Can greater bank capital lead to less bank lending? An analysis of the bank-level evidence from Europe.

Virginia Minni

Research in Applied Economics

THE UNIVERSITY OF WARWICK

Overview of the project

- 2007-2008 financial crisis ⟹ central role of financial intermediaries' stability in supporting a smooth transmission of monetary policy
- Bank lending channel: $\Delta i \uparrow \Longrightarrow \Delta \ln(loans) \downarrow$
- I study the impact of **banks' capital** conditions on the **provision of credit** in **Europe** and investigate whether **bank capital** can be a **source of frictions** in the transmission mechanism of monetary policy
- Role of bank capital: $capital \uparrow \Longrightarrow \Delta \ln(loans) \uparrow$
- Bank capital & bank lending: **endogenous** to each other
- Is the endogeneity due to simultaneity? ⟹ simultaneous equations model (ILS)
- Or is it an omitted variable problem? ⟹ IV estimation (2SLS, GMM)

The endogeneity problem

- **Endogeneity** of capital ratio ⟹ bias in the OLS estimator
- Lending growth and capital endogenously determined through the performance of borrowers firms
- Many papers take a **lag of the capital to asset ratio** measure
- **BUT** lacking an economic account of bank capital
- What I propose:
- 1) Simultaneous equations model (**ILS**)
- a) the capital to asset ratio ⟹ regulatory pressure (reg)

  b) the growth in the supply of loans ⟹ interest rate changes (di)

$$\begin{cases} \Delta \ln(loans)_{it} = \alpha_{i0} + \alpha_1 capital_{it} + \alpha_2 \Delta i_{mt} + \upsilon_{1it} \\ capital_{it} = \beta_{i0} + \beta_1 \Delta \ln(loans)_{it} + \beta_2 reg_{it} + \upsilon_{2it} \end{cases}$$

- 2) Instrumental Variables methods (**2SLS**)
- identify valid **instrumental variables** that isolate exogenous changes in bank capital
- 3) Compare results with **GMM** estimator that also takes into account endogeneity (robustness check)

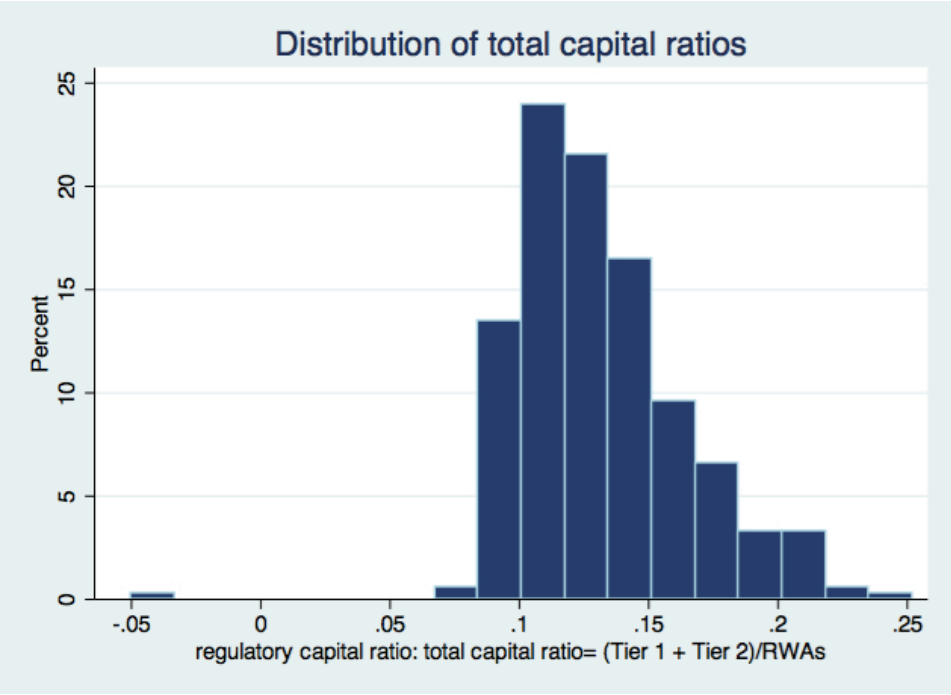
Research Findings

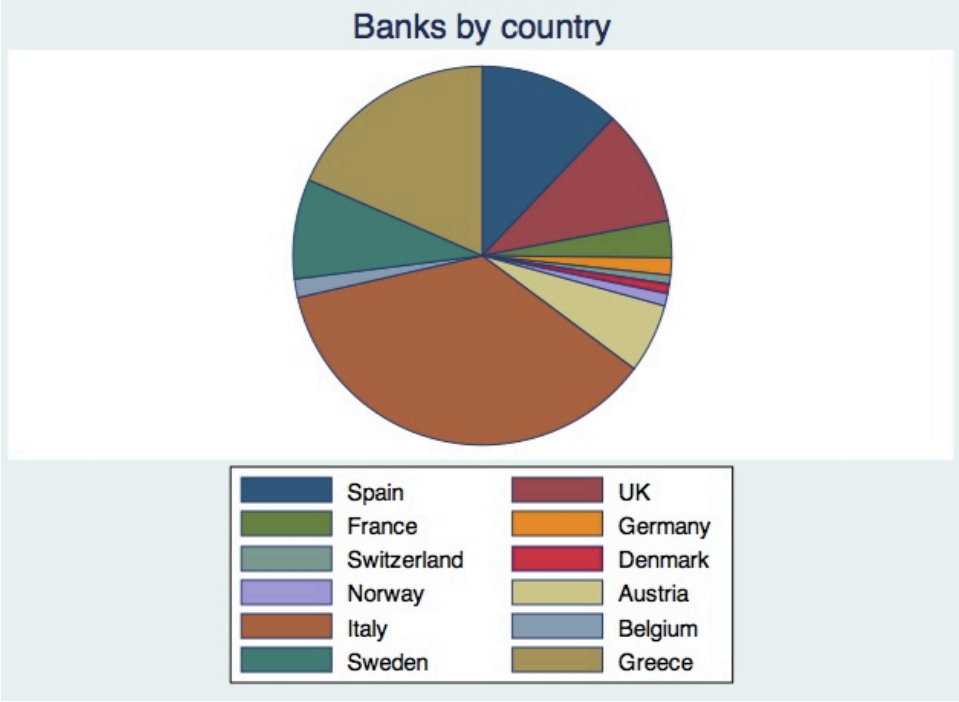
- In contrast to previous empirical literature, I find a **negative effect** of **bank capital** on **loan growth**
- Capital is built in a **pro-cyclical** way ⇨ not able to dampen the losses during recessions and amplifies the risks of credit restrictions ⇨ contributing to worsening output fluctuations
- This result matches the massive deleveraging observed since the deepening of the crisis
- These research findings contribute to the post-crisis banking literature by presenting novel bank-level evidence from **Europe**
- The fact that increases in the capital ratio may reduce, rather than sustain, the credit supply should be considered when designing **macro-prudential policies**

Data source and variables

- Panel of credit institutions from 13 European countries
- Annual data from 2004 to 2013 included
- Sources: Bloomberg, OECD, Eurostat, BIS, National Central Banks

Main Variables	**Control Variables**
Loan growth: change in log of total loans	Real GDP growth
Capital Ratio: total regulatory capital	crisis: financial crisis dummy=1 when year=2009
Interest rate: overnight rate	Size: log of total assets
	Liquidity: cash over total assets
	Regulatory pressure: dummy (proxy) that takes into account whether a bank is undercapitalised or overcapitalised relative to the mean of the sample
	Risk: ratio of RWAs to total assets
	Deposit ratio: total deposits over total liabilities

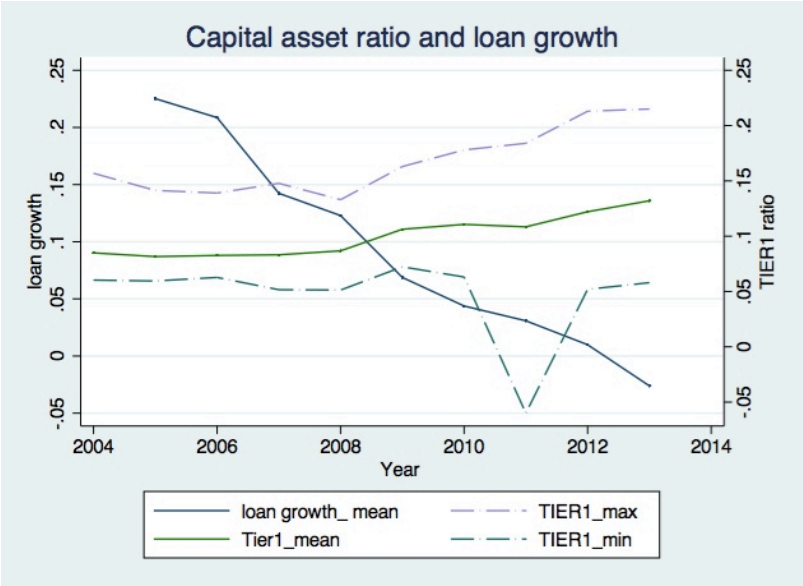


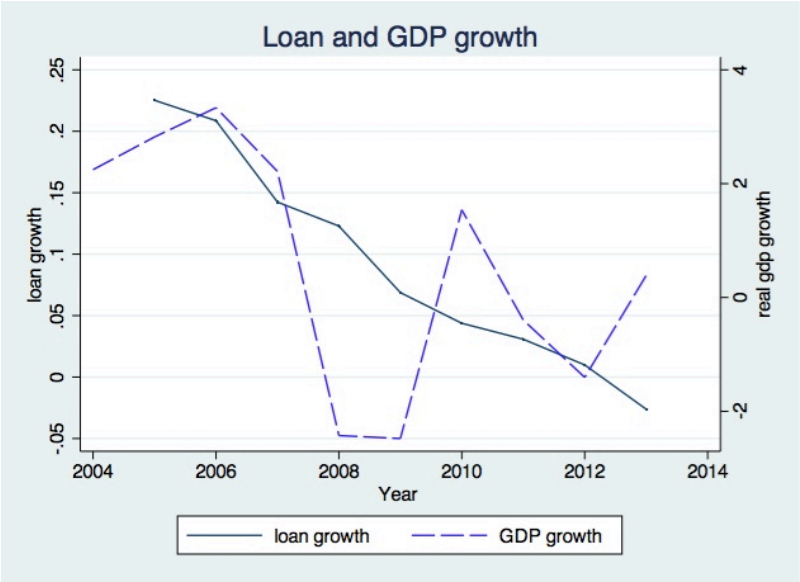


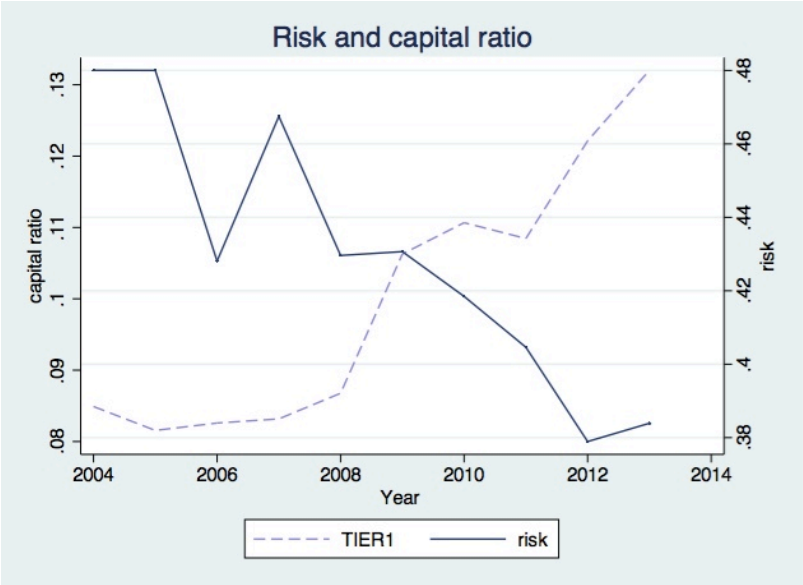
- Majority of banks have capital ratios that largely exceed the **Basel II requirement of 8%**

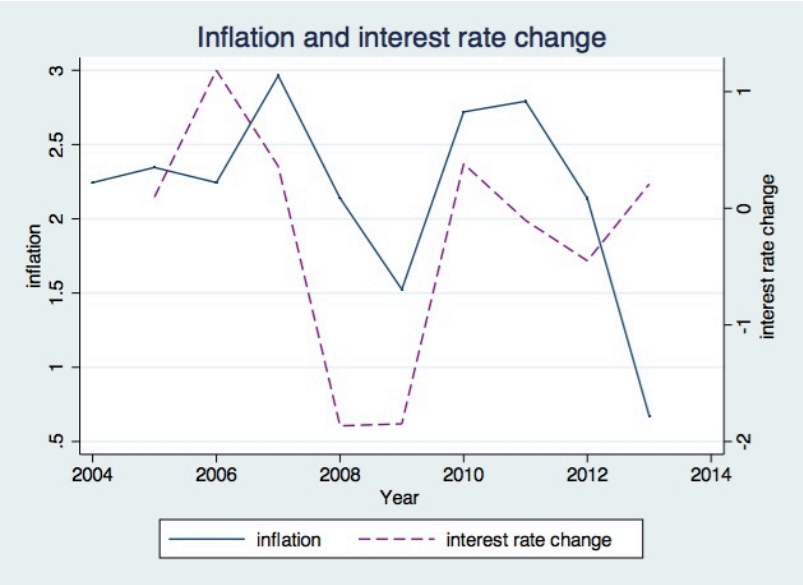
- The sample contains a large number of banks from **Italy, Spain, Greece**

Time series and trends









Tests

- FE/RE test

Hausman Test	H0: FE=RE
$\chi^2 = 17.42$, P-value= 0.008	Reject H0 ⟹ FE

- Heteroscedasticity test

Breusch-Pagan Test	H0: constant variance
$\chi^2 = 101.98$, P-value= 0.000	Reject H0 ⟹ clustered standard errors

- Exogeneity test for bank capital

Durbin-WU Hausman Test	H0: no endogeneity problem
F-stat (1,40)= 9.63, P-value= 0.0035	Reject H0 ⟹ capital is endogenous

- Overidentification test of all instruments

Hansen J-statistic	H0: instruments are valid (uncorrelated with the error term)
$\chi^2 = 1.230$ P-value= 0.5407	Do not Reject H0 ⟹ instruments are valid

Simultaneous Equations

Structural Equations:

$$\begin{bmatrix} \Delta \ln(loans)_{it} \\ capital_{it} \end{bmatrix} = \begin{bmatrix} \alpha_0 \\ \beta_0 \end{bmatrix} + \begin{bmatrix} 0 & \alpha_1 & \alpha_2 & 0 \\ \beta_1 & 0 & 0 & \beta_2 \end{bmatrix} \begin{bmatrix} \Delta \ln(loans)_{it} \\ capital_{it} \\ \Delta i_{mt} \\ reg_{it} \end{bmatrix} + \begin{bmatrix} \upsilon_{1it} \\ \upsilon_{2it} \end{bmatrix}$$

Reduced form Equations :

$$\begin{bmatrix} \Delta \ln(loans)_{it} \\ capital_{it} \end{bmatrix} = \begin{bmatrix} \pi_0 \\ \pi_3 \end{bmatrix} + \begin{bmatrix} \pi_1 & \pi_2 \\ \pi_4 & \pi_5 \end{bmatrix} \begin{bmatrix} \Delta i_{mt} \\ reg_{it} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \end{bmatrix}$$

- Order condition & Rank condition are satisfied
- Solutions to the System:

$$\begin{bmatrix} \Delta \ln(loans)_{it} \\ capital_{it} \end{bmatrix} = \begin{bmatrix} \alpha_0 = \pi_0 - \dfrac{\pi_2 \pi_3}{\pi_5} \\ \beta_0 = \pi_3 - \dfrac{\pi_0 \pi_4}{\pi_1} \end{bmatrix} + \begin{bmatrix} 0 & \alpha_1 = \dfrac{\pi_2}{\pi_5} & \alpha_2 = \pi_1 - \dfrac{\pi_2 \pi_4}{\pi_5} & 0 \\ \beta_1 = \dfrac{\pi_4}{\pi_1} & 0 & 0 & \beta_2 = \pi_5 - \dfrac{\pi_2 \pi_4}{\pi_1} \end{bmatrix} \begin{bmatrix} \Delta \ln(loans)_{it} \\ capital_{it} \\ \Delta i_{mt} \\ reg_{it} \end{bmatrix} + \begin{bmatrix} \upsilon_{1it} \\ \upsilon_{2it} \end{bmatrix}$$

$\Delta \ln(loans)_{it}$	ILS (N. obs 334)
$capital_{it}$	-2.667*** (0.462)
Δi_{mt}	1.575** (0.650)

$capital_{it}$	ILS (N. obs 334)
$\Delta \ln(loans)_{it}$	0.020 (0.048)
reg_{it}	-0.044*** (0.006)

2SLS

- First stage regression:

$$capital_{it} = \partial_{i0} + \partial_1 reg_{it} + \partial_2 dep_{it} + \partial_3 risk_{it} + \partial_4 \Delta i_{mt-1} + \partial_5 X_{it-1} + \partial_6 crisis_t + \eta_{1it}$$

- Second stage regression:

$$\Delta \ln(loans)_{it} = \alpha_{0i} + \widehat{\alpha_1 capital}_{it} + \alpha_2 \Delta i_{mt-1} + \alpha_3 X_{it-1} + \alpha_4 crisis_t + \eta_{2it}$$

$\Delta \ln(loans)_{it}$	2SLS (N. obs 289)	2SLS (N. obs 289)
$capital_{it}$	-2.460*** (.643)	-2.847*** (.904)
Δi_{mt-1}	-3.861* (1.984)	-4.213** (2.101)
$\Delta \ln(gdp)_{mt-1}$	1.558** (.617)	1.738** (.700)
$crisis_t$	-.054 ** (.028)	-.054** (.027)
$size_{it}$		.160* (.088)
$liquidity_{it-1}$		-.308 (.510)

ILS, 2SLS, GMM

$$\Delta \ln(loans)_{it} = \alpha_0 \Delta \ln(loans)_{it-1} + \alpha_1 capital_{it} + \alpha_2 \Delta i_{mt-1} + \alpha_3 X_{it-1} + \alpha_4 crisis_t + v_{it}$$

$\Delta \ln(loans)_{it}$	2SLS (289)	2SLS (289)	GMM (289)	GMM (289)
$\Delta \ln(loans)_{it-1}$			-.081 (.053)	-.093* (.053)
$capital_{it}$	-2.460*** (.643)	-2.847*** (.904)	-2.208*** (.681)	-2.211** (.889)
Δi_{mt-1}	-3.861* (1.984)	-4.213** (2.101)	-4.776* (2.478)	-3.595* (2.126)
$\Delta \ln(gdp)_{mt-1}$	1.558** (.617)	1.738** (.700)	1.740** (.826)	1.447** (.701)
$crisis_t$	-.054 ** (.028)	-.054** (.027)	-.069* (.038)	-.062* (.036)
$size_{it}$		.160* (.088)		.073** (.029)
$liquidity_{it-1}$		-.308 (.510)		-1.487** (.631)

Results

- Can **higher bank capital** lead to **less bank lending**?

- In contrast to earlier studies, I find evidence of a **negative relationship** between bank capital and bank lending

- Counterintuitive result ⟹ the effect of bank capital on bank lending is evolving along with changing economic circumstances leading to **new dimensions of the BLC**

Policy implications

- The capital ratio is increased by **reducing the RWAs**, rather than by injecting new capital into the banks' balance sheet
- The financial crisis has led to a significant **pro-cyclical de-leveraging** process in the banking sector
- To restore their capital positions, banks have been reducing their lending activities despite the extremely low interest rates and the non-standard policy measures aimed at increasing bank lending
- The rationale behind higher capital requirements goes along the lines of ensuring **lower systemic risks** and a healthier financial system through a reduced risk of bank failure
- Yet, this paper shows that **capital increases** may lead to a **slowdown in lending growth** and potential **detrimental effects on the economies** concerned
- Future regulation should consider **counter-cyclical capital** requirements

⇒ the Basel III standards

Limitations and further research

- **Dataset** limitations: liquidity variable, sample of banks, data of higher frequency ⟹ richer datasets

- **endogeneity** issue between bank lending and **the monetary policy rate** ⟹ exogenous monetary policy component (for e.g. the narrative approach by Romer and Romer (2004))

- **Instrumental variable** methods: careful selection of the instruments for bank capital

- Further research on the implications **of Basel III capital regulations** for bank lending

- The evidence presented in the paper is consistent with a scenario in which **the changes** detected in the transmission mechanism cannot be considered as permanent but are likely to **evolve over time** ⟹ further analysis to fully understand the role of bank capital in the monetary policy transmission mechanism

Can greater bank capital lead to less bank lending? An analysis of the bank-level evidence from Europe.

Virginia Minni

Research in Applied Economics

THE UNIVERSITY OF WARWICK