Lower bank capital requirements as a policy tool to support credit to SMEs: Evidence from a policy experiment

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Motivation

- SMEs are one of the main drivers of economic growth:
  - Half of employment
  - 43% of the value added
  - 99,9% of companies
- Few funding opportunities for SMEs:
  - Bank lending is a crucial external funding source
  - Alternative sources of external funding are either scarce or costly
- Public debate about the new capital regulation:
  - Possible adverse consequences on SMEs, due to their supposed higher risk
  - So far, all studies focused on increasing capital requirements

Motivation

Supporting Factor: A reduction in capital requirements for banks that lend to SMEs was introduced as a temporary reform.

$\rightarrow$ EBA is required to report to EC within 3 years:

- "*An analysis of **effective riskiness** of Union SMEs over a full economic cycle*"
- "*An analysis of the evolution of the **lending trends** and conditions for SMEs*"

In this paper

I. **Risk analysis**: Consistency the reduction in capital requirements for SMEs?

- ◇ Economic capital model to simulate CRs while considering potential diversification/concentration effects within portfolios.
- ◇ Results : Lower CRs for SMEs than for large companies.

  → SF as a reduction in CRs is **justified**.

II. **Credit analysis**: Improvement of the credit supply towards SMEs?

- ◇ Differences-in-differences: eligible SMEs vs ineligible SMEs / Pre vs Post implementation
- ◇ Results : Positive impact of the SF on bank lending.

  → SF as a reduction in CRs is **effective** but **questionable**.

Risk analysis: Consistency of the discount in CR for SMEs

- Current regulatory formulas are driven by (ASRF model, Gordy, 2003):
  - ◇ Probability of default → depending on firms
  - ◇ Loss given default → fixed by the regulator
  - ◇ Asset correlations → considered as **invariant**

  → SMEs show higher probability of default than large companies

  → SMEs show higher CRs that do not reflect their risk

- (1) Multifactor model allows for variation in assets correlation intra and inter portfolios for each size class.

- Comparison of these estimated CR to:

  (2) Regulatory Basel III CRs

  (2 bis) Regulatory Basel III CRs with Supporting factor

Risk analysis: Consistency of the discount in CR for SMEs

Comparison of economic CRs and regulatory CRs

Size (Turnover in million euros)	**Multifactor model (1)**	**Regulatory Basel II/III model (2)**	**Regulatory CRD IV/CRR model with SF (2 bis)**	**Ratio (2)/(1)**	**Ratio (2 bis)/(1)**
0.75 - 1.5	0.83	6.2	5.2	7.5	6.3
1.5 - 7.5	1.1	9.8	7.5	8.9	6.8
7.5 - 15	1.7	9.8	6.7	5.8	3.9
15 - 50	3.2	9.4	5.4	2.9	1.7
$>$ 50	6.3	10.2	10.2	1.6	1.6

(1) Multifactor model

(2) Regulatory Basel III CRs

(3) Regulatory Basel III CRs with Supporting factor

$\rightarrow$ Lower Capital Requirements for SMEs than for large companies.

Credit analysis: Institutional Framework

Capital Requirement Regulation (CRR), Article 501, January 2014.

Supporting Factor:
"*Capital requirements for credit risk on exposures to SMEs shall be multiplied by the factor 0,7619.*"

- Exposures to SMEs: Firms with turnover $\leq$ €50Million
- Exposures amount at the banking group level $\leq$ €1.5Million

Data

French national credit register (Bank of France database)

- 55 million observations on bank-firm relationships in France
- Period over 2010-2016, quaterly data
- 7 main banking groups reported, defined by their GEA
- 351,470 independent SMEs, permanently eligible or ineligible during the whole period
- Information about size, rating, dpt and industrial sector of the firm

Specification: difference-in-differences

$$L_{f,b,t+1} = \alpha + \beta \cdot Eligible_{f,b,t} \cdot Post_t + \gamma \cdot Eligible_{f,b,t} + \theta \cdot Post_t + \sum_{b,t} \mu_{b,t} \cdot 1_{b,t} + \sum_{b} \omega_b \cdot 1_b + \sum_{f} \rho_f \cdot 1_f + \epsilon_{b,f,t}$$

with: $$Eligible_{f,b,t} = \begin{cases} 1 \text{ if } Loans_{f,b,t} \leq €1.5 \text{ million} \\ 0 \text{ if } Loans_{f,b,t} > €1.5 \text{ million} \end{cases}$$

$$Post_t = \begin{cases} 1 \text{ if } t \geq 2014Q1 \\ 0 \text{ if } t < 2014Q1 \end{cases}$$

and: $L_{f,b,t+1} = LN \text{ of the } \mathbf{Total} \text{ amount of credit at the following period}$

$\sum_{b,t} \mu_{b,t} \cdot 1_{b,t}$, $\sum_{b} \omega_b \cdot 1_b$ and $\sum_{f} \rho_f \cdot 1_f$ denotes fixed effects

Logarithm of the total outstanding amount of credit

VARIABLES	LN (Total outstanding amount of loans) (1)	(2)	(3)	(4)	(5)
Eligible * Post	0.087***	0.095***	0.094***	**0.043*** **	0.015**
	(0.013)	(0.013)	(0.013)	(0.009)	(0.007)
Observations	16,331,261	16,331,261	16,331,261	16,275,264	16,275,264
Adjusted R-squared	0.174	0.178	0.178	0.733	0.733
Time FE	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y
Size FE	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y
Dpt FE	Y	Y	Y	Y	Y
Bank FE	N	Y	Y	Y	Y
Bank*Time FE	N	N	Y	Y	Y
Firm FE	N	N	N	Y	Y
Group-specific trends	N	N	N	N	Y
Cluster	Firm-bank	Firm-bank	Firm-bank	Firm-bank	Firm-bank

After the implementation of the SF:

- Positive flow of new credit increased by 4.4% for eligible firms compared to ineligible firms.

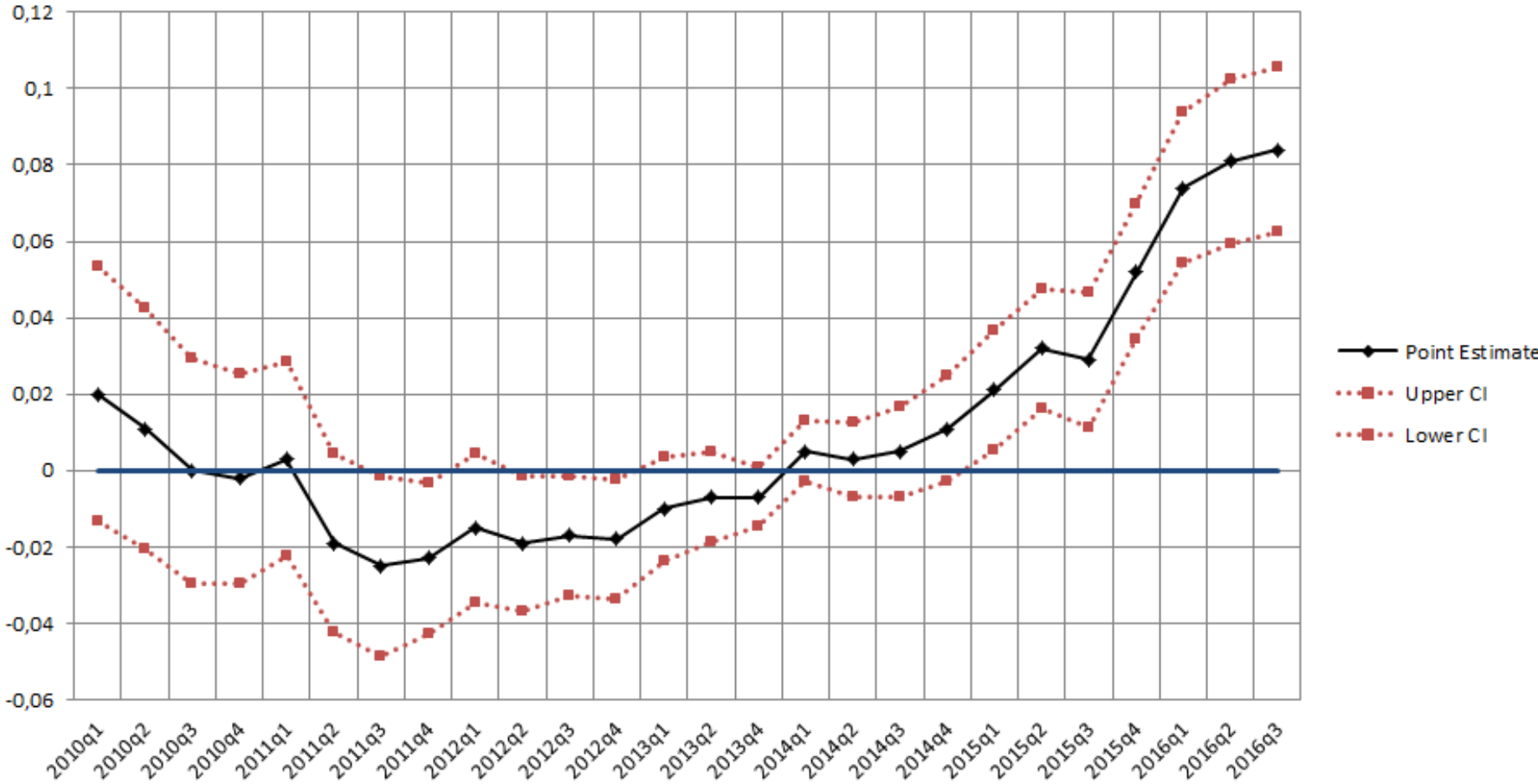
Collapsing on two periods : before and after SF

VARIABLE	LN (Total outstanding amount of loans) (1)	(2)	(3)	(4)
Eligible * Post	0.063***	0.073***	0.074***	**0.029****
	(0.013)	(0.013)	(0.013)	(0.014)
Observations	2,089,003	2,089,003	2,089,003	1,665,354
Adjusted R-squared	0.179	0.184	0.185	0.583
Period FE	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y
Size FE	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
Dpt FE	Y	Y	Y	Y
Bank FE	N	Y	Y	Y
Bank*Period FE	N	N	Y	Y
Firm FE	N	N	N	Y
Cluster	Firm-bank	Firm-bank	Firm-bank	Firm-bank

After the implementation of the SF:

- Positive flow of new credit increased by 2.9% for eligible firms compared to ineligible firms.

Impact of being eligible to the SF by quarter



- Confidence interval contains 0 until 2014, the introduction of the SF.
- Positive impact after 2014.

Expected impacts of the reform

- Improvement of credit supply to eligible SMEs

NEVERTHELESS...

- Reduction in capital requirements applies on the stock of exposures, not on the flow of new credit
  $\rightarrow$ Incentives for banks to grant more loans?
- Threshold of eligibility at €1.5Million
  $\rightarrow$ Incentives for banks around the threshold to increase exposures?
- Temporary reform
  $\rightarrow$ Incentives for banks to grant more loans in the long run?

Impact of the SF by class of exposures

VARIABLES	LN (Total outstanding amount of loans) (1)	(2)	(3)	(4)
Eligible * Post * small	0.078***	0.085***	0.084***	**0.044*** **
	(0.010)	(0.010)	(0.010)	**(0.007)**
Eligible * Post * medium	0.025**	0.031***	0.026**	**0.021** **
	(0.011)	(0.011)	(0.011)	**(0.008)**
Eligible * Post * large	0.006	0.008	0.005	**-0.022** **
	(0.012)	(0.012)	(0.012)	**(0.009)**
Observations	16,331,261	16,331,261	16,331,261	16,275,264
Adjusted R-squared	0.305	0.308	0.308	0.750
Time FE	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y
Size FE	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
Dpt FE	Y	Y	Y	Y
Bank FE	N	Y	Y	Y
Bank*Time FE	N	N	Y	Y
Firm FE	N	N	N	Y
Cluster	Firm-bank	Firm-bank	Firm-bank	Firm-bank

Exposures : **small** = [0 - 500,000] **medium** = [500,000 - 1M] **large** = [1M - 1.5M]

- Improvement of credit supply is concentrated on the **smallest** exposures.

Impact of the SF by firm's rating and size

VARIABLE	LN (Total outstanding amount of loans) (1)	(2)
Eligible * Post * risky		**-0.067*** **
		(0.025)
Eligible * Post * unknown		**0.018**
		(0.013)
Eligible * Post * safe		**0.066*** **
		(0.014)
Eligible * Post * large	**0.109*** **	
	(0.014)	
Eligible * Post * small	**0.005**	
	(0.012)	
Observations	16,275,264	16,275,264
Adjusted R-squared	0.733	0.733
Time FE	Y	Y
Rating FE	Y	Y
Size FE	Y	Y
Industry FE	Y	Y
Dpt FE	Y	Y
Bank FE	Y	Y
Firm FE	Y	Y
Bank*Time FE	Y	Y
Cluster	Firm-bank	Firm-bank

Improvement of credit supply is concentrated on:

→ the **safest** firms

→ the **largest** firms

Alternative specifications

- Robustness checks related to the €1.5M threshold
  - drop exposures **€1.5M - €2M** : Positive impact
  - drop exposures **€1M - €2M** : Positive impact
  - drop exposures **€1.4M - €1.6M** : Positive impact
- Robustness checks related to the sample
  - drop the period **2013Q3 - 2014Q1** : Positive impact
  - drop firms whose turnover is **unknown** : Positive impact

Conclusion

- **Consistency** of the reduction in CRs for SMEs
- **Positive** impact of the SF on credit supply to SMEs
- Impact located on the smallest exposures, the least risky firms and the largest firms
  - ◇ Implementation of the €1.5M threshold
  - ◇ Application of the reduction on the stock of credit
  - ◇ Temporary nature of the reform

  ⇒ **The SF enabled to improve the allocation of credit toward eligible SMEs, but results highlight the drawbacks of the design of the reform that deserves to be reconsidered.**

Further investigations

- Impact of the SF on the extensive margin
  - Probability of increasing loans
  - Probability of decreasing loans
- Threshold impact
  - Probability of increasing loans and passing above the threshold
  - Probability of increasing loans without passing the threshold
- Impact of the SF depending on the saving in CRs generated

Thank you.

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Appendix : Risk analysis

Random effects variances (%)					
size classes	Retail	Corporate			
	0.75 - 1.5	1.5 - 5	5 - 15	15 - 50	> 50
Estimates	0.0094	0.0034	0.0163	0.0723	0.225
Standard Errors	0.01005	0.0012	0.0144	0.03602	0.07615

Correlation matrix of random effects					
size classes	0.75 - 1.5	1.5 - 7.5	7.5 - 15	15 - 50	> 50
0.75 - 1.5	1.0000				
1.5 - 7.5	0.6454	1.0000			
7.5 - 15	-0.5802	0.2520	1.0000		
15 - 50	-0.7361	0.04326	0.9721	1.0000	
> 50	-0.7698	-0.04406	0.9519	1.0000	1.0000

Appendix: Impact of the SF

VARIABLE	LN (Total outstanding amount of loans) (1)	(2)	(3)	(4)	(5)
Eligible * Post	0.087***	0.095***	0.094***	**0.043*** **	0.067***
	(0.014)	(0.014)	(0.014)	(0.010)	(0.010)
Observations	16,331,261	16,331,261	16,331,261	16,275,264	16,275,264
Adjusted R-squared	0.174	0.178	0.178	0.733	0.733
Time FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Rating FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Size FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Dpt FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Bank FE	No	**Yes**	**Yes**	**Yes**	**Yes**
Bank*Time FE	No	No	**Yes**	**Yes**	**Yes**
Firm FE	No	No	No	**Yes**	**Yes**
Size*Time FE	No	No	No	No	**Yes**
Cluster	Firm-bank	Firm-bank	Firm-bank	Firm-bank	Firm-bank

Appendix: Impact of the SF, collapsing 2 periods

VARIABLE	LN (Total outstanding amount of loans) (1)	(2)	(3)	(4)	(5)
Eligible * Post	0.063***	0.073***	0.074***	**0.029****	0.087***
	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)
Observations	2,089,003	2,089,003	2,089,003	1,665,354	2,089,003
Adjusted R-squared	0.179	0.184	0.185	0.583	0.185
Period FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Rating FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Size FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Dpt FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Bank FE	No	**Yes**	**Yes**	**Yes**	**Yes**
Bank*Period FE	No	No	**Yes**	**Yes**	**Yes**
Firm FE	No	No	No	**Yes**	**Yes**
Size*Period FE	No	No	No	No	**Yes**
Cluster	Firm-bank	Firm-bank	Firm-bank	Firm-bank	Firm-bank

Appendix: Impact of the SF by class of exposures

VARIABLE	LN (Total outstanding amount of loans) (1)	(2)	(3)	(4)	(5)
Eligible * Post * small	0.078***	0.085***	0.084***	**0.044*** **	0.069***
	(0.011)	(0.011)	(0.011)	**(0.008)**	(0.008)
Eligible * Post * medium	0.025**	0.031***	0.026**	**0.021** **	0.032***
	(0.011)	(0.011)	(0.011)	**(0.009)**	(0.009)
Eligible * Post * large	0.006	0.008	0.005	**-0.022** **	-0.012
	(0.013)	(0.013)	(0.013)	**(0.010)**	(0.010)
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Adjusted R-squared	0.305	0.308	0.308	0.750	0.750
Time FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Rating FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Size FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Dpt FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Bank FE	No	**Yes**	**Yes**	**Yes**	**Yes**
Bank*Time FE	No	No	**Yes**	**Yes**	**Yes**
Firm FE	No	No	No	**Yes**	**Yes**
Size*Time FE	No	No	No	No	**Yes**
Cluster	Firm-bank	Firm-bank	Firm-bank	Firm-bank	Firm-bank

Appendix: Robustness checks

VARIABLE	LN (Total outstanding amount of loans)				
	(1)	(2)	(3)	(4)	(5)
Eligible * Post	**0.059***** (0.009)	**0.059***** (0.010)	**0.045***** (0.009)	**0.036***** (0.009)	**0.063***** (0.011)
Observations	16,214,490	16,267,688	16,270,819	8,930,159	13,808,816
Adjusted R2	0.728	0.732	0.733	0.697	0.727
Time FE	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y
Size FE	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y
Dpt FE	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Cluster	Firm-bank	Firm-bank	Firm-bank	Firm-bank	Firm-bank
Sample	**[0;1000[& [2000-5000[**	**[0;1500[& [2000-5000[**	**[0;1400[& [1600-5000[**	**Drop firms with unknown size**	**Drop [2013Q3-2014Q2]**

- Whole sample coefficient : 4.3%

Appendix: Types of exposures

Short term loans (<1 year)	CO
	CC
	AF
	CA
Medium and long term loans (>1 year)	TE
	TA
Financial leases and leasing	BM
	BI
Securitized loans	IT
Undrawn credit lines	OC
	OD
	AD

* ELIGIBILITY THRESHOLD:

Exposures considered to assess

if SMEs are eligible (< €1.5M)

* APPLICATION OF THE SF:

Exposures that benefit from

the 25% reduction in

capital requirements

Appendix : Differences-in-differences specification

$$L_{f,b,t+1} = \alpha + \beta \cdot Eligible_{f,b,t} \cdot Post_t + \gamma \cdot Eligible_{f,b,t} + \theta \cdot Post_t + \sum_{b,t} \mu_{b,t} \cdot 1_{b,t} + \sum_{b} \omega_b \cdot 1_b + \sum_{f} \rho_f \cdot 1_f + \epsilon_{b,f,t}$$

with: $$Eligible_{f,b,t} = \begin{cases} 1 \text{ if } Loans_{f,b,t} \leq €1.5 \text{ million} \\ 0 \text{ if } Loans_{f,b,t} > €1.5 \text{ million} \end{cases}$$

$$Post_t = \begin{cases} 1 \text{ if } t \geq 2014Q1 \\ 0 \text{ if } t < 2014Q1 \end{cases}$$

and: $L_{f,b,t+1} = LN \text{ of the } \mathbf{Total} \text{ amount of credit at the following period}$

$\sum_{b,t} \mu_{b,t} \cdot 1_{b,t}$, $\sum_{b} \omega_b \cdot 1_b$ and $\sum_{f} \rho_f \cdot 1_f$ denotes fixed effects