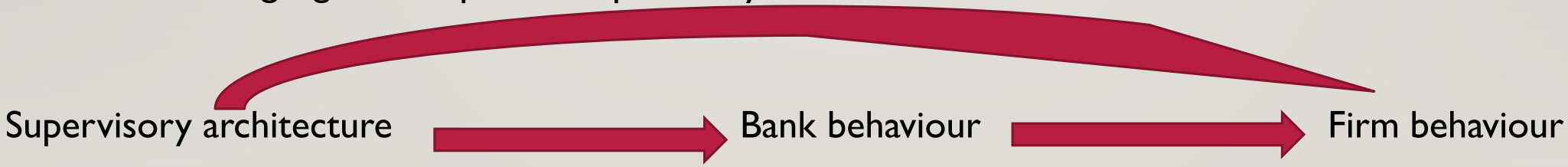
OUT WITH THE NEW, IN WITH THE OLD? BANK SUPERVISION AND THE COMPOSITION OF FIRM INVESTMENT

MIGUEL AMPUDIA THORSTEN BECK ALEXANDER POPOV

EUI FLORENCE SCHOOL OF BANKING AND FINANCE

MOTIVATION

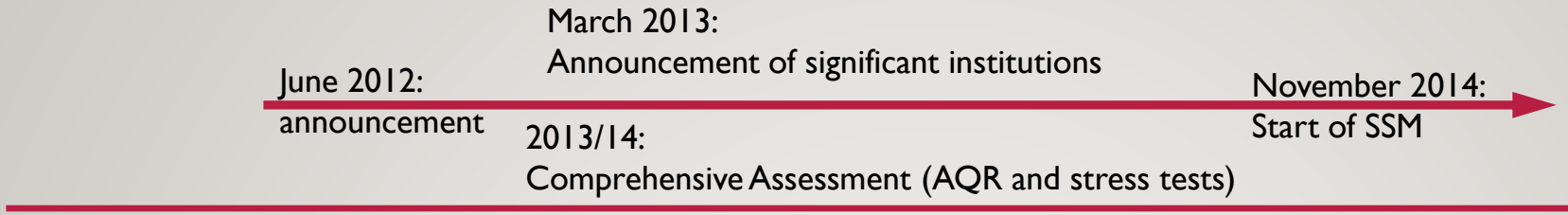
- **Effective supervision can increase stability, but does it come with growth costs?**
  - Laeven and Valencia (2010): high growth costs of financial crises
  - Ranciere et al. (2008): countries with more developed financial systems but occasional financial crises have, on average, grown faster than countries with stable but shallow financial conditions
- We use the change in supervisory architecture in 2014 in the euro area as exogenous positive shock to the supervisory efficiency to assess these hypotheses
- We link firm-level investment data to the firm's main lender and use a difference-in-differences estimation to gauge the impact of supervisory architecture on firm investment



WHAT DOES THEORY/LITERATURE PREDICT?

- Implications of effective supervision for bank lending and firm investment:
  - More rigorous supervision → more prudent risk taking by banks
  - Stronger focus on collateralized lending
- Move to SSM has reduced lending in the affected banks and increased their resilience (Fiordelisi, Ricci and Stentella Lopes, 2017; Eber and Minoiu, 2017; Altavilla et al., 2020)
- Our contribution
  - Implications for composition of firms' investment and thus economic growth
  - Focus on large economic area (euro area) compared to extensive literature on US

THE CHANGE IN SUPERVISORY ARCHITECTURE



- As reaction to Global Financial and euro debt crises, decision to move towards a euro area financial safety.
- June 2012: Decision to establish Single Supervisory Mechanism (complemented with Single Resolution Mechanism; outstanding: deposit insurance)
- SSM directly supervises significant institutions and indirectly less significant institutions
- In run-up to start of SSM: Comprehensive Assessment that included Asset Quality Review and Stress Tests, between November 2013 and October 2014

DATA

Firm-level data from Orbis

- 2008-19
- Large variation in coverage across countries; compare number of firms in Orbis with Eurostat (drop countries with less than 10% coverage)
- exclude firms borrowing from the 2 largest SIs and firms borrowing fromLSIs other than the 5 largest, in each country
- Only firms in manufacturing, construction, wholesale and retail trade, transportation and storage, accommodation and food service activities, information and communication, professional and scientific and technical activities.
- 121,394 firms in 12 euro area countries (Austria, Estonia, France, Germany, Greece, Latvia, Lithuania, Luxembourg, Netherlands, Portugal, Slovenia, and Spain) borrowing from 1,839 banks belonging to 139 banking groups.
- Use data on firm investment and characteristics and the main lender of the firm (time-invariant for 2013; assumption that limited changes)

TREATMENT VS. CONTROL AND MATCHING

Panel A. Firm-specific factors: Full sample

	(1)	(2)
	Difference (SI=1, SI=0)	*P*-value
Log (Assets)	0.0013***	0.001
Cash / Assets	-0.0163***	0.006
Age	0.0004***	0.000
Debt / Assets	0.0001	0.381
Net worth	0.0001	0.697
# firms	199,065	

Panel B. Firm-specific factors: Matched sample

	(1)	(2)
	Difference (SI=1, SI=0)	*P*-value
Log (Assets)	-0.0006	0.287
Cash / Assets	-0.0197	0.100
Age	-0.0001	0.666
Debt / Assets	0.0026	0.424
Net worth	-0.0001	0.444
# firms	121,394	

DESRCRIPTIVE STATISTICS

	(1)	(2)	(3)	(4)	(5)
	Mean	Median	St. dev.	Min.	Max.
Log (Total fixed assets)	12.4889	12.5287	2.2839	0	22.8731
Intangible assets share	0.1224	0.0023	0.2438	0	1
Δ Labor productivity	0.0062	0.0050	0.2992	-1	1
Δ TFP	0.0192	0.0138	0.2891	-1	1
Δ Total debt / Assets	-0.0591	-0.0564	0.3550	-1	1
Δ Short-term debt / Assets	-0.0076	0.0033	0.4018	-1	1
Δ Long-term debt / Assets	-0.0924	-0.0895	0.3815	-1	1

IBSI DATA

Bank-level data

- IBSI: data on 247 financial institutions, starting in 2007 in 18 EU countries, unconsolidated, total lending to NFCs, households, governments

- We use data on 126 banking groups from 7 euro area countries (Austria, France, Germany, Greece, Luxembourg, Netherlands, and Spain)

FINREP DATA

- Data on total loans by an individual bank to firms in a sector in a country in an individual month.
  - 18 Level-1 sectors
- Aggregate the information across firms and months, as well as across two classes of banks: SIs and LSIs
- Share of total lending by SIs, out of total lending by both SIs and LSIs, to an individual sector in an individual country in a year

- For 12 euro area countries

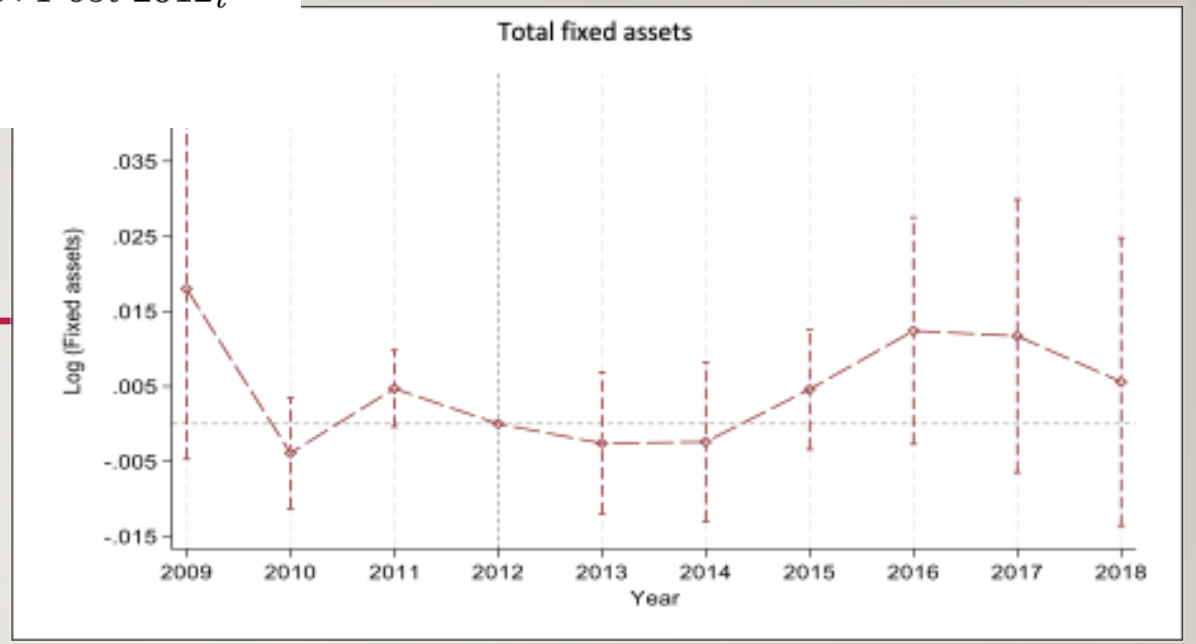
EU KLEMS

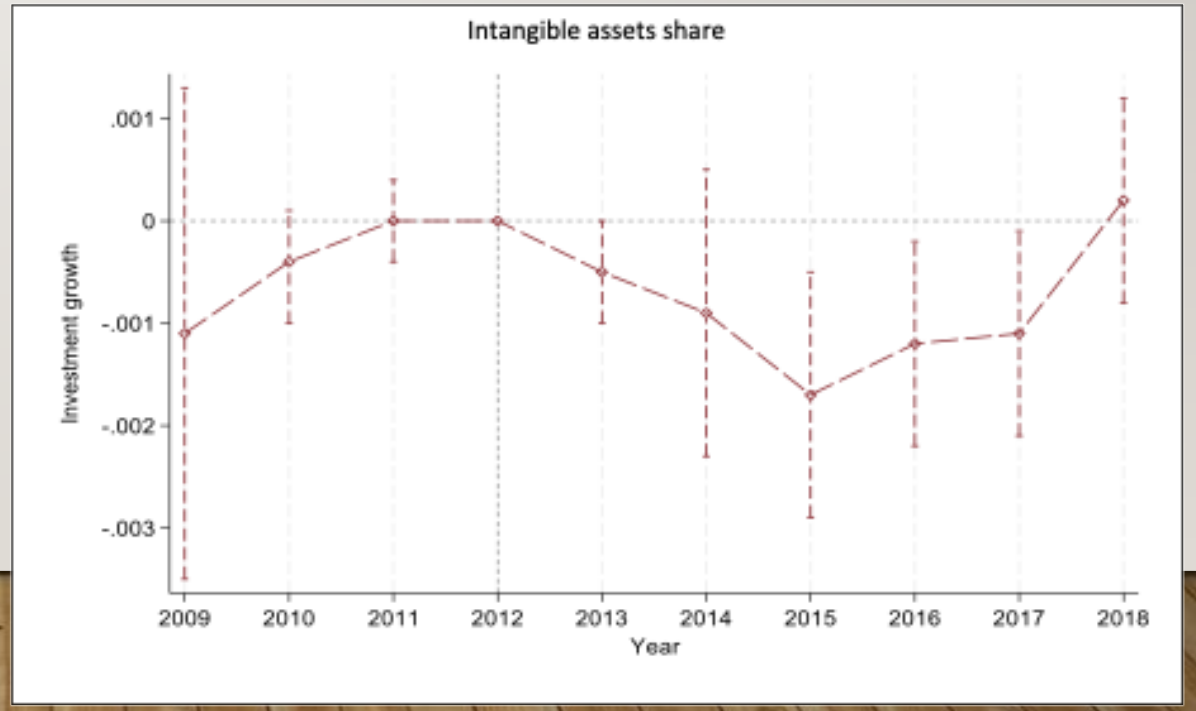
- Vienna Institute for International and Economic Studies.
- Total R&D investment in an individual sector in an individual country in a given year.

$$Log(K_{fbcst}) = \sum_{n=2009}^{2018} \beta_n \times Year_n \times SI_{fbcs} + \gamma_1 X_{fbcst} + \gamma_2 X_{fbcst} \times Post\,2012_t + \gamma_3 X_{fbcst} \times Post\,2014_t + \mu_f + \phi_{cst} + \varepsilon_{fbcst}$$

EVENT STUDY

ure 1. SSM and firm assets over time: SI versus LSI firms





METHODOLOGY

$$
\begin{aligned}
Intangible\ share_{fbcst} &= \beta_1 SI_{fbcs} \times Post\,2012_t + \beta_2 SI_{fbcs} \times Post\,2014_t \\
&+ \gamma_1 X_{fbcst} + \gamma_2 X_{fbcst} \times Post\,2012_t + \gamma_3 X_{fbcst} \times Post\,2014_t \\
&+ \mu_f + \phi_{cst} + \varepsilon_{fbcst}
\end{aligned}
$$

- Firm *f*, in country *c*, operating in sector s, borrowing from bank *b*, in year *t*
- Dependent variables: intangible asset share
- SI =1 if firm borrows from a significant institution
- Post2012 = 1 2013/14, Post2014 = 1 starting in 2015
- Standard error clustered at the country-year level

MAIN RESULTS

	(1)	(2)
	Intangible assets share	
Post 2012 × SI	-0.0005**	0.0028***
	(0.0002)	(0.0006)
Post 2014 × SI	-0.0011***	0.0022***
	(0.0004)	(0.0003)
Post 2012 × SI × Euro		-0.0033***
		(0.0006)
Post 2014 × SI × Euro		-0.0033***
		(0.0005)
Firm FEs	Yes	Yes
Firm controls	Yes	Yes
Post 2012 × Firm controls	Yes	Yes
Post 2014 × Firm controls	Yes	Yes
Country × Sector × Year FEs	Yes	Yes
Clustering	Country × SI	
Observations	1,201,303	1,404,082
R-squared	0.89	0.90

PLACEBO TEST WITH NON-EURO EU COUNTRIES AND ELIGIBLE SIGNIFICANT INSTITUTIONS

	(1)	(2)
	Intangible assets share	
Post 2012 × SI	-0.0005**	0.0028***
	(0.0002)	(0.0006)
Post 2014 × SI	-0.0011***	0.0022***
	(0.0004)	(0.0003)
Post 2012 × SI × Euro		-0.0033***
		(0.0006)
Post 2014 × SI × Euro		-0.0033***
		(0.0005)
Firm FEs	Yes	Yes
Firm controls	Yes	Yes
Post 2012 × Firm controls	Yes	Yes
Post 2014 × Firm controls	Yes	Yes
Country × Sector × Year FEs	Yes	Yes
Clustering	Country × SI	
Observations	1,201,303	1,404,082
R-squared	0.89	0.90

WHAT DRIVES DROP IN INTANGIBLE ASSET SHARE?

	(1)	(2)	(3)
	Log (Total fixed assets)	Log (Total tangible assets)	Log (Total intangible assets)
Post 2012 × SI	-0.0069**	-0.0080**	-0.0172***
	(0.0031)	(0.0032)	(0.0059)
Post 2014 × SI	0.0053	0.0065	-0.0005
	(0.0041)	(0.0041)	(0.0209)
Firm FEs	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes
Post 2012 × Firm controls	Yes	Yes	Yes
Post 2014 × Firm controls	Yes	Yes	Yes
Country × Sector × Year FEs	Yes	Yes	Yes
Clustering		Country × SI	
Observations	1,211,027	1,211,566	1,112,682
R-squared	0.88	0.87	0.85

QUARTILES OF INTANGIBLE ASSETS

	(1)	(2)	(3)
	Intangible assets share		
Post 2012 × SI	0.0000	-0.0010***	-0.0009
	(0.0000)	(0.0002)	(0.0009)
Post 2014 × SI	0.0000*	-0.0010***	-0.0050*
	(0.0000)	(0.0002)	(0.0027)
Firm FEs	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes
Post 2012 × Firm controls	Yes	Yes	Yes
Post 2014 × Firm controls	Yes	Yes	Yes
Country × Sector × Year FEs	Yes	Yes	Yes
Clustering		Country × SI	
Observations	135,418	305,507	308,495
R-squared	0.23	0.31	0.77

OTHER ROBUSTNESS TESTS

- Clustering at country-level, country-SI-year and bank-level
- Control for bank-fixed effects
- Replace SI with indicator of supervisory power pre-SSM (on NCA level)
- Excluding firms borrowing banks that received public assistance during the Global Financial Crisis
- Full sample of firms
- Collapsed data over three period (pre-SSM, announcement, post-SSM)

EFFECT ON R&D SPENDING BY FIRMS

	(1)
	Log (R&D)
Post 2012 × Share SI	-0.1468
	(0.6367)
Post 2012 × Share SI	-0.3671**
	(0.1536)
Country × Sector FEs	Yes
Year FEs	Yes
Observations	1,526
R-squared	0.97

NO VARIATION ACROSS FIRMS WITH DIFFERENT FINANCING CONSTRAINTS

	(1)	(2)
	Intangible assets share	
Post 2012 × SI	0.0002	-0.0010**
	(0.0016)	(0.0004)
Post 2014 × SI	-0.0001	-0.0017**
	(0.0018)	(0.0007)
Post 2012 × SI × Small	-0.0010	
	(0.0023)	
Post 2014 × SI × Small	-0.0017	
	(0.0022)	
Post 2012 × SI × Young		0.0028
		(0.0030)
Post 2014 × SI × Young		-0.0054**
		(0.0027)
Small		
Young		
Firm FEs	Yes	Yes
Firm controls	Yes	Yes
Post 2012 × Firm controls	Yes	Yes
Post 2014 × Firm controls	Yes	Yes
Country × Sector × Year FEs	Yes	Yes
Clustering	Country × SI	
Observations	953,527	953,527
R-squared	0.91	0.91

STRONGER EFFECTS IN MORE INNOVATION-INTENSIVE SECTORS

	(1)	(2)
	Intangible assets share	
Post 2012 × SI	0.0014	0.0016*
	(0.0010)	(0.0008)
Post 2014 × SI	0.0019	0.0020*
	(0.0012)	(0.0011)
Post 2012 × SI × R&D	-0.0009	
	(0.0007)	
Post 2014 × SI × R&D	-0.0016	
	(0.0012)	
Post 2012 × SI × Patents		-0.0024**
		(0.0012)
Post 2014 × SI × Patents		-0.0037*
		(0.0020)
Firm FEs	Yes	Yes
Firm controls	Yes	Yes
Post 2012 × Firm controls	Yes	Yes
Post 2014 × Firm controls	Yes	Yes
Country × Sector × Year FEs	Yes	Yes
Clustering	Country × SI	
Observations	168,953	168,953
R-squared	0.89	0.89

NEGATIVE EFFECTS ON LABOR PRODUCTIVITY

	(1)	(2)
	Δ Labor productivity	Δ TFP
Post 2012 × SI	-0.0015***	-0.0015
	(0.0004)	(0.0018)
Post 2014 × SI	-0.0013**	-0.0005
	(0.0005)	(0.0012)
Firm FEs	Yes	Yes
Firm controls	Yes	Yes
Post 2012 × Firm controls	Yes	Yes
Post 2014 × Firm controls	Yes	Yes
Country × Sector × Year FEs	Yes	Yes
Clustering	Country × SI	
Observations	824,365	400,658
R-squared	0.12	0.20

$$\Delta Productivity_{fbcst} = \beta_1 SI_{fbcs} \times Post\ 2012_t + \beta_2 SI_{fbcs} \times Post\ 2014_t + \gamma_1 X_{fbcst} + \gamma_2 X_{fbcst} \times Post\ 2012_t + \gamma_3 X_{fbcst} \times Post\ 2014_t + \mu_f + \phi_{cst} + \varepsilon_{fbcst}$$

REDUCED EXTERNAL FUNDING ON FIRM-LEVEL

	(1)	(2)	(3)
	Δ Total debt / Assets	Δ Short-term debt / Assets	Δ Long-term debt / Assets
Post 2012 × SI	0.0034	0.0044	0.0034**
	(0.0025)	(0.0038)	(0.0015)
Post 2014 × SI	-0.0070***	-0.0046***	-0.0048***
	(0.0006)	(0.0016)	(0.0009)
Firm FEs	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes
Post 2012 × Firm controls	Yes	Yes	Yes
Post 2014 × Firm controls	Yes	Yes	Yes
Country × Sector × Year FEs	Yes	Yes	Yes
Clustering		Country × SI	

$$\Delta log\ \frac{Debt_{fbcst}}{Assets_{fcst-1}} = \beta_1 SI_{fbcs} \times Post\ 2012_t + \beta_2 SI_{fbcs} \times Post\ 2014_t$$
$$+\gamma_1 X_{fbcst} + \gamma_2 X_{fbcst} \times Post\ 2012_t + \gamma_3 X_{fbcst} \times Post\ 2014_t$$
$$+\mu_f + \phi_{cst} + \varepsilon_{fbcst}$$

BANK LENDING

	(1)	(2)
	Δ Loans / Assets	
Post 2012 × SI	-0.0839***	-0.1269***
	(0.0258)	(0.0348)
Post 2014 × SI	-0.0187	-0.0193
	(0.0291)	(0.0823)
Post 2012 × Capital		-0.3707**
		(0.1702)
Post 2014 × Capital		0.2711
		(0.9643)
Post 2012 × SI × Capital		0.5566***
		(0.1891)
Post 2014 × SI × Capital		-0.0218
		(0.9240)
Bank FEs	Yes	Yes
Country × Year FEs	Yes	Yes
Clustering	Country × Year	
Observations	1,026	1,026
R-squared		

$$\Delta \log NFCLending_{bct} = \beta SI_{bct} \times Post2012_t + \gamma SI_{bct} \times Post2014_t + \mu_b + \phi_{ct} + \varepsilon_{bct},$$

BANK LENDING

	(1)	(2)
	Δ Loans / Assets	
Post 2012 × SI	-0.0839***	-0.1269***
	(0.0258)	(0.0348)
Post 2014 × SI	-0.0187	-0.0193
	(0.0291)	(0.0823)
Post 2012 × Capital		-0.3707**
		(0.1702)
Post 2014 × Capital		0.2711
		(0.9643)
Post 2012 × SI × Capital		0.5566***
		(0.1891)
Post 2014 × SI × Capital		-0.0218
		(0.9240)
Bank FEs	Yes	Yes
Country × Year FEs	Yes	Yes
Clustering	Country × Year	
Observations	1,026	1,026
R-squared	0.33	0.34

CONCLUSIONS

- Firms borrowing from significant institutions reduce investment in intangible assets and increase investment in tangible assets
- Robust to many sensitivity analyses
- Stronger in industries more reliant on intangible assets
- Negative effect on labour productivity and long-term debt
- Reduction in bank lending, especially for less capitalised banks
- **In summary: trade-off/tension between stability and growth**
- **Policy implication: strengthen non-bank sector (venture capital funds, angel financiers etc.)**

THANK YOU

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WWW.THORSTENBECK.COM

@TL-BECK.BSKY.SOCIAL