



EUROPEAN CENTRAL BANK

EUROSYSTEM

Out with the new, in with the old? Bank supervision and the composition of firm investment*



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Relationship between growth and stability

- **View 1: Stability breeds growth**
 - Long-term growth higher in countries where growth less volatile (Ramey & Ramey, 1992)
 - Low volatility increases return to investment
- **View 2: Trade-off**
 - Countries with higher long-term growth experience more frequent crises (Ranciere et al., 2008)
 - Same force behind both development and chaos
 - Low volatility may lead to crises (Brunnemeier & Sannikov, 2014; Bekaert & Popov, 2019)
- **Relation between stability and growth in general still an open question**
- **This paper: exogenous shock to financial stability -> effect on growth mechanisms**

Stability-inducing reform: Euro Area's Banking Union / SSM

- **Single Supervisory Mechanism (SSM) announced in 2012, implemented in November 2014**
 - Significant Institutions (SIs) put under direct SSM supervision in Frankfurt
 - Less Significant Institutions (LSIs) remained under national supervision
- **Primary objective: financial stability**
 - *„[...] safety and soundness of credit institutions and the stability of the financial system.“*
- **Substantial post-SSM de-risking of euro area banks**
 - Banks now hold more and better collateral (Altavilla et al., 2020)
- **Effect on level and composition of firms' investment?**
- **Implications for aggregate growth**
 - Sectoral shifts, changes in productivity

What we find

- **Significant Institutions reduce lending, firms borrowing from SIs reduce debt levels**
- **„Affected“ firms reallocate investment**
 - Cash holdings go up, especially during Comprehensive Assessment (2013—2014)
 - Tangible investment goes up during the SSM period (2015—2017)
 - Intangible investment declines during both periods
 - Total investment does not decline
- **Reduction in labor productivity in „affected“ firms**
 - But not in employment
- **Effects more pronounced in R&D-intensive sectors**
 - Stricter supervision may reduce banks' ability to support a knowledge-based economy

Related literature

- **Optimal supervisory architecture**
 - Centralized supervision more efficient (Dell'Arriccia & Marques 2006, Rochet 2008)
 - Local supervision more efficient (Laffont & Tirole 1993, Carletti et al. 2016, Colliard 2020)
 - Empirical evidence mixed (Beck et al. 2013, Behn et al. 2017, Foarta 2018, Gornicka & Zoican 2016, Segura & Vicente 2018)
- **Supervision and bank behavior**
 - Mostly US evidence (Agarwal et al. 2014, Danisewicz et al. 2018, Delis & Staikouras 2011, Gopalan et al. 2017, Hirtle et al. 2020, Kang et al. 2015, Rezende 2016)
 - Scant evidence from Europe (Bonfim et al. 2020)
 - Papers on SSM only look at bank lending (Eber & Minoiu 2016, Fiordelisi et al. 2017, Altavilla et al. 2020)

Data

- **Firm-level data: Orbis**
 - Balance sheet characteristics for 241,082 unique firms in 13 euro area countries
 - Age, size, sales, cash flow, debt, sector
 - 3 main types of assets: tangible assets, intangible assets, current assets
 - Firm-bank link (main bank, up to 6 banks)
 - Set-up allows to compare similar SI- and LSI-linked firms in the same country & sector
 - Three periods: pre-BU (2010-12), Comprehensive Assessment (2013-14), SSM (2015-17)
 - All data collapsed into three firm-period observations (as per Duflo et al., 2004)
- **Bank-level data: IBSI**
 - Actual lending by SIs and LSIs

Supervision and firm investment: Headline result

$$\frac{I_{fbest}}{K_{fcst-1}} = \beta_1 SI_{fbest} \times Post2012_t + \beta_2 SI_{fbest} \times Post2014_t + \mu_f + \phi_{cst} + \varepsilon_{fbest}$$

	(1)	(2)	(3)	(4)	(5)
	Δ Total Assets	Δ Tangible assets	Δ Intangible assets	Δ Other fixed assets	Δ Current assets
Post 2012 \times SI	0.0044*** (0.0012)	0.0025 (0.0024)	-0.0065*** (0.0016)	-0.0007 (0.0015)	0.0039*** (0.0014)
Post 2014 \times SI	0.0092*** (0.0092)	0.0028*** (0.0007)	-0.0058** (0.0028)	-0.0011 (0.0021)	0.0021*** (0.0007)
Firm FEs	Yes	Yes	Yes	Yes	Yes
Country \times Sector \times Period FEs	Yes	Yes	Yes	Yes	Yes
Clustering			Country		
Observations	722,806	643,226	223,515	393,600	705,776
R-squared	0.42	0.43	0.44	0.37	0.37

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Post 2014 × SI	0.0092*** (0.0092)	0.0028*** (0.0007)	-0.0058** (0.0028)	-0.0011 (0.0021)	0.0021*** (0.0007)
Firm FEs	Yes	Yes	Yes	Yes	Yes
Country × Sector × Period FEs	Yes	Yes	Yes	Yes	Yes
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- **After 2012, total assets increase at firms borrowing from SIs, by 21% / 44%, relative to LSI-linked firms**
 - Increase in cash holdings by 16% during Comprehensive Assessment period, by 8% in long run
 - Tangible assets declined by 7% less during Post-SSM period
 - Accompanied by a permanent 7% decline in intangible investment

Supervision and firm investment: Placebo 1, pre-SSM

$$\frac{I_{fbest}}{K_{fcst-1}} = \beta_1 SI_{fbest} \times Post2010_t + \mu_f + \phi_{cst} + \varepsilon_{fbest}$$

	(1)	(2)	(3)	(4)
	Δ Tangible assets	Δ Intangible assets	Δ Other fixed assets	Δ Current Assets
Post 2010 \times SI	-0.0009 (0.0024)	-0.0035 (0.0036)	0.0025 (0.0017)	-0.0017 (0.0026)
Firm FEs	Yes	Yes	Yes	Yes
Country \times Sector \times Period FEs	Yes	Yes	Yes	Yes
Clustering			Country	
Observations	644,952	251,654	387,046	694,625
R-squared	0.47	0.54	0.42	0.35

- Repeat test on same sample of firms over pre-BU period (2009—2012)
 - 1 pre- and 1 post- observation
- Effects disappear, suggesting a genuine time effect of SSM announcement

Supervision and firm investment: Placebo 2, non-SSM countries

$$\frac{I_{fbest}}{K_{fcst-1}} = \beta_1 SI_{fbest} \times Post2012_t + \beta_2 SI_{fbest} \times Post2014_t + \mu_f + \phi_{cst} + \varepsilon_{fbest}$$

	(1)	(2)	(3)	(4)
	Δ Tangible assets	Δ Intangible assets	Δ Other fixed assets	Δ Current Assets
Post 2012 \times SI	-0.0153** (0.0059)	0.0050 (0.0162)	-0.0266** (0.0130)	0.0034 (0.0068)
Post 2014 \times SI	-0.0071 (0.0062)	-0.0067 (0.0186)	-0.0174 (0.0136)	0.0010 (0.0067)
Firm FEs	Yes	Yes	Yes	Yes
Country \times Sector \times Period FEs	Yes	Yes	Yes	Yes
Clustering			Country	
Observations	79,413	14,815	8,022	79,825
R-squared	0.43	0.50	0.47	0.35

- Repeat test on sample of non-euro area firms over the same period
 - Hungary (good coverage of banks and firms)
 - Split banks in pseudo-SSM and pseudo-non-SSM, based on would-be size criterion
- Effects disappear, suggesting a genuine jurisdiction effect of the SSM

Supervision and firm investment: Robustness

- **Only firms with all types of investment**
- **Propensity-score matched sample**
 - SI and LSI firms different on a number of dimensions
- **Controlling for time-varying effect of lagged firm characteristics**
 - Age, Size, Sales/Assets, Debt/Assets, Cash/Assets
- **Control for bank fixed effects**
- **SUR**
 - All types of investment simultaneously determined
- **Non-collapsed data**

Supervision and firm investment: Sector heterogeneity

	(1)	(2)	(3)	(4)
	Δ Tangible assets	Δ Intangible assets	Δ Other fixed assets	Δ Current assets
Post 2012 \times SI	0.0022 (0.0023)	-0.0079*** (0.0026)	-0.0017 (0.0015)	0.0041** (0.0016)
Post 2012 \times SI \times Intang. Intensity	1.7613* (1.3085)	4.6080 (4.0893)	4.9283* (2.5333)	-0.9943 (1.9186)
Post 2014 \times SI	0.0030*** (0.0008)	-0.0074*** (0.0020)	-0.0021 (0.0024)	0.0023*** (0.0008)
Post 2014 \times SI \times Intang. Intensity	-0.6797 (2.6371)	5.2046 (8.7251)	4.9350 (4.0490)	-1.0067 (0.8994)
Firm FEs	Yes	Yes	Yes	Yes
Country \times Sector \times Period FEs	Yes	Yes	Yes	Yes
Clustering			Country	
Observations	643,226	223,515	393,600	705,776
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- **Increase in tangible investment strongest in R&D-intensive sectors**

- Reduced ability of banks to support „knowledge economy“
- Aggregate implications: 60% of long-term growth due to R&D, 0% to capital (Fernald & Jones, 2014)

Other effects: Employment and labor productivity

	(1)	(2)
	Δ Employment	Δ Labor productivity
Post 2012 \times SI	-0.0003 (0.0011)	-0.0002 (0.0011)
Post 2014 \times SI	0.0009 (0.0010)	-0.0017*** (0.0006)
Firm FEs	Yes	Yes
Country \times Sector \times Period FEs	Yes	Yes
Observations	580,926	572,198
R-squared	0.38	0.27

Other effects: Employment and labor productivity

	(1)	(2)
	Δ Employment	Δ Labor productivity
Post 2012 \times SI	-0.0003 (0.0011)	-0.0002 (0.0011)
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Firm FEs	Yes	Yes
Country \times Sector \times Period FEs	Yes	Yes
Observations	580,926	572,198
R-squared	0.38	0.27

- **No discernible effect on employment**
- **Long-term decline in labor productivity, by 16%**
 - As total assets do not decline, must be driven by the decline in intangible investment
 - Long-term growth implications from reduced productivity

Mechanism: Reduced lending vs. tighter collateral requirements

- **Two potential mechanisms**
 - SSM-supervised banks reduce lending
 - Higher capital ratios
 - SSM-supervised banks demand more tangible collateral
 - Safer lending portfolio
- **Can test first mechanisms**
 - Firm debt (Orbis)
 - NFC lending by classes of banks (IBSI)
- **Result 1: Total firm debt declines after 2014, driven by a reduction in long-term debt**
- **Result 2: Total lending by SIs declines after 2012 (foreign NFCs), after 2014 (foreign & domestic NFCs)**

Conclusion

- **Stability-enhancing bank supervision affects firms' real decisions**
 - Firms' investment re-allocated from intangible assets to tangible assets and cash
 - Accompanied by a reduction in labor productivity
 - Stronger in R&D-intensive sectors
 - Not a temporary phenomenon confined to the Comprehensive Assessment
 - Partially driven by reduced lending by banks under direct SSM supervision
- **Extensions**
 - Intangible investment not the same as innovation -> Look at patent data
 - Extend placebo analysis to other countries (UK, PL, DK)
 - Lower lending or more collateral-based lending? -> More recent Credit Register data (Anacredit)

Thank you!
