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Bank equity valuations and credit supply

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- Do bank equity valuations, and changes in their cost of equity, impact bank lending behaviour?
- Yes, changes in bank equity valuations do affect credit supply:
 - 10% decrease in a bank's equity price leads to a reduction in its supply of loans to firms by around 0.5 percentage points in annual growth terms
 - Analogously, each percentage point increase in the cost of bank equity leads to a 0.4 percentage point slowdown

Overview

1 Introduction and motivation

2 Identification and methodology

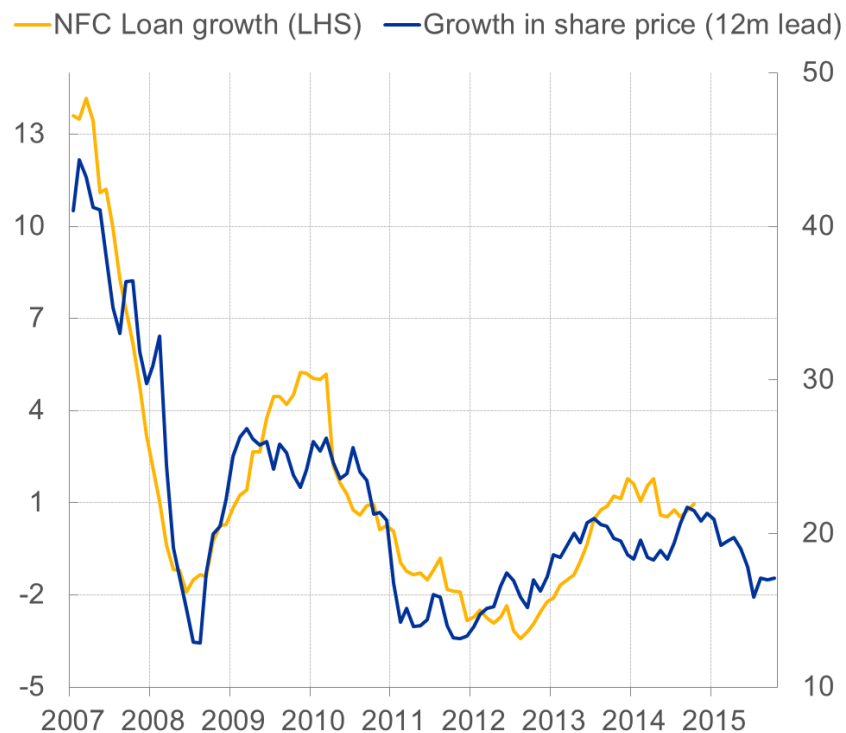
3 Results

4 Conclusions

- Recent crisis rekindled interest in the effect of **financial market turbulence** on credit provision and the relevance of **bank equity** for monetary policy transmission
- Turbulence in bank equity valuations, and resulting changes in their cost of equity (COE), can impact bank lending behaviour, particularly in light of **capital regulations**
- We exploit the variation in equity prices that is orthogonal to the factors that also determine loan supply to estimate the pure causal impact of bank equity movements on credit supply

Correlation doesn't necessarily mean causation

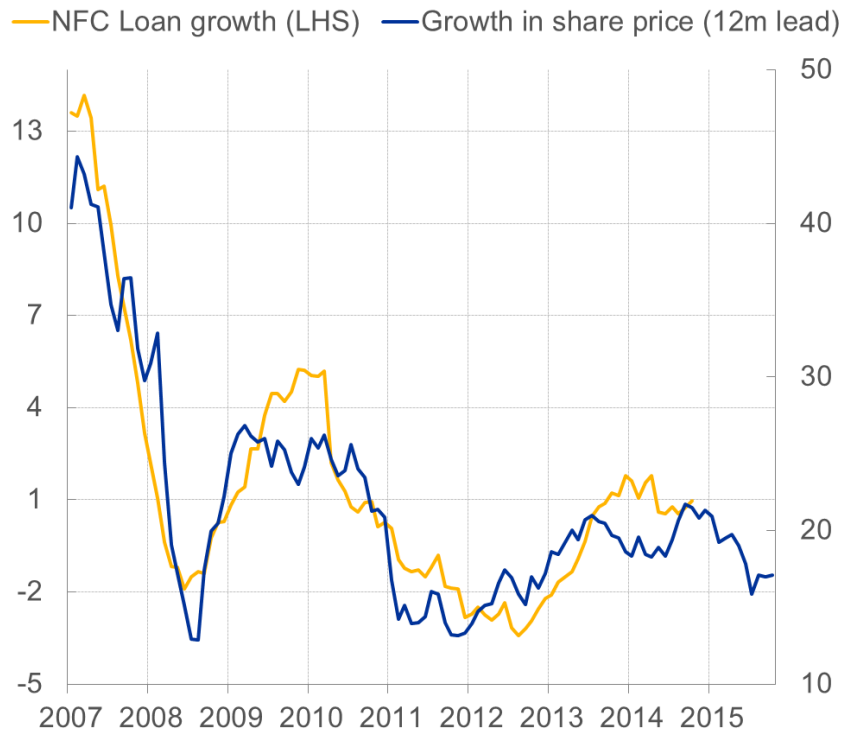
Equity prices and loan growth
(annual growth rates, weighted averages)



- Endogeneous factors driving the comovement
- Aim is to identify whether there is a pure causal effect from changes in equity on credit supply

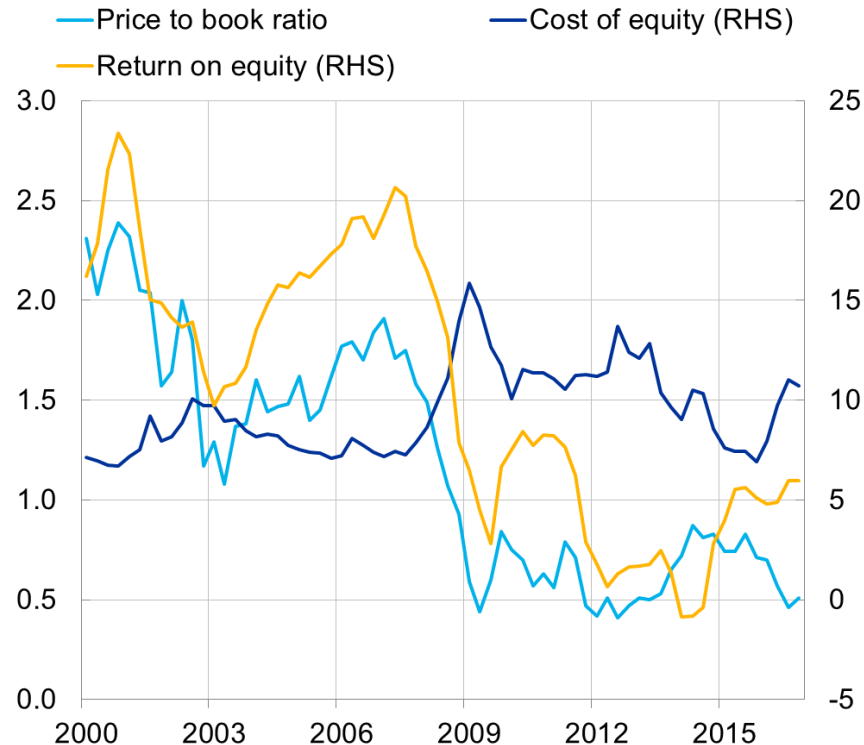
Notes: NFC loans are annual growth rates of loans to non-financial corporations lagging share price by 12 months. Share price and loan growth are weighted averages of iBSI data for the euro area.

Equity prices and loan growth (annual growth rates, weighted averages)



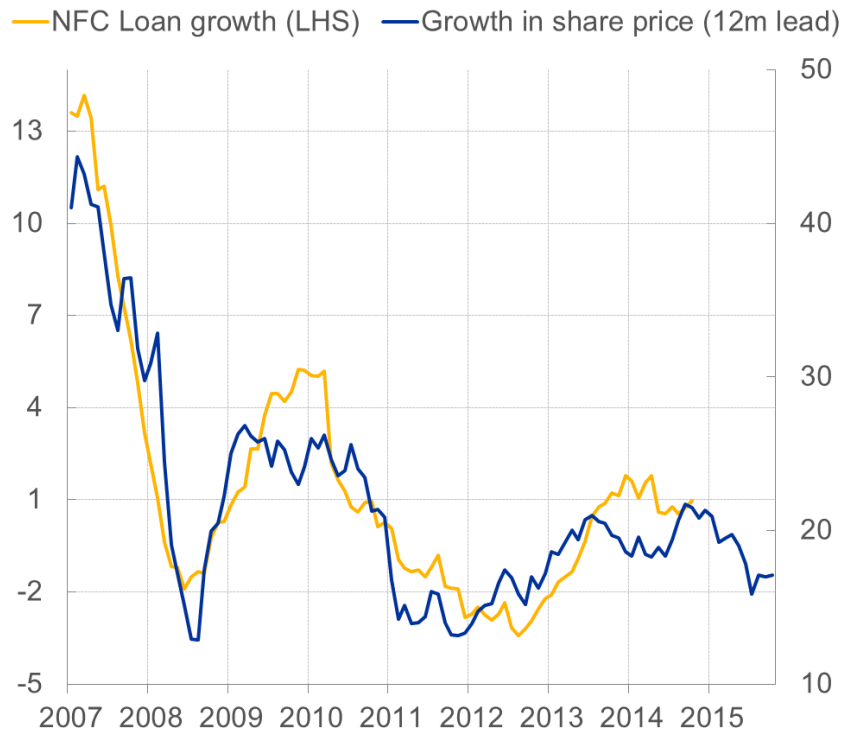
Notes: NFC loans are annual growth rates of loans to non-financial corporations lagging share price by 12 months. Share price and loan growth are weighted averages of iBSI data for the euro area.

COE, ROE and price to book ratios (percentage points)



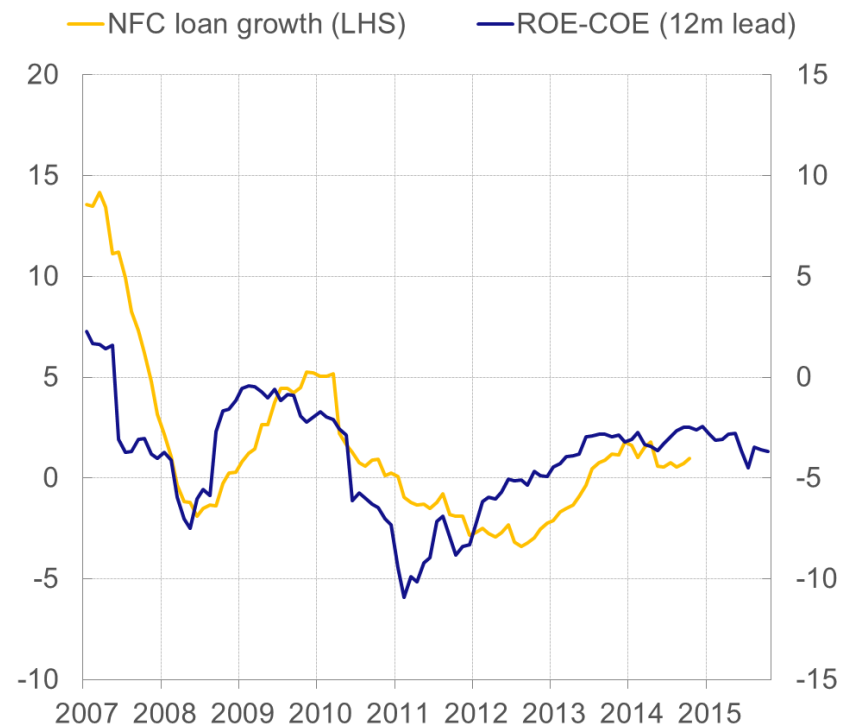
Notes: Cost of equity is expected return on the EuroSTOXX Banks index, estimated by applying the CAPM to the EuroSTOXX market index with 1yr rolling betas. Estimates of equity premium are based on I/B/E/S earnings forecasts and Consensus estimates of long term real GDP growth. Latest observations: 2016Q3 for earnings over market cap and P/B, 2016Q4 for cost of equity (early November).

Equity prices and loan growth (annual growth rates, weighted averages)



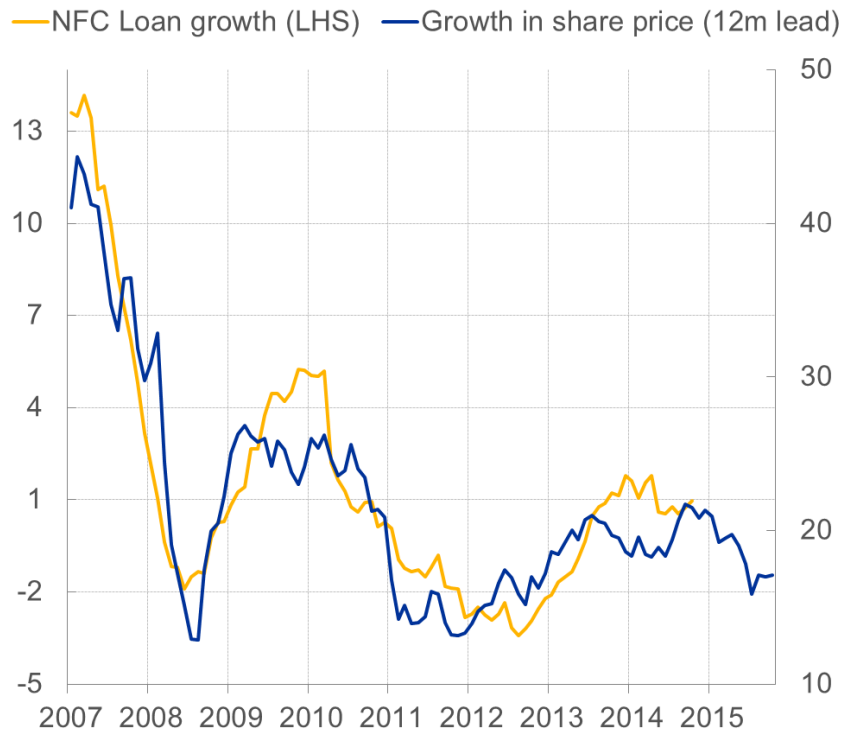
Notes: NFC loans are annual growth rates of loans to non-financial corporations lagging share price by 12 months. Share price and loan growth are weighted averages of iBSI data for the euro area.

ROE-COE gap and future loan growth (annual growth rates, weighted averages)



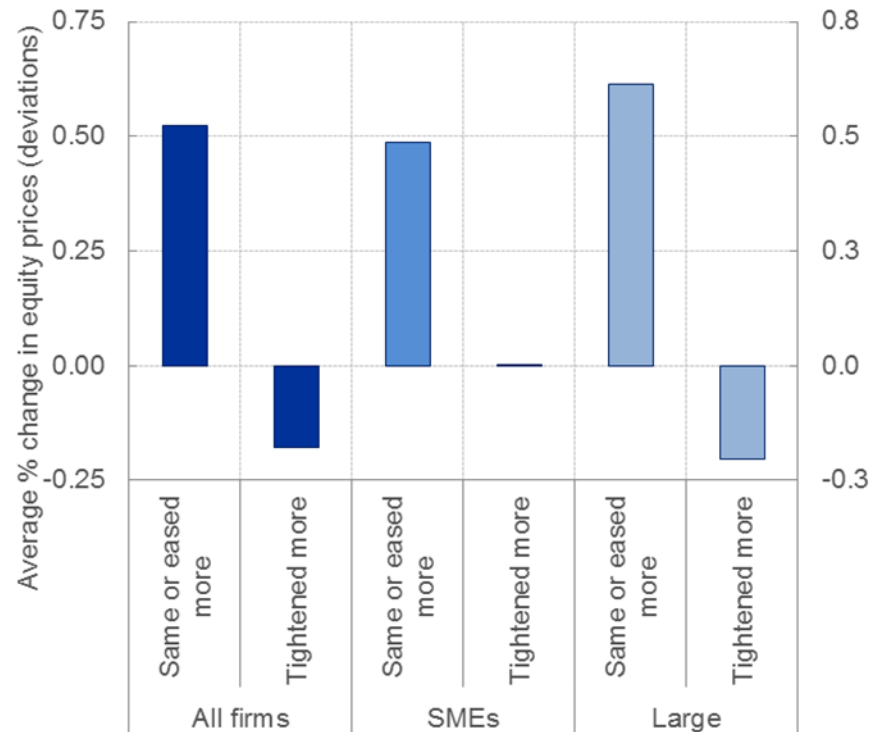
Notes: NFC loans are annual growth rates of loans to non-financial corporations lagging share price by 12 months. ROE-COE gap and loans are weighted averages of iBSI data for the euro area.

Equity prices and loan growth (annual growth rates, weighted averages)



Notes: NFC loans are annual growth rates of loans to non-financial corporations lagging share price by 12 months. Share price and loan growth are weighted averages of iBSI data for the euro area.

Share price change according to the effect of banks' capital position on credit supply to enterprises



Notes: BLS data on 57 banks from 11 countries 2003 - 2016. Shows deviation of each bank's share price from country average in each quarter according to their deviation from the country average BLS response in the same quarter. Country averages are weighted by loans to the non-financial private sector of each bank from iBSI.

Previous literature links equity and loan supply

- Bank capital channel of monetary policy
 - Van den Heuvel (2006)
- Effect of capital requirements
 - De Jonghe, Wachter and Ongena (2016), Allen, Carletti and Marquez (2011)
- Structure of liabilities and effect on credit supply
 - Berger et al. (2008), Froot and Stein (1998)
- Bank equity and credit
 - Balduzzi, Brancati and Schinatarelli (2013), Celerier, Kick and Ongena (2016)

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- Challenges:
 - Separating credit supply and demand: assume constant demand for
 - each country-time period
 - banks with same characteristics
 - Accounting for endogeneity of equity returns to credit supply
 - Earnings prospects
 - Control using analysts' estimates surveys
 - Discount factor
 - Changes in interest rates
 - Risk aversion
 - Bank specific uncertainty

- *Hyp 1: The growth rate of banks' credit supply should be positively related to the market returns of holding their equity*

$$\Delta L_{i,s,t} = \beta \text{Return}_{i,t-1} + \delta \text{Controls}_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

$\Delta L_{i,s,t}$	Loan growth of bank i in year t to sector s
$\text{Return}_{i,t-1}$	Market return of bank i in previous year
$\text{Controls}_{i,t-1}$	Profitability, capital (levels and square), NPLs, change in earnings, expected long term earnings growth

- *Hyp 2: The growth rate of banks' credit supply should be negatively related to their COE and positively to their ROE*

$$\Delta L_{i,s,t} = \tau \text{ROE}_{i,t-1} + \alpha \text{COE}_{i,t-1} + \delta \text{Controls}_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

$\text{GAP}_{i,t-1}$	$-\text{ROE}_{i,t-1}$	Book return on equity of bank i in previous year
	$\text{COE}_{i,t-1}$	Cost of equity of bank i in previous year

- *Hyp 3: These two effects should be stronger the higher the capital charge of a type of credit*

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Positive relationship between stock returns and loan supply...

$$\Delta L_{i,s,t} = \beta \text{Return}_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

	<i>NFPS</i>	<i>NFC</i>	<i>HH</i>
<i>Annual stock return_t</i>	0.0543*** (0.0115)	0.0675*** (0.0170)	0.0257** (0.0102)
<i>ROE_t</i>			
<i>Capital Ratio_t</i>			
<i>Capital ratio_t²</i>			
<i>NPL ratio_t</i>			
<i>Δ Earnings expectations_t</i>			
<i>Expected long term earnings growth_t</i>			
<i>Country - year fixed effects</i>	Yes	Yes	Yes
<i>N</i>	902	823	699
<i>R²</i>	0.201	0.159	0.410

Notes: Standard errors are clustered at the country level and shown in parentheses. ***, ** and * denote statistical significance at the 99%, 95% and 90% levels. NFPS, NFC and HH stand for non-financial private sector, non-financial corporations and households respectively.

.... after controlling for balance sheet characteristics...

$$\Delta L_{i,s,t} = \beta \text{Return}_{i,t-1} + \delta \text{Controls}_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

	<i>NFPS</i>	<i>NFC</i>	<i>HH</i>
<i>Annual stock return_t</i>	0.0443* (0.0220)	0.0727*** (0.0240)	0.0247 (0.0172)
<i>ROE_t</i>	0.362*** (0.101)	0.380** (0.160)	0.167** (0.0618)
<i>Capital Ratio_t</i>	3.639 (2.484)	3.332 (3.779)	2.528 (2.207)
<i>Capital ratio_t²</i>	-0.223* (0.114)	-0.234 (0.170)	-0.157 (0.0966)
<i>NPL ratio_t</i>	-0.335** (0.136)	-0.357** (0.149)	-0.235** (0.110)
<i>Δ Earnings expectations_t</i>			
<i>Expected long term earnings growth_t</i>			
<i>Country - year fixed effects</i>	Yes	Yes	Yes
<i>N</i>	593	541	463
<i>R²</i>	0.285	0.233	0.450

Notes: Standard errors are clustered at the country level and shown in parentheses. ***, ** and * denote statistical significance at the 99%, 95% and 90% levels. NFPS, NFC and HH stand for non-financial private sector, non-financial corporations and households respectively.

$$\Delta L_{i,s,t} = \beta \text{Return}_{i,t-1} + \delta \text{Controls}_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

	<i>NFPS</i>	<i>NFC</i>	<i>HH</i>
<i>Annual stock return_t</i>	0.0230 (0.020)	0.0497* (0.027)	0.00970 (0.0235)
<i>ROE_t</i>	0.159* (0.084)	0.180 (0.134)	0.171* (0.0951)
<i>Capital Ratio_t</i>	3.241 (3.290)	2.453 (4.867)	2.243 (2.850)
<i>Capital ratio_t²</i>	-0.194 (0.164)	-0.172 (0.236)	-0.146 (0.121)
<i>NPL ratio_t</i>	-0.124 (0.155)	-0.106 (0.169)	-0.161 (0.197)
<i>Δ Earnings expectations_t</i>	0.0314* (0.017)	0.035** (0.013)	0.00993 (0.0341)
<i>Expected long term earnings growth_t</i>	-0.0148 (0.019)	0.00194 (0.0220)	-0.0269 (0.0209)
<i>Country - year fixed effects</i>	Yes	Yes	Yes
<i>N</i>	462	423	342
<i>R²</i>	0.287	0.226	0.448

Notes: Standard errors are clustered at the country level and shown in parentheses. ***, ** and * denote statistical significance at the 99%, 95% and 90% levels. NFPS, NFC and HH stand for non-financial private sector, non-financial corporations and households respectively.

Negative relationship after controlling for demand...

$$\Delta L_{i,s,t} = \alpha COE_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

	<i>NFPS</i>	<i>NFC</i>	<i>HH</i>
<i>COE_t</i>	-0.176*	-0.275**	-0.100
<i>ROE_t</i>	(0.0893)	(0.0937)	(0.120)
<i>Gap (ROE – COE)_t</i>			
<i>Capital Ratio_t</i>			
<i>Capital ratio_t²</i>			
<i>NPL ratio_t</i>			
<i>Country - year fixed effects</i>	Yes	Yes	Yes
<i>N</i>	660	609	493
<i>R²</i>	0.338	0.280	0.474

Notes: Standard errors are clustered at the country level and shown in parentheses. ***, ** and * denote statistical significance at the 99%, 95% and 90% levels. NFPS, NFC and HH stand for non-financial private sector, non-financial corporations and households respectively.

$$\Delta L_{i,s,t} = \alpha COE_{i,t-1} + \delta Controls_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

	<i>NFPS</i>	<i>NFC</i>	<i>HH</i>
<i>COE_t</i>	-0.280** (0.121)	-0.406*** (0.112)	-0.208 (0.176)
<i>ROE_t</i>			
<i>Gap (ROE – COE)_t</i>			
<i>Capital Ratio_t</i>	3.028 (3.217)	3.095 (4.281)	2.497** (0.967)
<i>Capital ratio_t²</i>	-0.158 (0.159)	-0.171 (0.198)	-0.143*** (0.0374)
<i>NPL ratio_t</i>	-0.218* (0.115)	-0.0927 (0.109)	-0.346** (0.136)
<i>Country - year fixed effects</i>	Yes	Yes	Yes
<i>N</i>	501	463	369
<i>R²</i>	0.330	0.256	0.511

Notes: Standard errors are clustered at the country level and shown in parentheses. ***, ** and * denote statistical significance at the 99%, 95% and 90% levels. NFPS, NFC and HH stand for non-financial private sector, non-financial corporations and households respectively.

$$\Delta L_{i,s,t} = \alpha COE_{i,t-1} + \tau ROE_{i,t-1} + \delta Controls_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

	<i>NFPS</i>	<i>NFC</i>	<i>HH</i>
<i>COE_t</i>	-0.222* (0.123)	-0.347** (0.127)	-0.143 (0.151)
<i>ROE_t</i>	0.190*** (0.0618)	0.215** (0.0856)	0.135 (0.0801)
<i>Gap (ROE – COE)_t</i>			
<i>Capital Ratio_t</i>	2.525 (3.307)	2.754 (4.339)	2.160 (1.462)
<i>Capital ratio_t²</i>	-0.142 (0.162)	-0.163 (0.198)	-0.134** (0.0546)
<i>NPL ratio_t</i>	-0.116 (0.114)	0.0209 (0.126)	-0.292** (0.128)
<i>Country - year fixed effects</i>	Yes	Yes	Yes
<i>N</i>	497	459	363
<i>R²</i>	0.345	0.269	0.507

Notes: Standard errors are clustered at the country level and shown in parentheses. ***, ** and * denote statistical significance at the 99%, 95% and 90% levels. NFPS, NFC and HH stand for non-financial private sector, non-financial corporations and households respectively.

Positive relationship for gap between ROE and COE

$$\Delta L_{i,s,t} = \theta(COE_{i,t-1} - \tau ROE_{i,t-1}) + \delta Controls_{i,t-1} + \gamma_{c,t} + \varepsilon_{i,t}$$

	<i>NFPS</i>	<i>NFC</i>	<i>HH</i>
<i>COE_t</i>			
<i>ROE_t</i>			
<i>Gap (ROE – COE)_t</i>	0.198*** (0.0632)	0.247*** (0.068)	0.137 (0.092)
<i>Capital Ratio_t</i>	2.468 (3.378)	2.508 (4.356)	2.144 (1.487)
<i>Capital ratio_t²</i>	-0.139 (0.165)	-0.152 (0.199)	-0.133** (0.0548)
<i>NPL ratio_t</i>	-0.109 (0.122)	0.0509 (0.135)	-0.290** (0.121)
<i>Country - year fixed effects</i>	Yes	Yes	Yes
<i>N</i>	497	459	363
<i>R²</i>	0.345	0.269	0.507

Notes: Standard errors are clustered at the country level and shown in parentheses. ***, ** and * denote statistical significance at the 99%, 95% and 90% levels. NFPS, NFC and HH stand for non-financial private sector, non-financial corporations and households respectively.

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- The growth rate of banks' credit supply is positively related to the market returns of holding their equity:
 - 10% decrease in a bank's equity price leads to a reduction in its supply of loans to firms by around 0.5 percentage points in annual growth terms
- The growth rate of banks' credit supply is positively related to the gap between ROE and COE:
 - Analogously, each percentage point increase in the cost of bank equity leads to a 0.4 percentage point slowdown.
- Effects are stronger for loans to firms, which tend to have a relatively higher capital charge