.2931	2.3
(B) Second moments			
$\sigma_{d_b} \ / \ \sigma_Y$	Std. bank dividends	15.0049	15.050
$\sigma_{E_b} \ / \ \sigma_Y$	Std. bank capital	6.3856	6.554
$\sigma_{B_b} \ / \ \sigma_Y$	Std. bank assets	6.3856	6.473
$\sigma_I \ / \ \sigma_Y$	Std. investment	2.4898	2.642
$\sigma_C \ / \ \sigma_Y$	Std. consumption	0.6362	0.748
σ_Y	(Std.GDP) x 100	2.1368	2.138

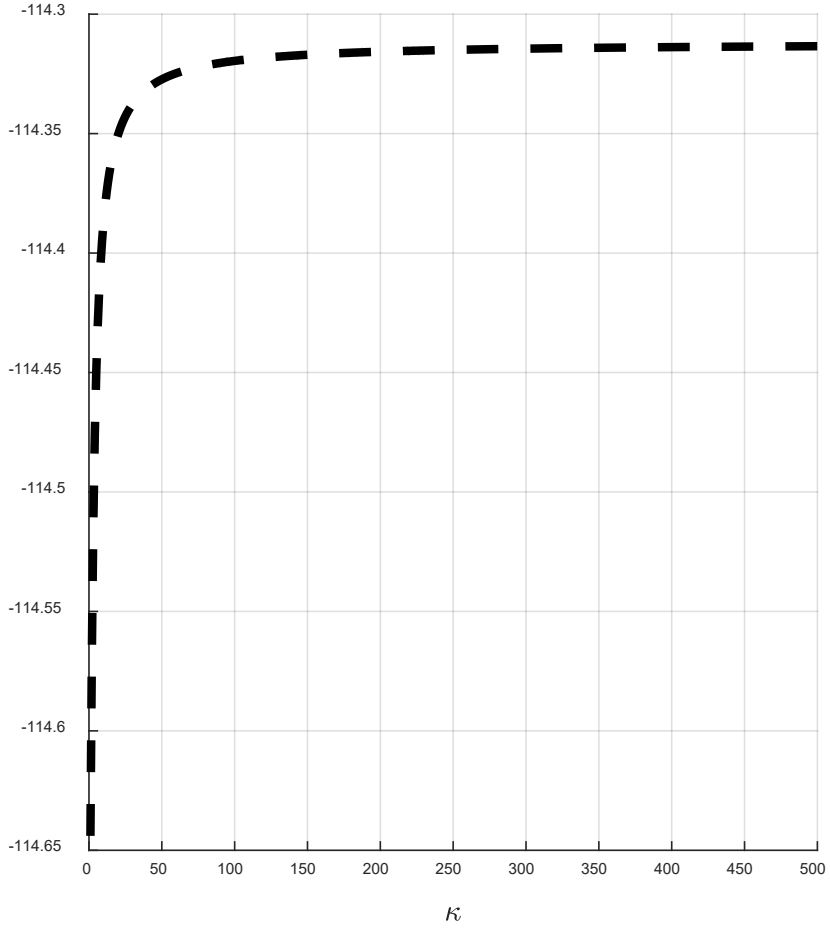
COVID-19: Supply Shock and Dividend Recommendation



Welfare: Countercyclical Responsiveness and Enforcement



Degree of Countercyclical Responsiveness



Degree of Enforcement

Welfare: Optimal Dividend Recommendation (DPT) and Welfare Gains

$$\arg\max_{\Theta} E_0 \sum_{t=0}^{\infty} \beta_h^t U\left(C_{h,t}, H_{h,t}, N_{h,t}\right)$$

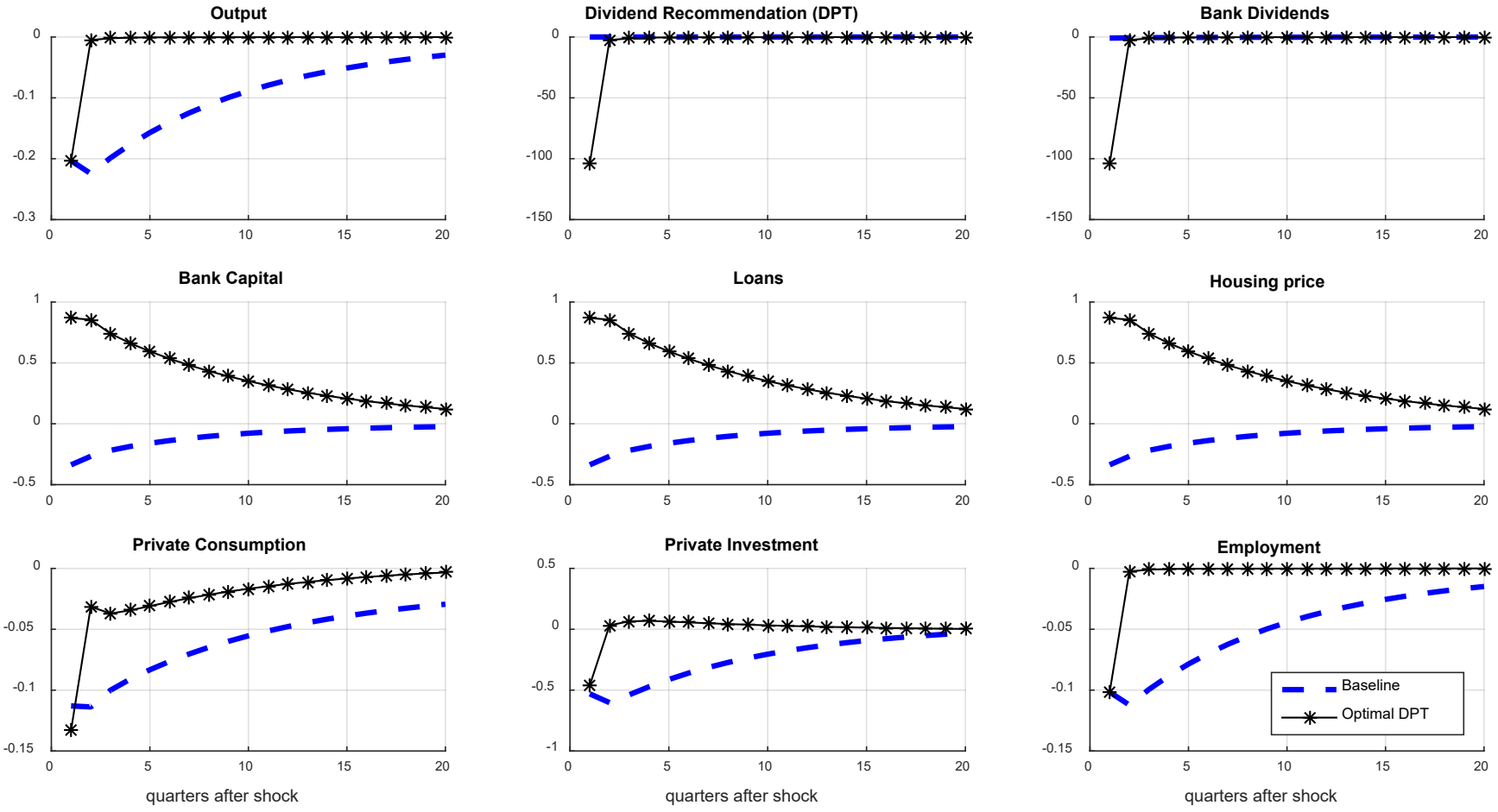
$$E_0 \sum_{t=0}^{\infty} \beta_h^t U\left(C_{h,t}^A, H_{h,t}^A, N_{h,t}^A\right) = E_0 \sum_{t=0}^{\infty} \beta_h^t U\left[(1+\lambda) C_{h,t}^B, H_{h,t}^B, N_{h,t}^B\right]$$

Table 3: Optimal dividend recommendation (DPT) and welfare gains

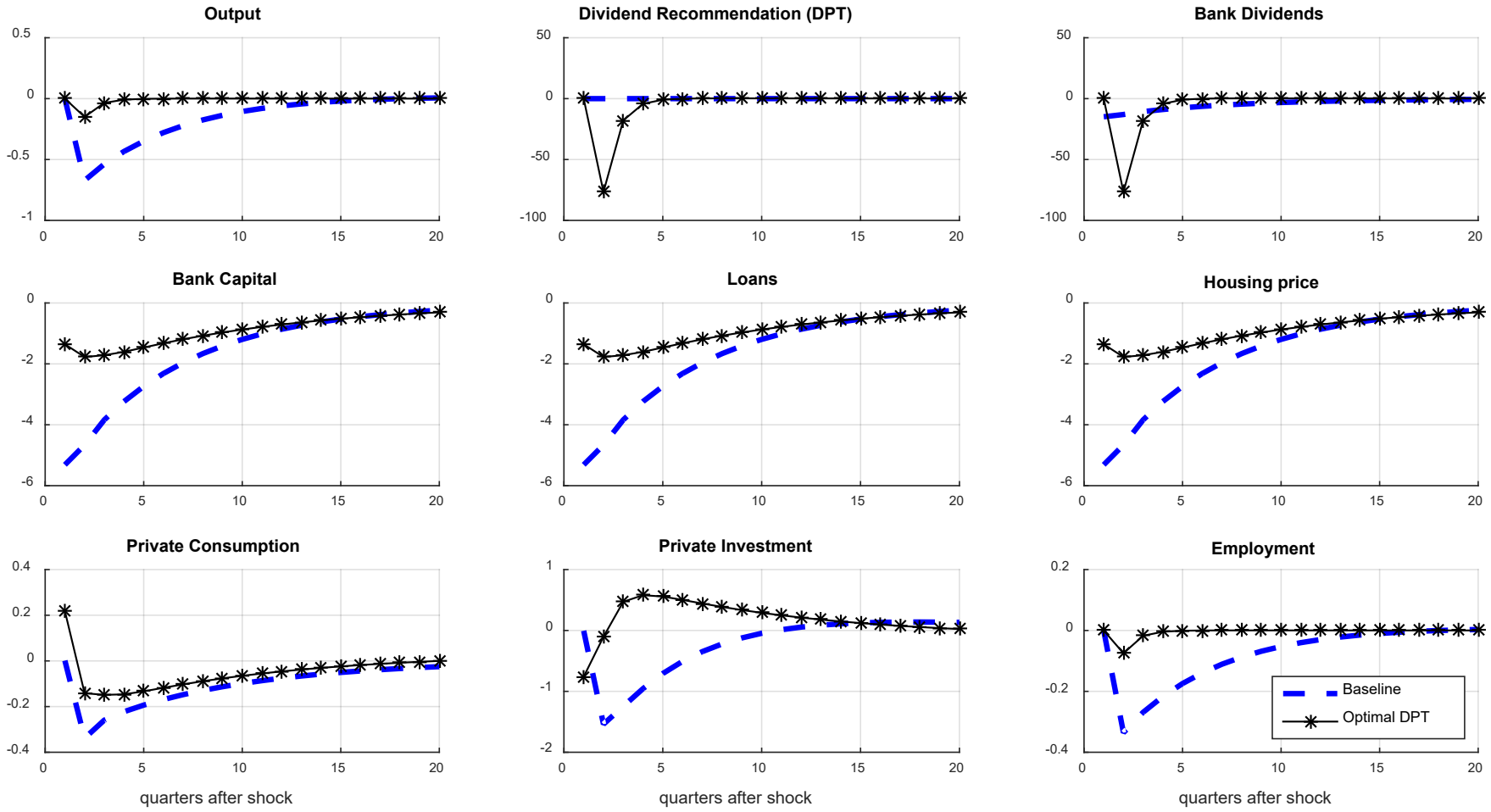
Optimal responsiveness	Optimal enforcement	Welfare gains
$\rho_x^* = 30.71$	$\kappa^* = 29805.95$	$\lambda^* = 0.31$

Note: Second-order approximation to the welfare gains associated to the optimal dividend recommendation (DPT) and the corresponding optimized policy parameters. Welfare gains are expressed in percentage permanent consumption.

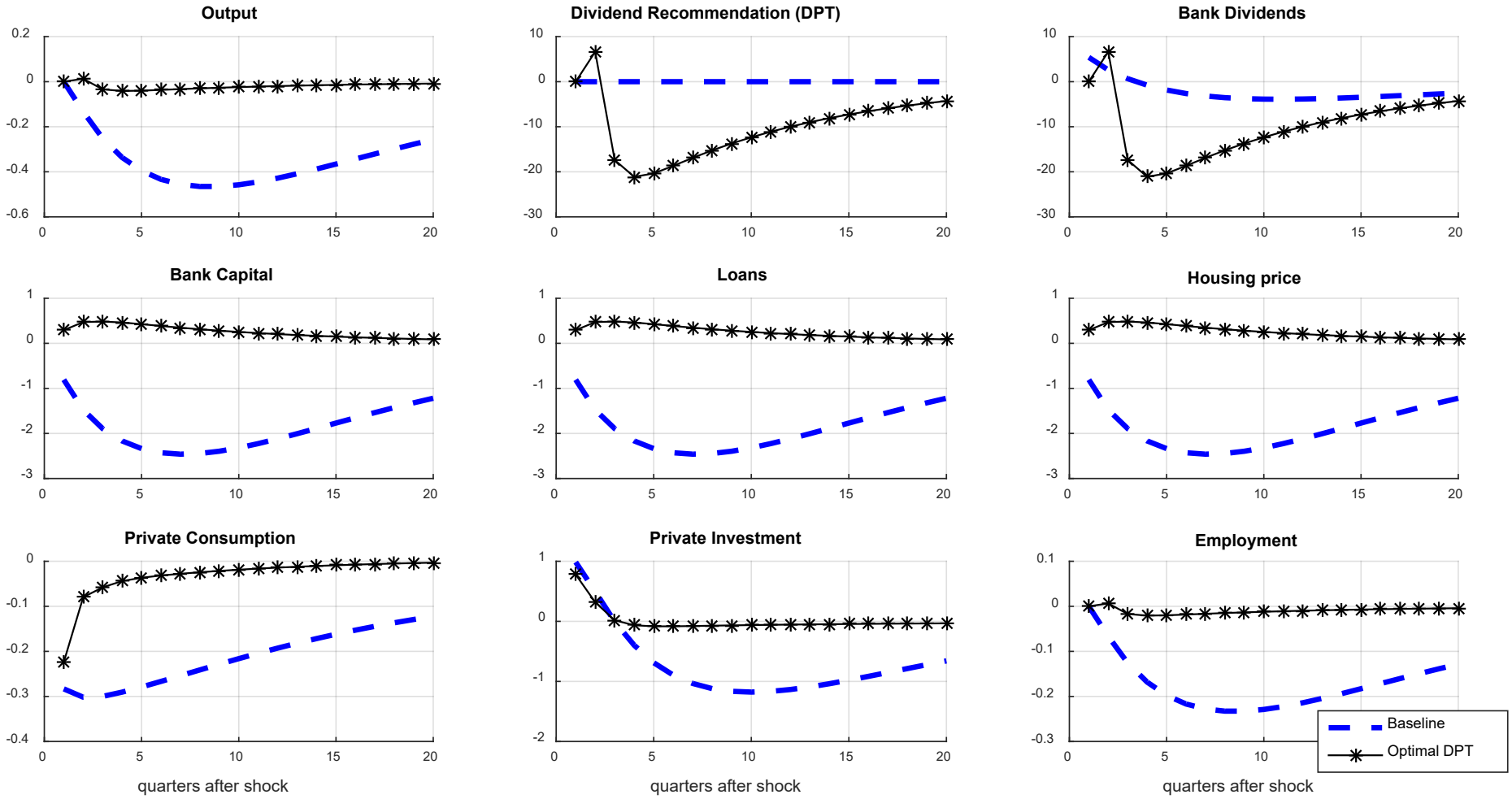
Productivity Shock and Optimal Dividend Recommendation



Financial Shock and Optimal Dividend Recommendation



Preference Shock and Optimal Dividend Recommendation



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Conclusion

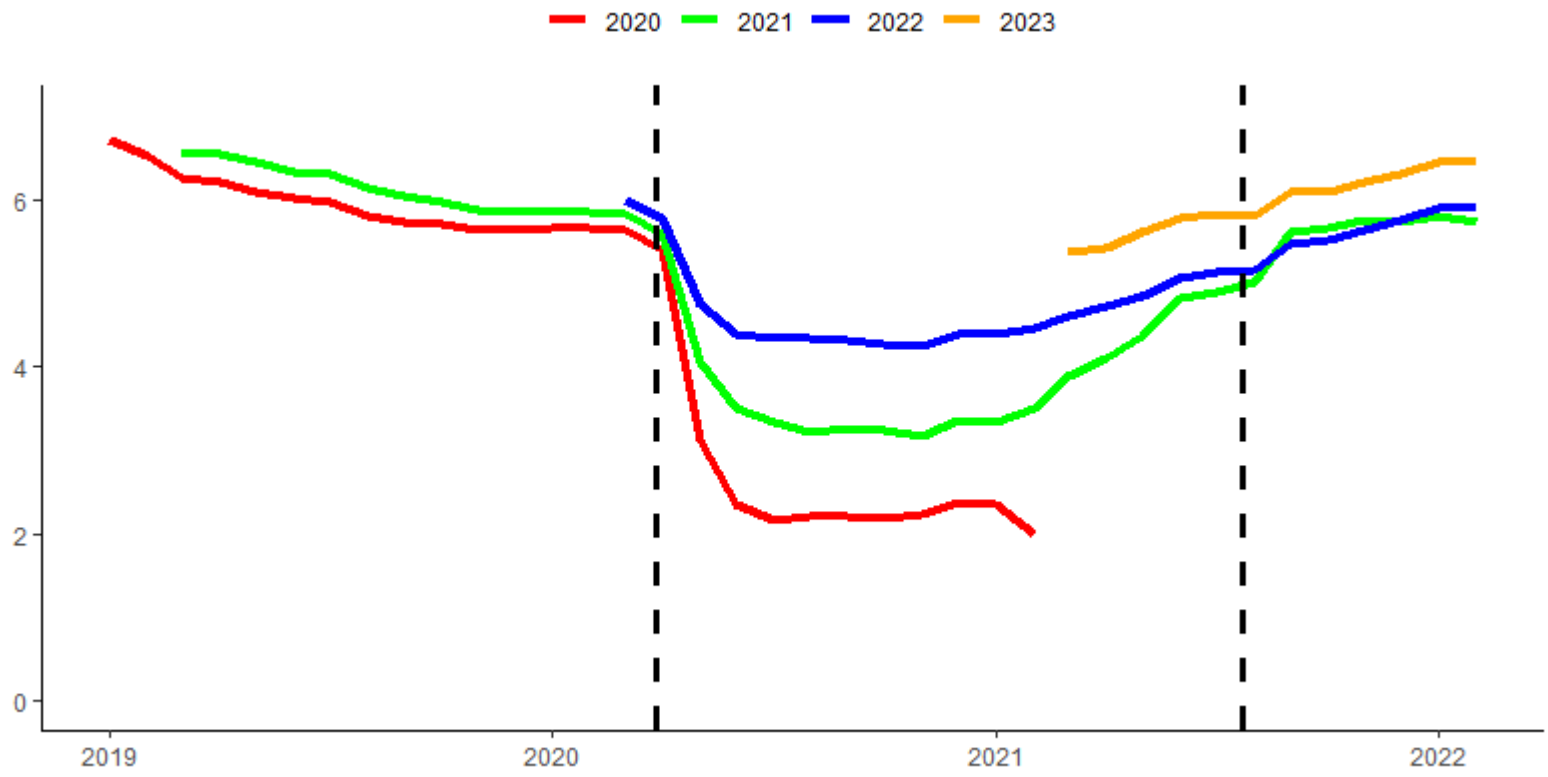
- Micro-level evidence on the main effects of the ECB SSM recommendation (2020):
  - Estimated effects suggest that:
    - Significant impact on lending
    - Moderate and transitory impact on bank stock valuations (which would have been lower if the measure would have been anticipated)
    - Cyclical compensation in dividends
      - Investors' expect a compensation effect once the ban is lifted
      - Banks tend to compensate for the non-distributed dividends once the ban is lifted.
- General equilibrium analysis
  - Proposal of a stylized set-up for SWDR analysis: captures transmission and effects
  - Optimal degree of enforcement of SWDRs is high
  - Stabilization capacity and attainable welfare gains associated with optimal DPT larger than with COVID-19 recommendation

Thank you

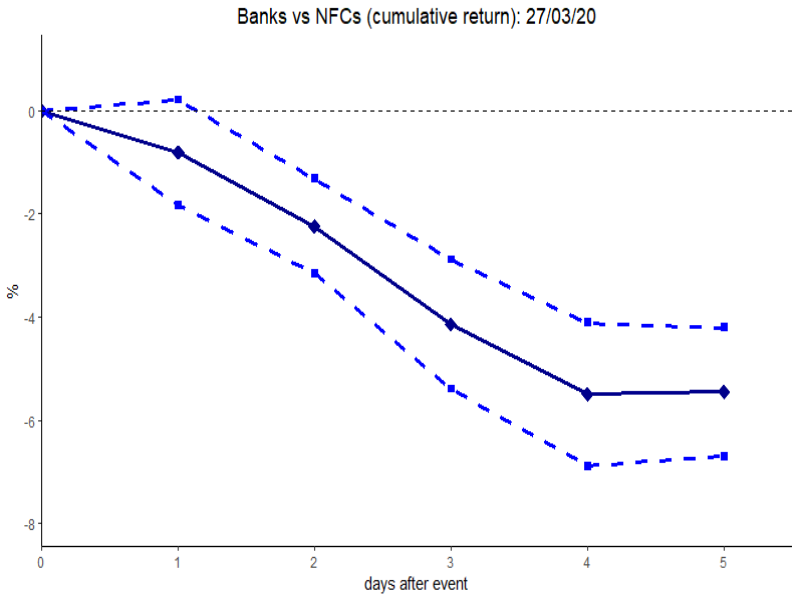
Background slides

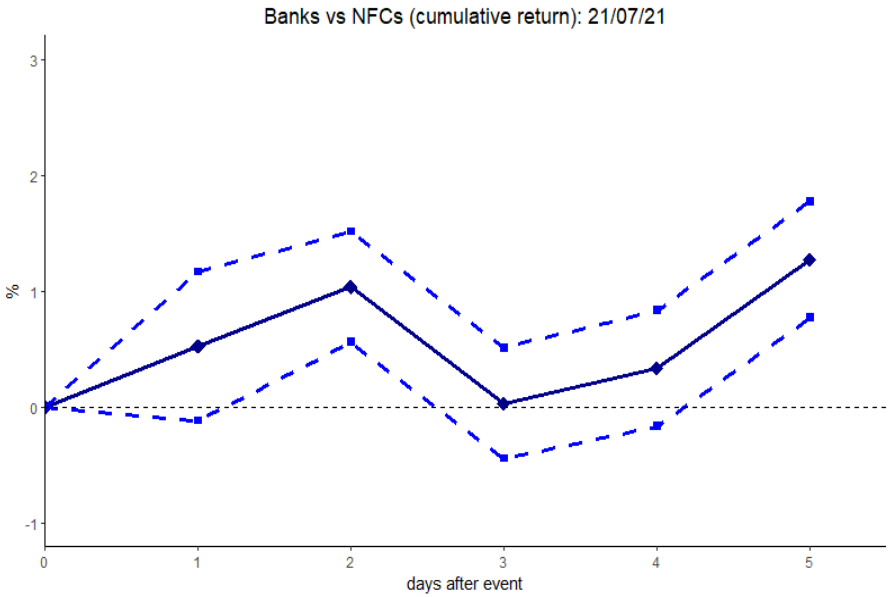
Impact on future dividends

- Rebound in bank dividends after a period of restricted distribution



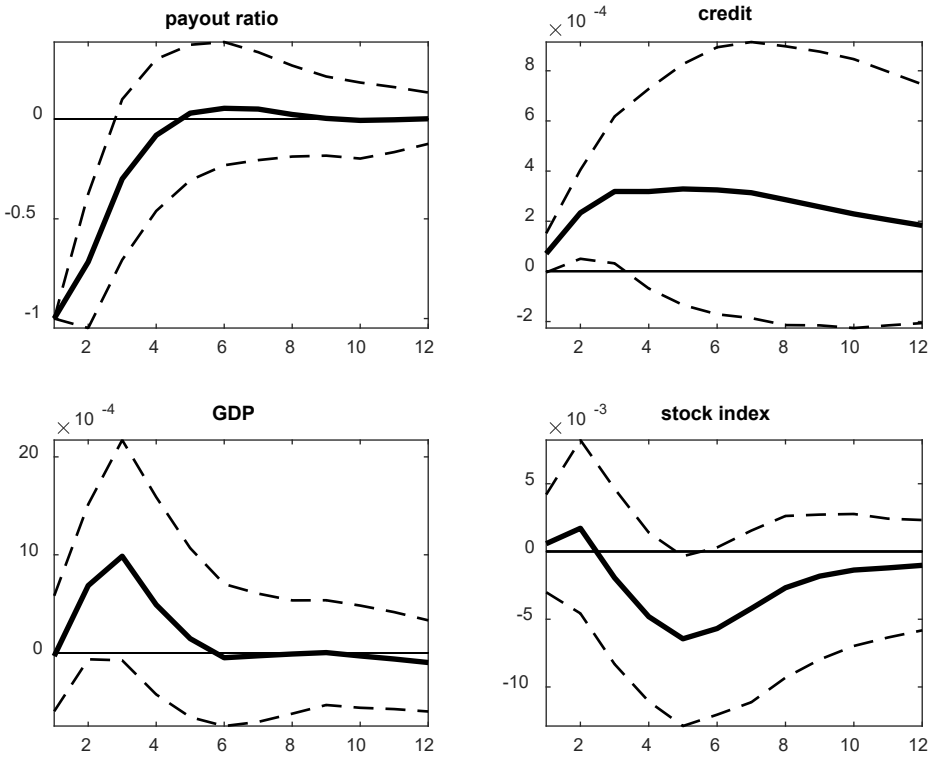
Impact on bank equity values





Empirical evidence based on macro data

- VAR – {payout ratio, bank credit, GDP, bank stock index}
- Cholesky identification



Shock Decomposition: GDP (hp filter)