Synthetic, but How Much Risk Transfer?

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ECB-BIS-CEPR Conference on Technological Innovations in Financial Markets
9 December 2025

The views expressed do not necessarily reflect those of the ECB or the Eurosystem

Motivation

Cornerstone of bank capital regulation:

$$\textit{Tier 1 capital ratio} = \frac{\textit{Tier 1 capital}}{\sum_i^N \textit{risk weight}_i * \textit{asset amount}_i} \overset{!}{>} 7\%$$

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Shrink balance sheet

(loan sales and securitization)

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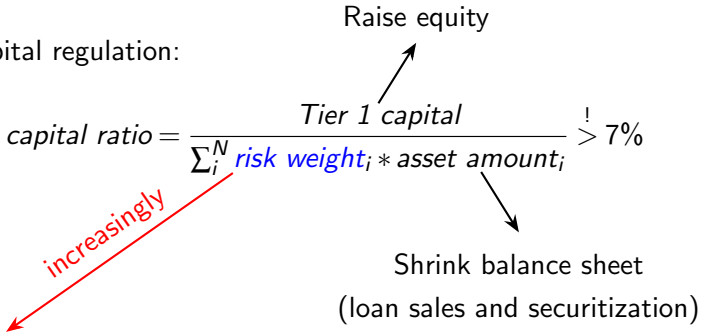
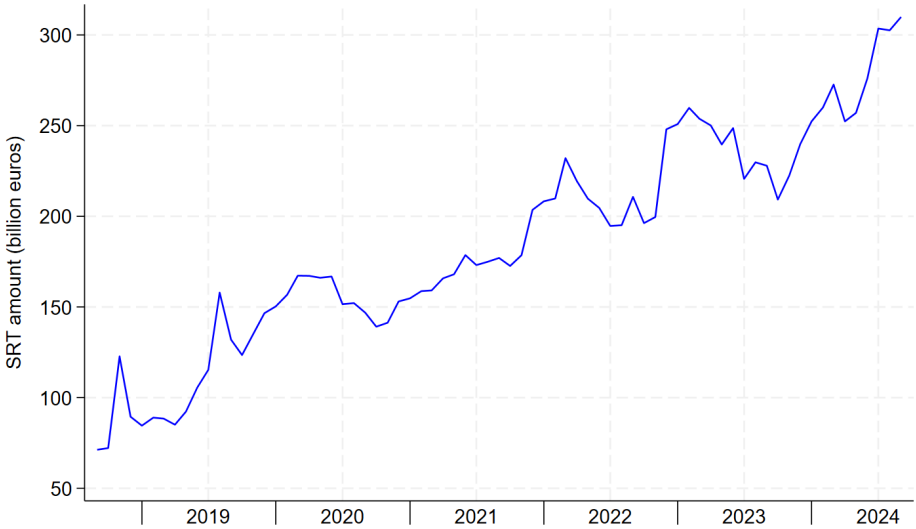


Synthetic risk transfer (SRT)

Instrument through which banks offload the credit risk of the first losses of a portfolio, while keeping the loans on their balance sheets $\Rightarrow$ *risk weight* reduction

Growth: stock of SRTs in Europe (corporate loans)



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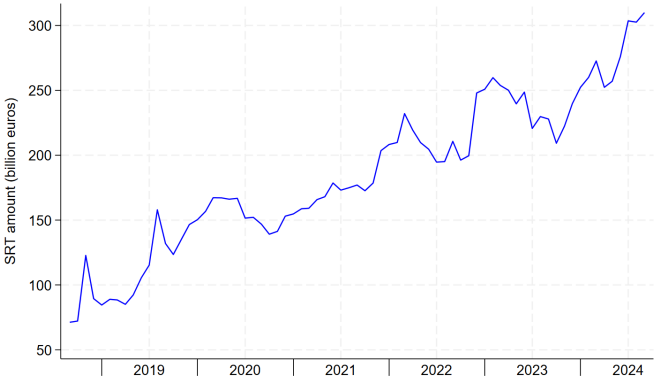

- $>10\%$ of corporate loans for 35 banks (many among the largest in Europe)
- Larger than traditional securitization for corporate loans (incl. CLOs)

... and in the US: < $100 billion, but + 400% in 2024 | Share of loan portfolio by country | SRT vs traditional securitization

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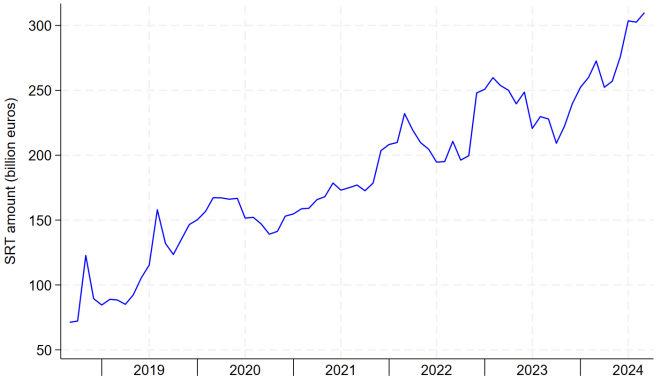

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Media attention

Reuters

Insight: Wall Street gets creative as regulators demand more capital

Bloomberg

If you're unfamiliar with synthetic risk transfers, there's a chance you'll hear all about them when the next financial crisis hits.

Market for Synthetic Risk Transfers Is Riddled With Gaps in Disclosure, IMF Officials Say

Media attention

Research Question

SRTs are unstudied in academic research

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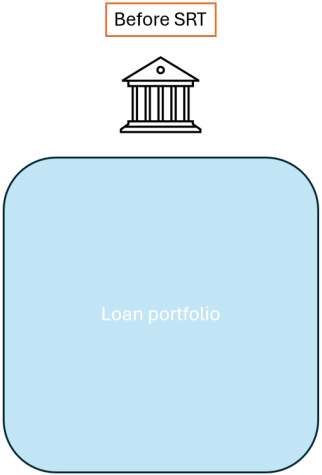
What are the incentives in the SRT market and potential risks to financial stability?

SRT—HOW IT WORKS



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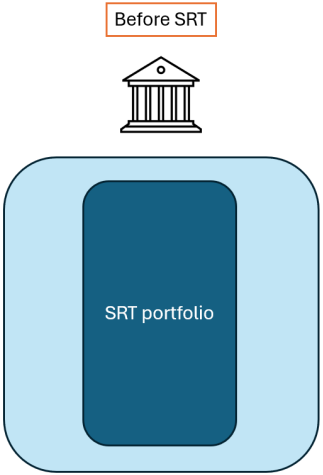

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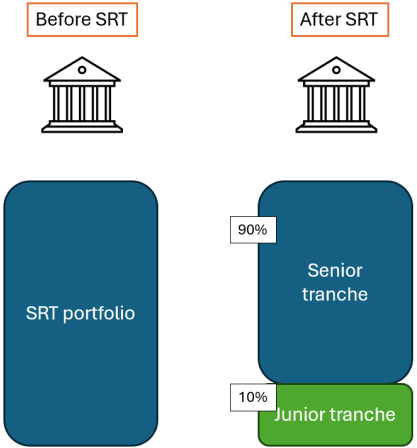

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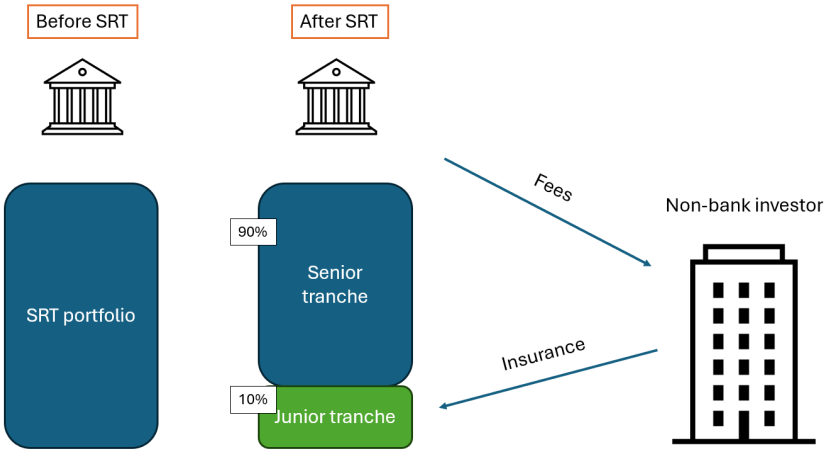

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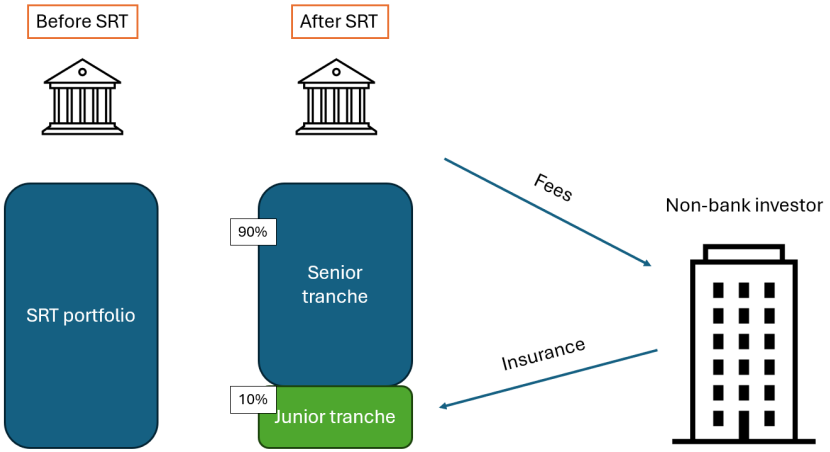

$$\frac{\textit{Tier 1 capital}}{\sum_i^N \mathbf{RW}_i * \textit{asset amount}_i}$$

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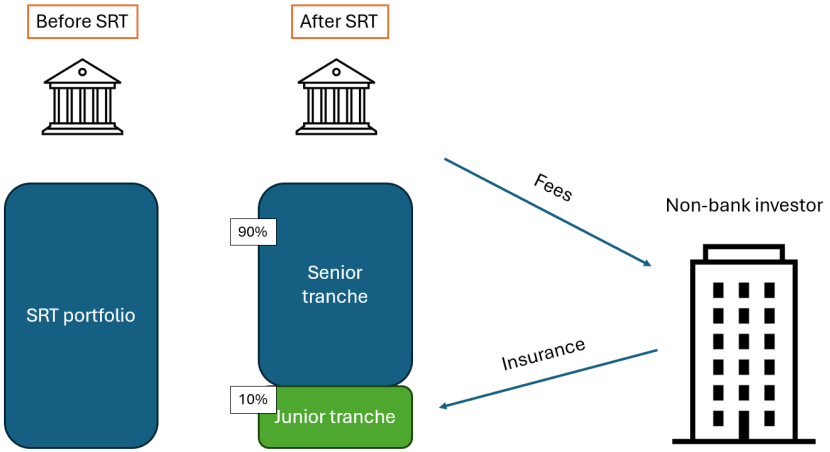

$$\frac{\textit{Tier 1 capital}}{\sum_i^N \mathbf{RW}_i * \textit{asset amount}_i} < \frac{\textit{Tier 1 capital}}{\sum_i^N RW_i * \textit{asset amount}_i}$$

Preview of findings

1. **Loan selection**
   - Banks use SRTs as a tool to decrease their effective capitalization
     - Banks choose capital-expensive loans
     - Banks redeploy the freed capital: lending ↑, capital ratio →, leverage ↑
     - Banks are left with capital-cheap loans
2. **Moral hazard**
   - Banks reduce monitoring of firms whose risk they transfer
3. **Interconnectedness of banks and non-banks**
   - Investors partially finance SRT investment with bank credit

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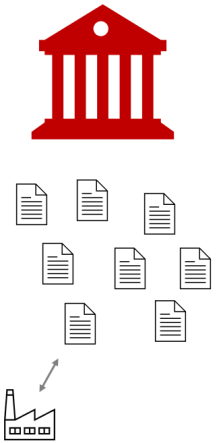

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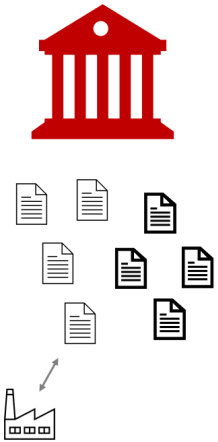

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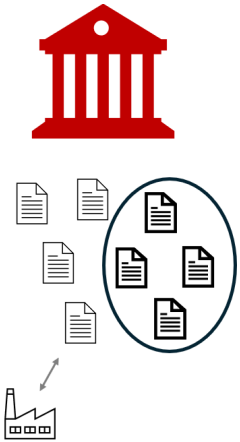

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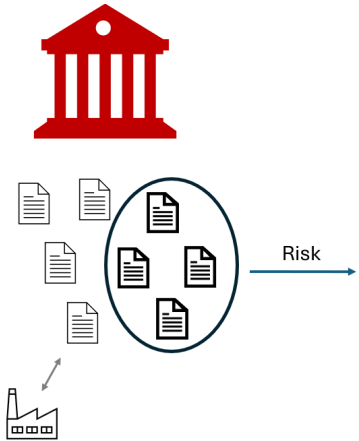

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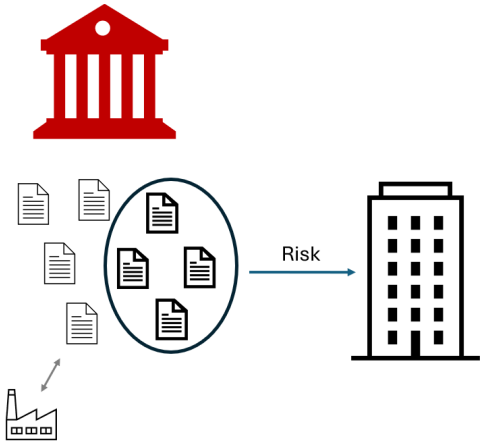

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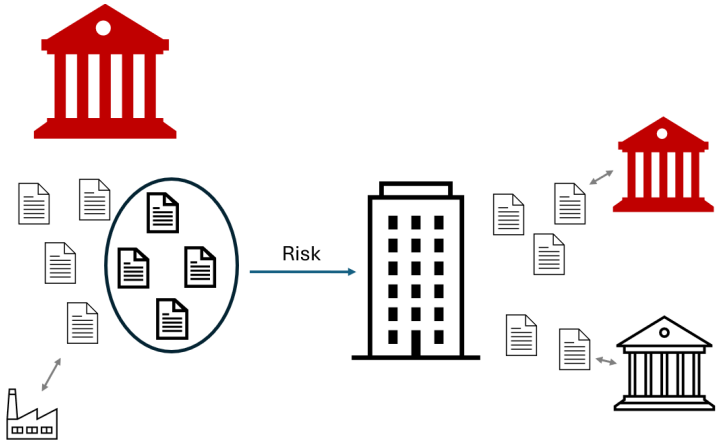

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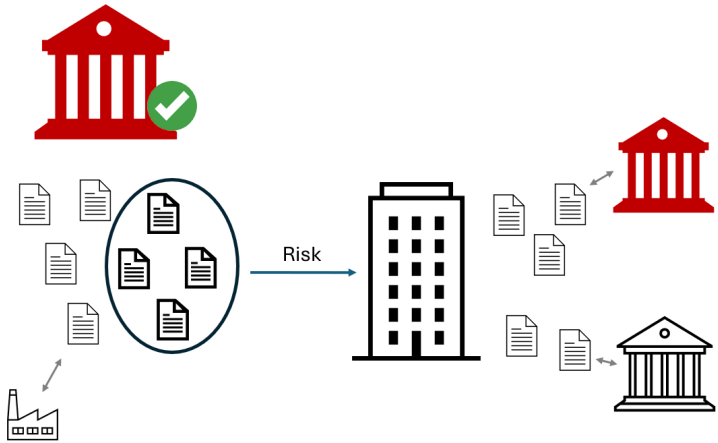

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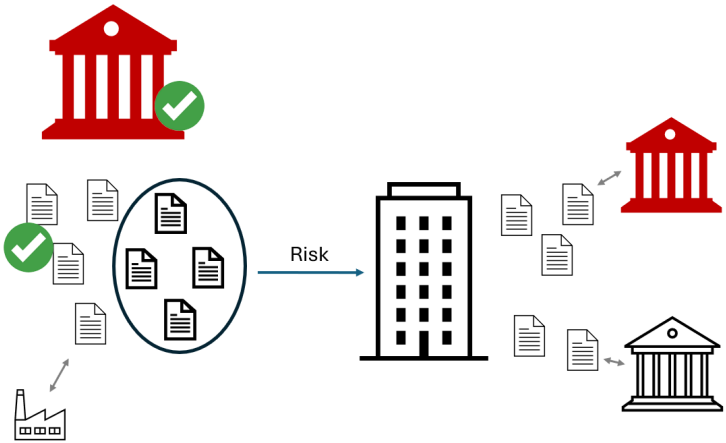

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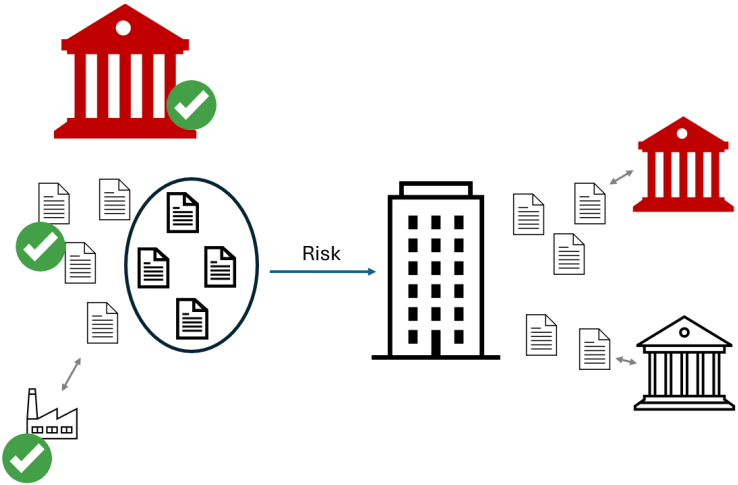

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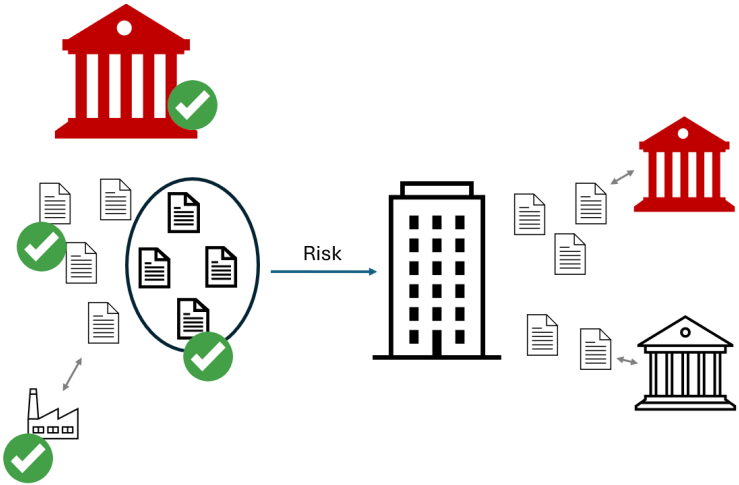

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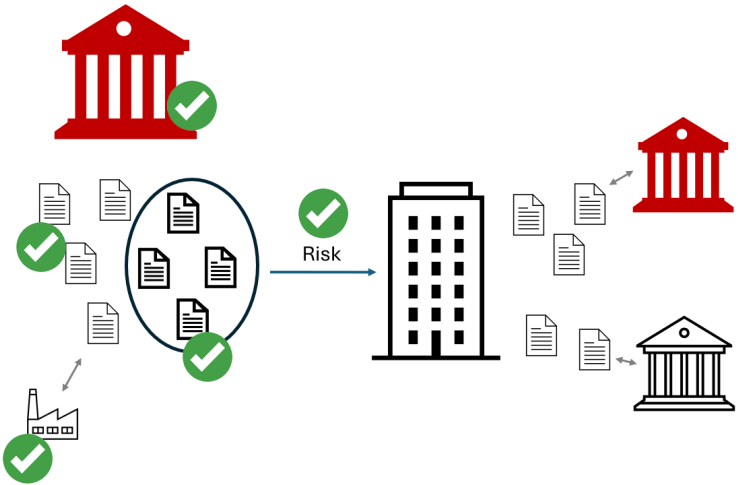

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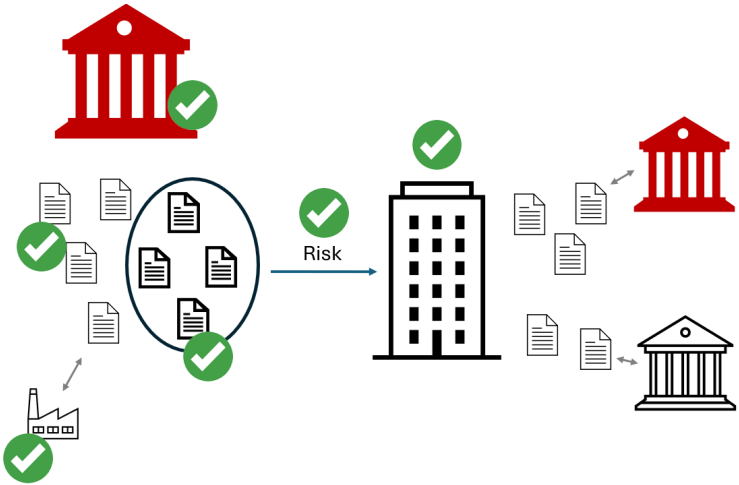

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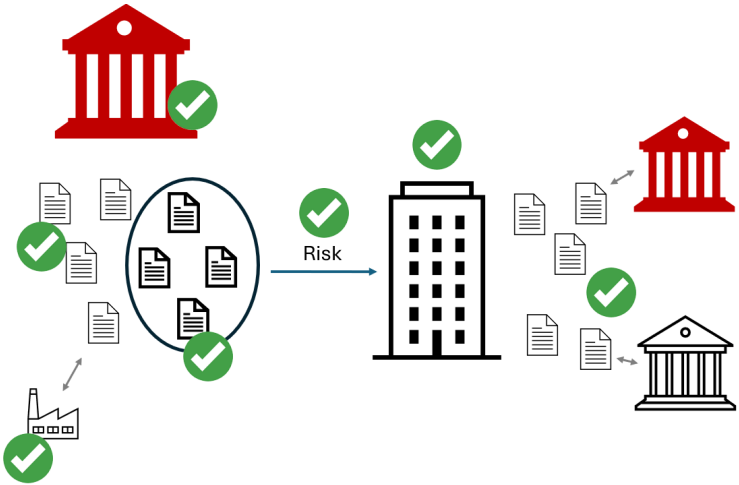

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- Sample period: Sept 2018–Sept 2024, monthly
- 93 banks that use SRTs Capital ratio graph Capital ratio regs Gap b/w capital a. leverage ratios Descriptives table
- 351 SRTs SRT transaction Share of loan portfolio by country
- 171,482 SRT loans Loan characteristics
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$\Rightarrow >$ 83% of European SRT market

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Channel 1: loan selection

Risk weights and bank capital

$$\textit{Tier 1 capital ratio} = \frac{\textit{Tier 1 capital}}{\sum_i^N RW_i * \textit{asset amount}_i} \overset{!}{>} 7\%$$

- Ideally: $RW_i = \textit{economic riskiness}$
- Often: $RW_i \neq \textit{economic riskiness}$
  - Discontinuities in RW estimation (in Standardized Approach or IRBA)
  - Bank underestimates PD/LGD (Begley et al. (RFS, 2017), Plosser and Santos (RFS, 2018), Behn et al. (JF, 2022))
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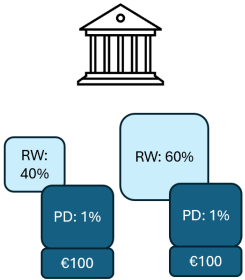

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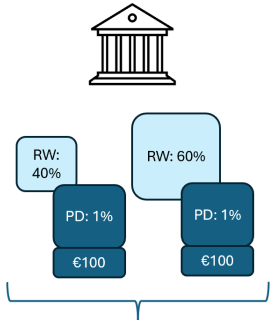
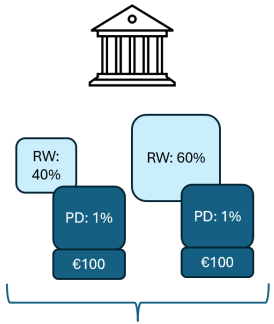


$$\text{Tier 1} = \frac{\textit{Tier 1 Capital}}{\textit{RW Assets}} = \frac{10}{0.4*100+0.6*100} = 10\%$$

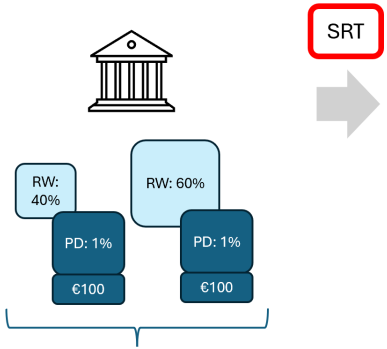
How banks can use SRTs to reduce effective capitalization



$$\text{Tier 1} = \frac{Tier\ 1\ Capital}{RW\ Assets} = \frac{10}{0.4*100+0.6*100} = 10\%$$

$$\text{Leverage} = \frac{Tier\ 1\ Capital}{Assets} = \frac{10}{100+100} = 5\%$$

How banks can use SRTs to reduce effective capitalization



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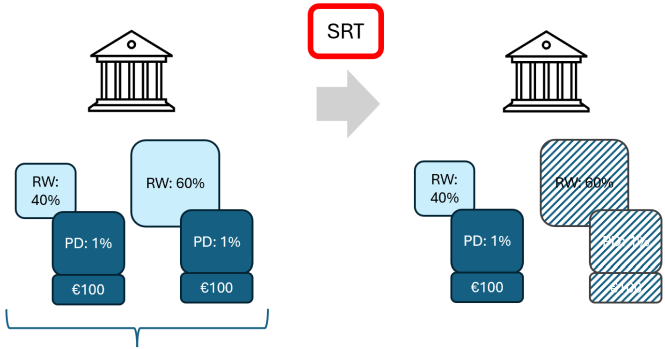

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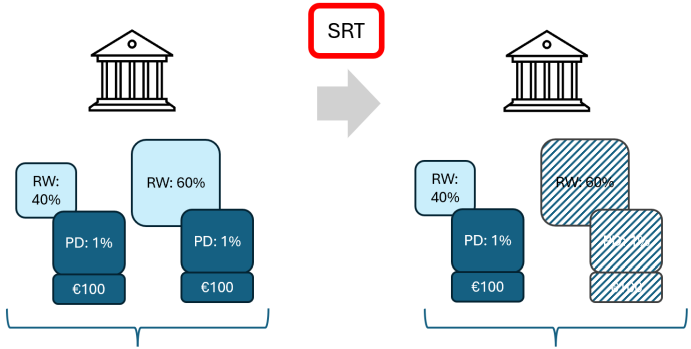

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Tier 1 $= \frac{10}{0.4*100} = 25\%$

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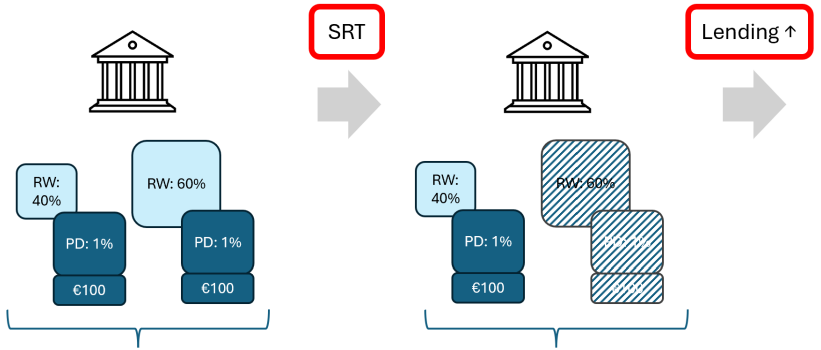

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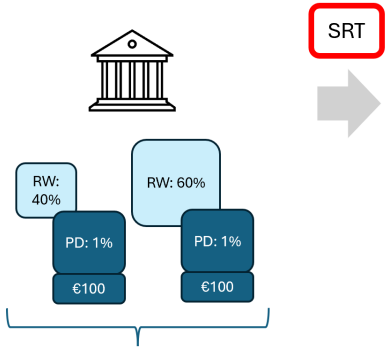
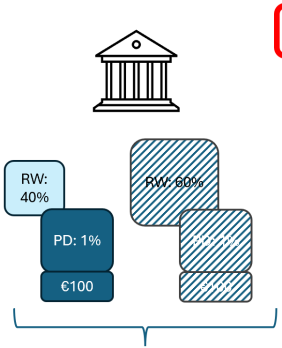
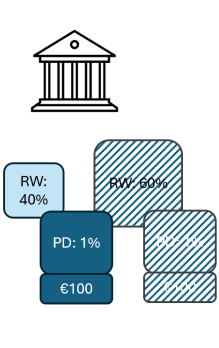


SRT



Lending ↑



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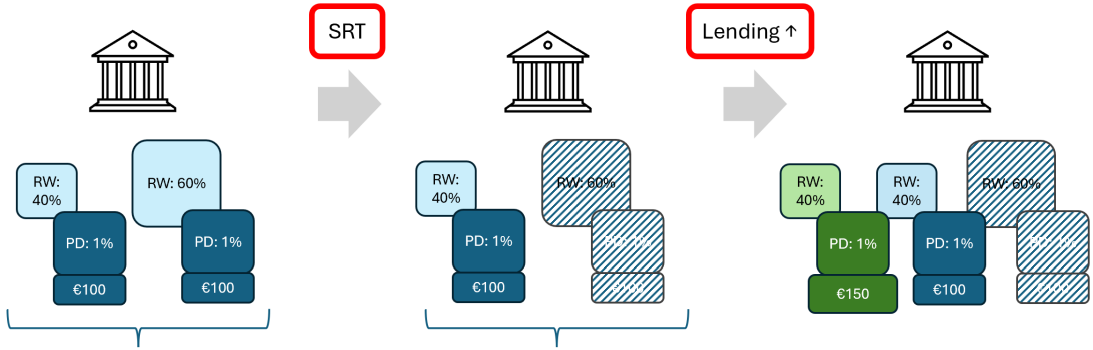

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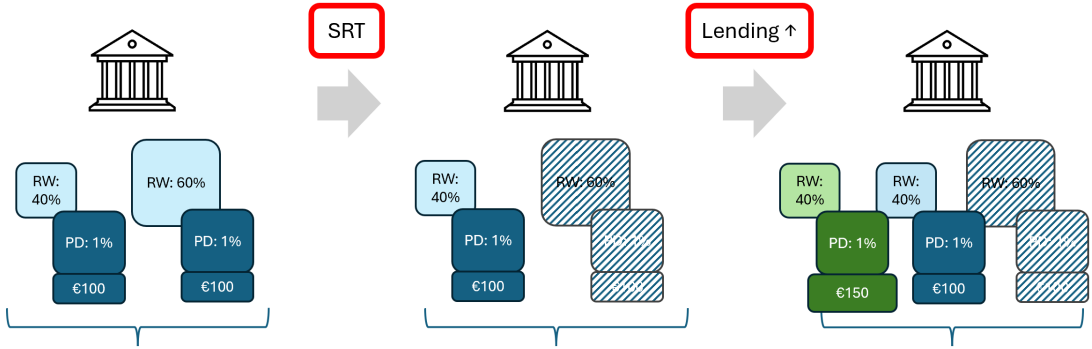

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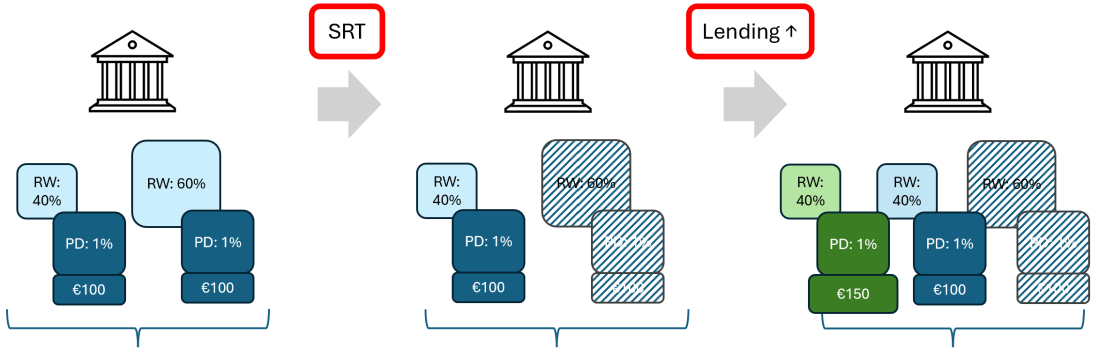
How banks can use SRTs to reduce effective capitalization



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Tier 1 $= \frac{10}{0.4*100+0.4*150} = 10\%$

Leverage $= \frac{10}{150+100+100} = 3\%$

Laboratory: jump in risk weights at €50mn. revenue

Problem: Risk weights endogenous to (unobserved) economic riskiness

Solution: "SME supporting factor"

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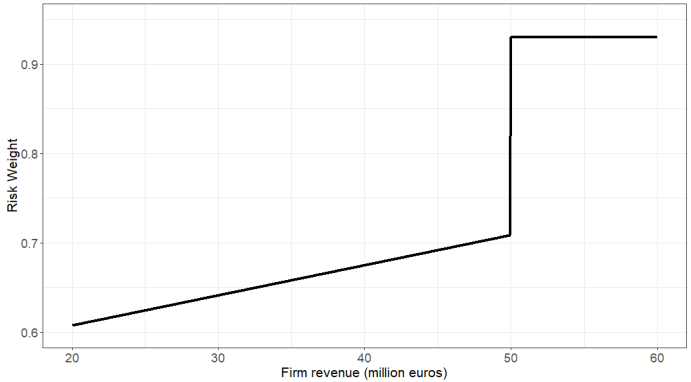

IRBA formula

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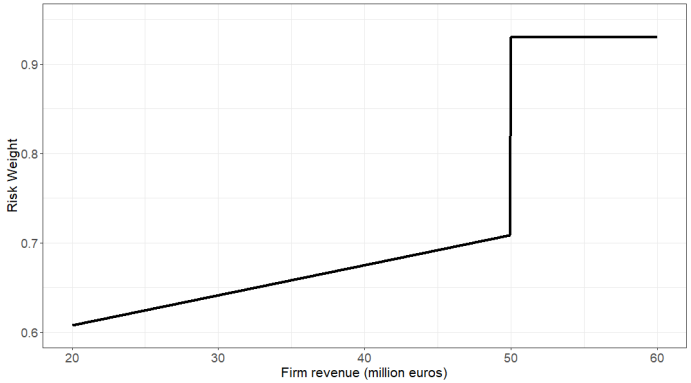


IRBA formula

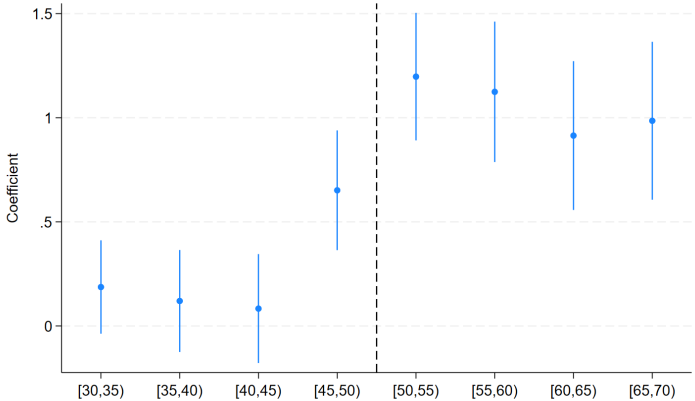
Hypothesis: Probability of synthetically transferring loan jumps at €50 mn. revenue threshold

REVENUE THRESHOLD CAUSES JUMP IN TRANSFER LIKELIHOOD

$$SRT\text{-}loan_{i,t} = \beta_1 Borrower\ revenue\ bins_{i,t} + \delta X_{i,t} + \varepsilon_{i,t}$$

Revenue threshold causes jump in transfer likelihood

$$SRT\text{-}loan_{i,t} = \beta_1 Borrower\ revenue\ bins_{i,t} + \delta X_{i,t} + \varepsilon_{i,t}$$



Controls: PD, loan rate, log loan size. FE: *Bank* × *year* × *loan type* × *interest rate type* × *loan purpose* × *borrower industry* × *residual maturity above 1 year.*
SE: wild-bootstrapped at bank-level.

zooming out | all loans | covariates at threshold | # loans at threshold

Banks redeploy the freed capital

$$Y_{b,t} = \beta_1 SRT\text{-}intensity_{b,t} + \beta_2 X_{b,t} + \delta_b + \gamma_t + \varepsilon_{b,t}$$

	(1) Loan growth (percent)	(2) Leverage ratio (percent)	(3) Tier 1 capita ratio (percent)
SRT intensity	0.336*	-5.204**	0.00641
	(0.188)	(2.152)	(0.0324)
Mean	0.357	7.665	0.202
Fixed effects	Firm × quarter, bank	Bank, year	Bank, year
Frequency	Quarterly	Yearly	Yearly
Controls	Bank size, capital ratio	Size bins × bank size	Size bins × bank size
SE cluster	Bank	Bank	Bank
Adj. R-squared	0.406	0.804	0.925
N	36,508,494	1,960	2,131

New lending is not capital-expensive Quantification

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Channel 2: moral hazard

Measuring monitoring

Ideally: Monitoring measure that varies over time and is bank-firm specific

Here: Frequency and magnitude of PD estimate updates (related to Cerqueiro et al. (2016))

- Borrower's true PD fluctuates over time
- Bank maps true PD into its (12-months ahead) PD estimates
  - AnaCredit contains these estimates monthly
- Higher monitoring $\rightarrow$ more frequent and stronger PD estimate updates

$\Rightarrow$ Two quarterly monitoring measures:

1. Frequency: PD estimate update dummy
2. Frequency and magnitude: SD(PD estimate)

Validation: Updated PD estimates contain more information about the firm Validation

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Empirical strategy

$$Monitoring_{f,b,t} = \beta_1 SRT\ loan_{f,b,t-1} * Post\ SRT_{f,t-1} + \beta_2 Post\ SRT_{f,t-1} * SRT\ to\ total\ exposure_{f,b,t-1} + \gamma_f + \delta_b + \omega_t + \varepsilon_{f,b,t}$$

- β_1: extensive margin
- β_2: intensive margin
- Firm $\times$ quarter and bank fixed effects (Kwaja-Mian):
  1. Compare monitoring within the same firm and quarter
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	(1) PD update	(2) SD(PD)	(3) PD update	(4) SD(PD)
SRT bank=1 × Post SRT=1	-0.0384*	-0.0283*	-0.0338	-0.0267*
	(0.0216)	(0.0146)	(0.0224)	(0.0158)
Post SRT=1 × SRT to total exposure			-0.0773***	-0.0489***
			(0.0268)	(0.0147)
Mean	0.314	0.108	0.315	0.108
Fixed effects	Firm × quarter, bank	Firm × quarter, bank	Firm × quarter, bank	Firm × quarter, bank
Controls	PD	PD	PD	PD
SE cluster	Bank	Bank	Bank	Bank
Adj. R-squared	0.305	0.196	0.304	0.196
N	3,459,442	3,381,511	3,405,618	3,328,335

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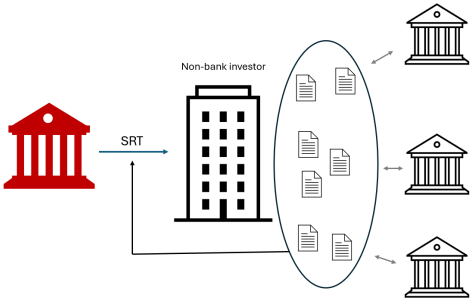
Channel 3: bank–non-bank interconnectedness

SRT INVESTMENT IS PARTIALLY FINANCED WITH BANK CREDIT (I)



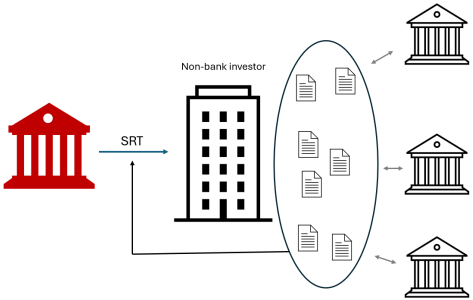
Hypothesis: Loan liabilities of SRT investors increase before SRT investment

Regression:

$$\textit{Log debt amount outstanding}_{i,j,t} = \beta_1 \textit{Months to SRT investment}_{i,j,t} + \theta_i + \omega_t + \varepsilon_{i,j,t}$$

- SRT-investment and calendar-time fixed effects

SRT investment is partially financed with bank credit (I)



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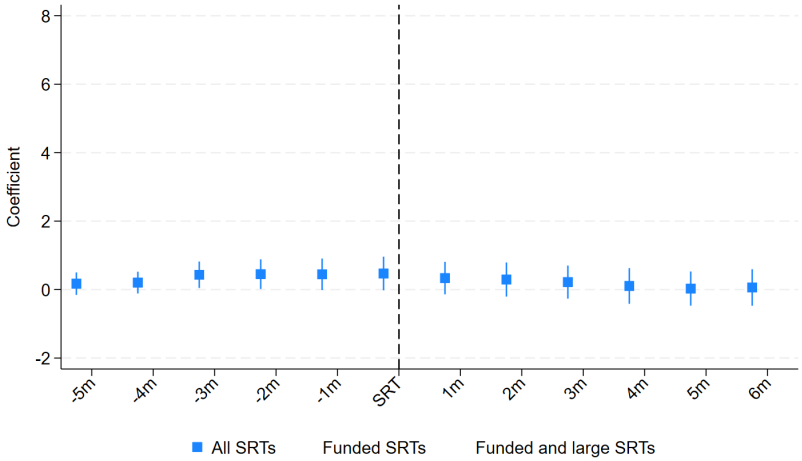

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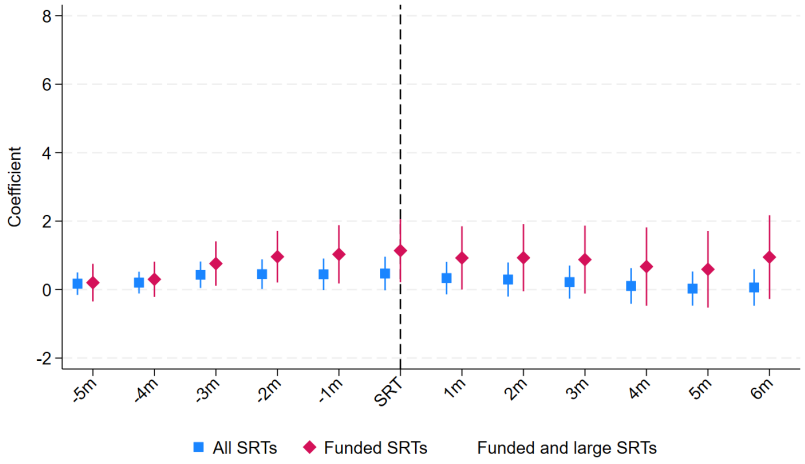

Pre-trends

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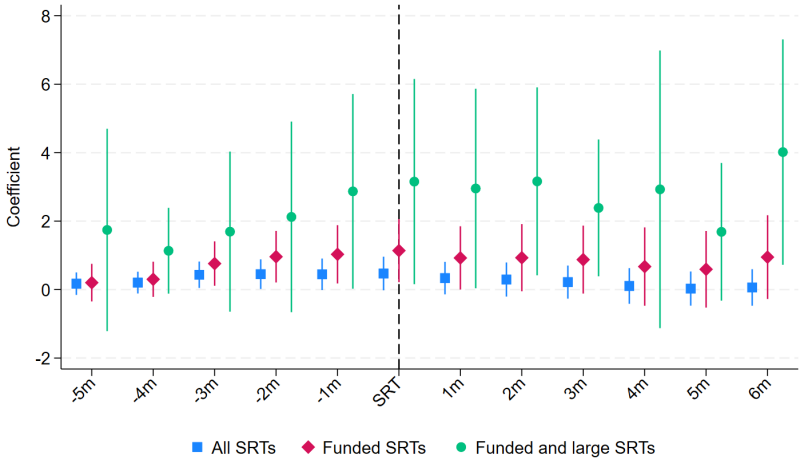

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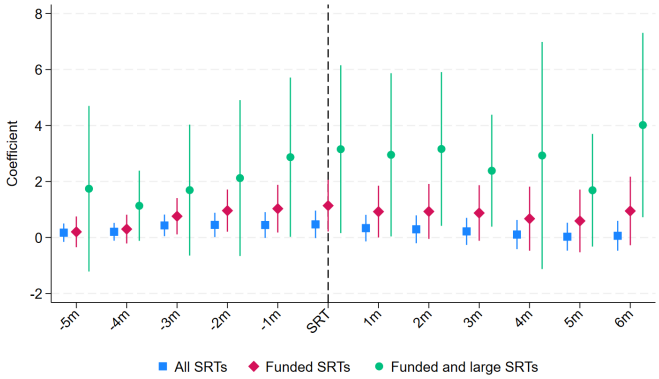

⇒ On average, 26% of SRT funding is debt-financed Higher in the US?

⇒ Loans to SRT investors cost €230,000 of regulatory capital, but free €5 million

Conclusion

Scope

- First academic study on SRTs
- Granular loan-level data on largest SRT market

Channels of incentives and potential risks

1. Loan selection
   - Objective: capital relief ⇒ banks reduce effective ex-post capitalization
   - *Implication:* Banks can use SRTs to trade away Basel's new floor on IRBA risk weights
2. Moral hazard
   - Decline in monitoring
3. Interconnectedness
   - Modest leverage of investors
   - Non-banks are nevertheless interconnected with banks

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- Granular loan-level data on largest SRT market

Channels of incentives and potential risks

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   - Objective: capital relief ⇒ banks reduce effective ex-post capitalization
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Appendix

References I

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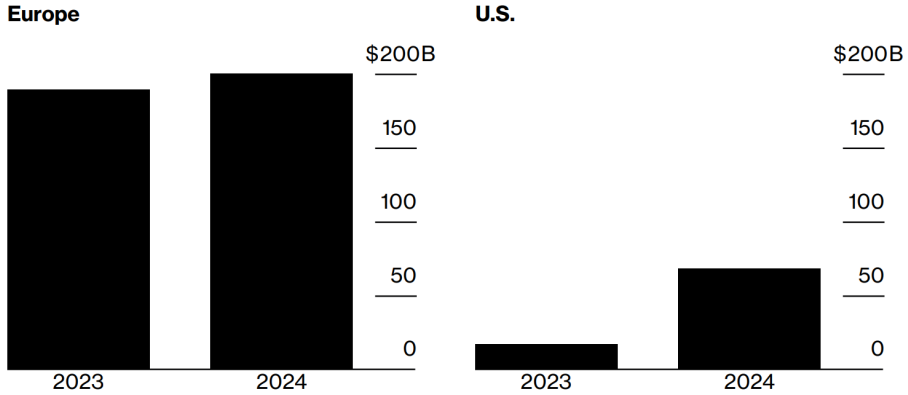
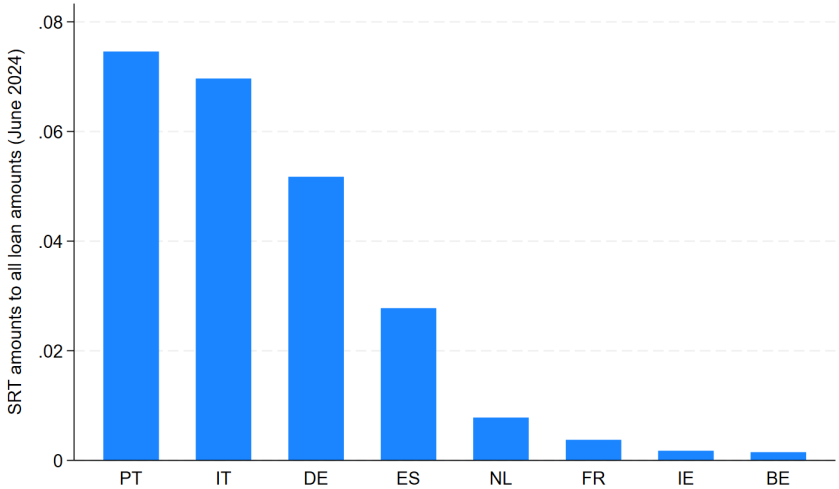
- Plosser, Matthew C and Joao AC Santos (2018). "Banks' incentives and inconsistent risk models". In: *The Review of Financial Studies* 31.6, pp. 2080–2112.

Market size in the U.S.

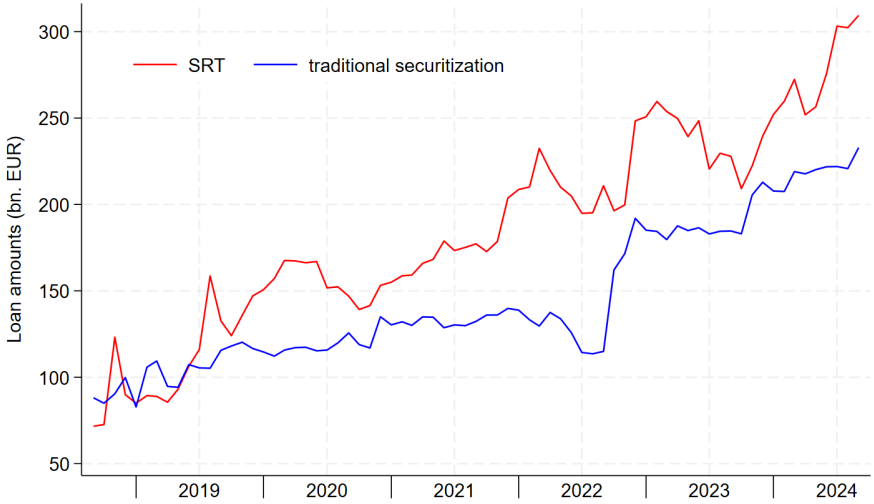


Source: KKR & Co., Bank of America estimates as of March 2024
Note: Figures refer to assets securitized. 2024 numbers are estimated volume.

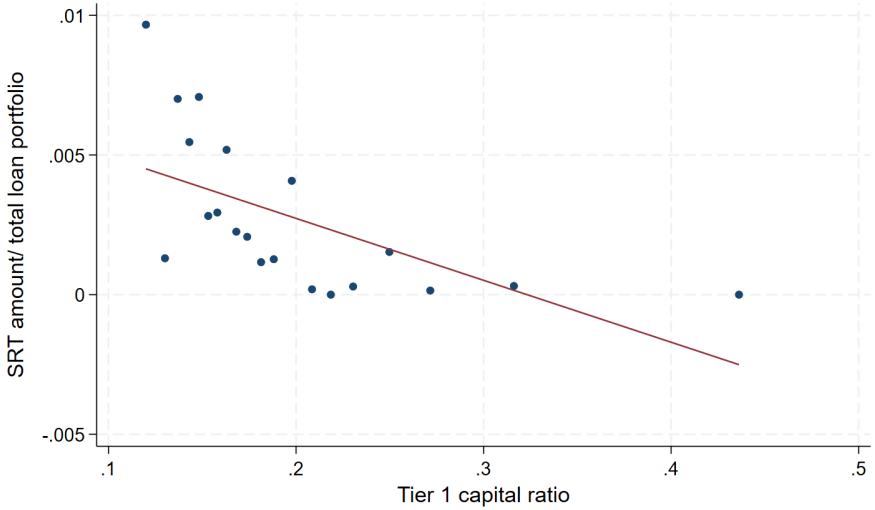
SHARE OF ALL CORPORATE LOANS BY COUNTRY



SRT vs. traditional securitization (corporate loans)



Tier 1 capital ratio and SRT issuance (i)



Tier 1 capital ratio and SRT issuance (ii)

$$SRT_{b,t} = \beta_1 \, Tier\ 1\ capital\ ratio_{b,t-1} + \beta_2 \, Tier\ 1\ capital\ ratio_{b,t-1} * Post\ April\ 2021_t + \beta_3 X_{b,t-1} + \varepsilon_{b,t}.$$

	(1) SRT	(2) SRT	(3) Log SRT amount	(4) Log SRT amount
Tier 1 capital ratio	-0.275***	-0.154	-7.286***	-1.238
	(0.0867)	(0.169)	(1.974)	(3.375)
Post 2021=1 × Tier 1 capital ratio		-0.190		-5.938**
		(0.122)		(2.445)
Mean	0.0672	0.0676	1.710	1.720
Fixed effects	Country × year	Bank, year	Country × year	Bank, year
SE cluster	WCR: Country	WCR: Bank	WCR: Country	WCR: Bank
Additional controls	Size bins × bank size, liquidity	Size bins × bank size, liquidity	Size bins × bank size, liquidity	Size bins × bank size, liquidity
Adj. R-squared	0.300	0.750	0.312	0.810
N	1,934	1,922	1,934	1,922
Frequency	Yearly	Yearly	Yearly	Yearly

Gap between capital ratio and leverage ratio

$$SRT_{b,t} = \beta_1 Gap\ b/w\ leverage\ and\ Tier\ 1\ ratio_{b,t-1} + \beta_2 X_{b,t-1} + \varepsilon_{b,t}$$

	(1)	(2)	(3)	(4)
	SRT	SRT	Log SRT amount	Log SRT amount
Gap b/w leverage and Tier 1 ratio	-0.0190**	-0.0183**	-0.549***	-0.535***
	(0.00825)	(0.00831)	(0.189)	(0.190)
Mean	0.0742	0.0710	1.889	1.821
Estimation	OLS	OLS	OLS	OLS
Fixed effects	Bank, year	Bank × year	Bank, year	Bank × year
SE cluster	Bank	Bank	Bank	Bank
R-squared	0.279	0.279	0.304	0.305
N	1,617	1,606	1,617	1,606
Frequency	Yearly	Yearly	Yearly	Yearly

SRT BANKS VS. NON-SRT BANKS

	SRT banks *94*					Selected non-SRT banks *1,130*				
	Mean	SD	10^{th}	Median	90^{th}	Mean	SD	10^{th}	Median	90^{th}
Balance sheet size (mn.)	478,000	502,000	5,000	373,000	1,360,000	119,000	244,000	2,000	24,000	392,000
Tier 1 capital ratio	15.6	2.6	12.3	14.9	19.6	20.5	7.5	14.0	18.2	30.3
Liquid assets to deposits (%)	41.9	23.9	17.8	32.3	81.2	36.7	24.2	11.2	29.3	75.3
PD loan portfolio (%)	2.5	2.4	0.3	1.9	5.8	1.9	2.2	0	1.0	5.3
Loan payments are overdue (%)	2.2	3.1	0	1.0	6.4	1.8	3.0	0	0.5	5.6
Loans are delinquent (%)	1.5	2.5	0	0.4	5.1	1.1	2.1	0	0.1	3.4
ROE (%)	9.1	5.3	2.7	8.4	16.8	7.5	7.0	1.1	6.3	16.1

Facts about the SRT transaction

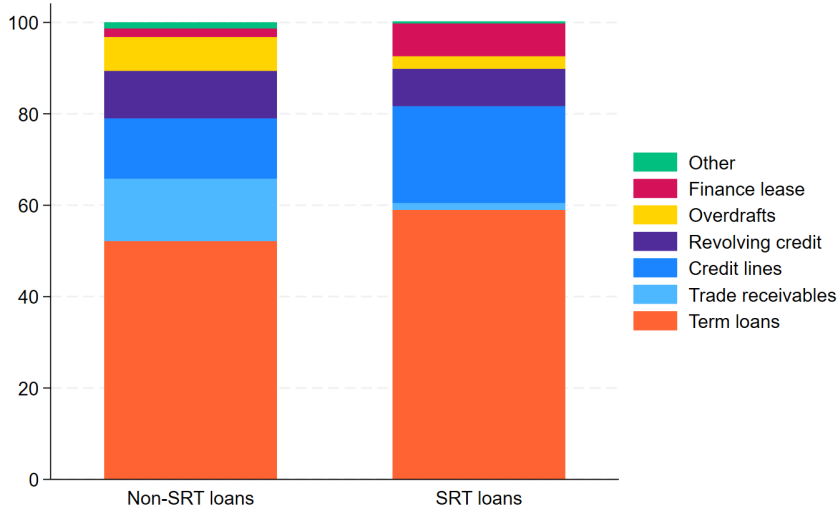
- 80% of SRTs through financial guarantees; 20% through CLNs
- €27 million (median) and €725 million (mean)
- 63 (median) and 484 (mean) loans
- Maturity: 9 (median) and 11 (mean) years
- 2 tranches; junior tranche: 15%
- 60% cash-collateralized; 25% other 0-RW assets; 15% uncollateralized
- 98% of SRTs are private transactions
- Coupon payments: 7%–13% (based on 3 transactions)

Back

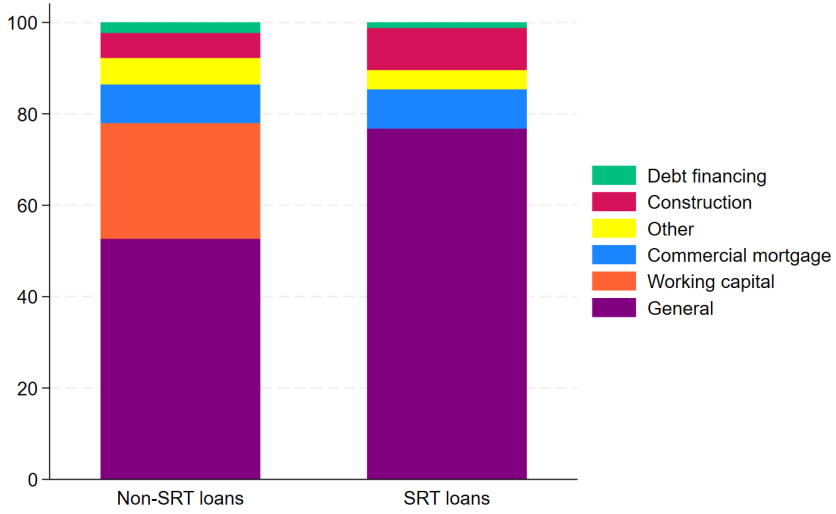
SAMPLE: SYNTHETICALLY TRANSFERRED LOANS

	Non-SRT loans $66,897,026$					SRT loans $171,482$				
	Mean	SD	10^{th}	Median	90^{th}	Mean	SD	10^{th}	Median	90^{th}
Loan amount	286,000	1,620,000	788	20,000	300,000	731,000	1,965,000	25,000	150,000	1,562,000
Borrower revenue (mn.)	377	1,540	0.2	4	446	86	671	0.2	4	76
Loan rate	0.044	0.033	0.009	0.039	0.081	0.030	0.020	0.010	0.024	0.059
Loan maturity (years)	4.1	5.2	0.2	2.0	10.0	5.7	4.1	2.0	5.0	10.0
Borrower PD	0.076	0.220	0.001	0.009	0.102	0.023	0.086	0.002	0.009	0.034
Loan payments overdue	0.075					0.031				
Loan is delinquent	0.050					0.017				
Fixed rate	0.68					0.40				

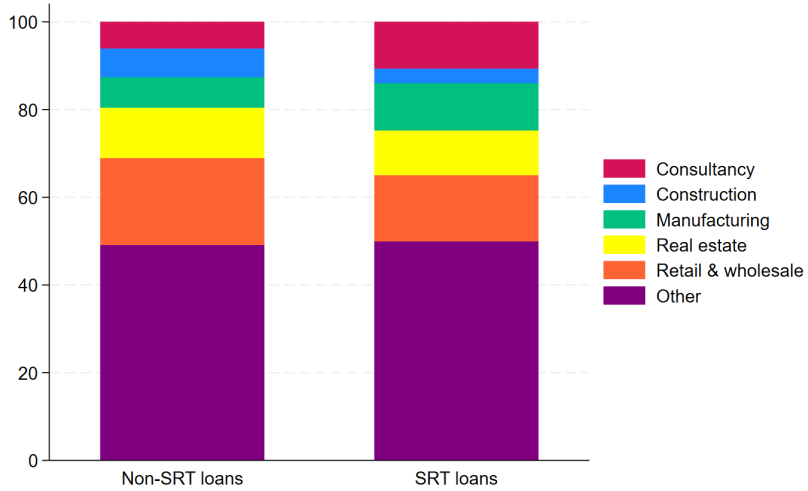
Credit lines can get synthetically transferred



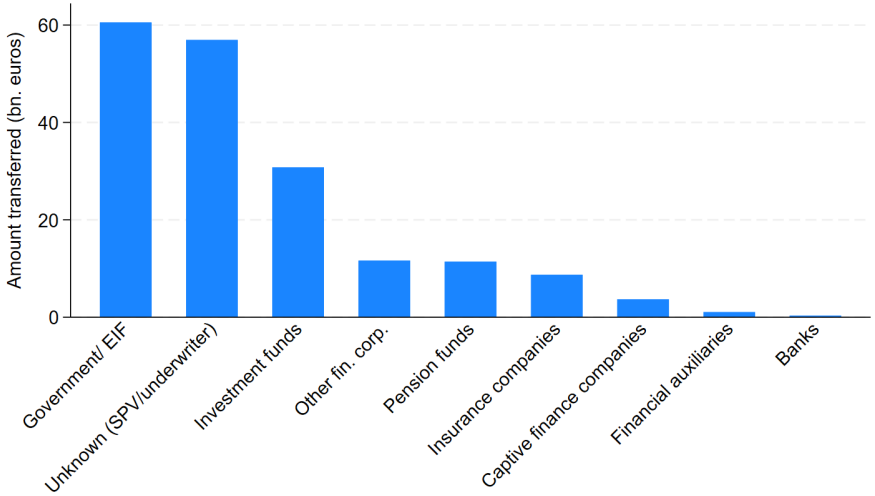
No working capital among SRT loans



SRTs SPAN ALL INDUSTRIES



WHO ARE THE NON-BANK SRT INVESTORS?



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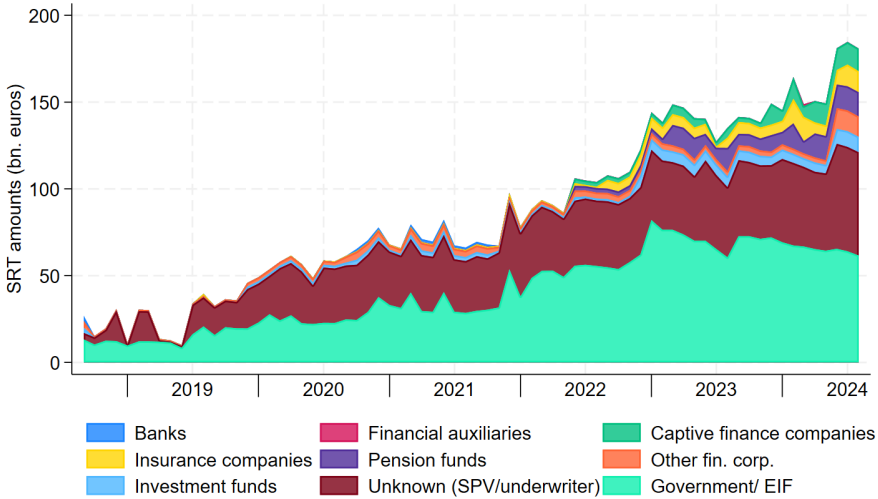


DESCRIPTIVE STATISTICS OF SRT INVESTOR

	All SRT investments *282*						SRT investments excl. Government / EIF *142*					
	Mean	SD	10^{th}	Median	90^{th}	N	Mean	SD	10^{th}	Median	90^{th}	N
Group level												
Total assets (mn. euros)*	168,000	309,000	32	3,040	5,690	133	134,000	393,000	9	23	220,000	34
Bank loans outstanding (mn.)	6,130	30,200	0	386	5,090	282	5,500	45,100	0	0.1	56	142
Bank loans committed (mn.)	6,550	30,200	0	1,250	6,070	282	5,190	40,500	0	0.5	146	142
Bank debt outstanding to assets*	0.25	0.32	0	0.06	0.79	282	0.04	0.07	0	0.02	0.17	142
SRT investment (first losses) to assets*	0.03	0.04	0	0	0.07	105	0.04	0.07	0	0.01	0.07	28
Number of bank relationships	18.2	33.6	1	7	28	282	7.3	31.0	1	1	3	142
Number of bank relationships during sample	35.4	60.3	2	10	55	282	12.8	52.6	2	3	7	142
Share of investors that receive credit from SRT-bank during sample	0.50					282	0.22					142
Unconsolidated level												
Total assets (mn. euros)	36,000	199,000	9	2,490	2,490	112	92,900	342,000	5	37	781,000	33
Bank loans outstanding (mn.)	505	1,690	0	0.6	381	282	21	135	0	0.1	8	142
Bank loans committed (mn.)	678	2,910	0	2	394	282	23	126	0	0.2	22	142
Loans & securities (mn.)	20,300	211,000	0	5	381	282	49	193	0	0.2	61	142
Liabilities to assets	0.08	0.12	0	0.05	0.15	102	0.04	0.10	0	0	0.12	30
SRT investment (first losses) to assets	0.06	0.11	0	0.02	0.13	103	0.10	0.15	0	0.05	0.36	29
Number of bank relationships	4.6	7.6	1	1	8	282	1.4	0.9	1	1	2	142
Number of bank relationships during sample	8.2	11.2	2	3	12	282	3.0	2.0	1	3	4	142
Share of investors that receive credit from SRT-bank during sample	0.18					282	0.15					142

RW CORRELATIONS—FULL TABLE

	(1) SRT loan (= 100)	(2) SRT loan (= 100)
Risk weight	0.205	0.505**
	(0.136)	(0.225)
PD		-5.563***
		(1.998)
Loan rate		-0.454
		(1.575)
Log residual maturity (years)		-0.152***
		(0.0381)
Log bank firm exposure		0.0182
		(0.0115)
Log revenue (million euros)		0.0410**
		(0.0179)
Mean	0.389	0.427
Fixed effects		FE
SE cluster	Bank	Bank
Controls	Loan size bins × log loan amount	Loan size bins × log loan amount
Adj. R-squared	0.00291	0.230
N	35,429,572	30,268,010
Frequency	Yearly	Yearly

Internal Ratings Based Approach Formula

For loans to firms with annual revenues < 50 million euros:

$$RW = \mathscr{F}\left(PD\uparrow, M\uparrow, LGD\uparrow, \frac{\min\{\max\{5, S\}, 50\} - 5}{45}\uparrow\right) \times \frac{\min\{E; €2{,}500{,}000\} \cdot 0.7619 + \max\{E - €2{,}500{,}000; 0\} \cdot 0.85}{E}$$

PD: probability of default

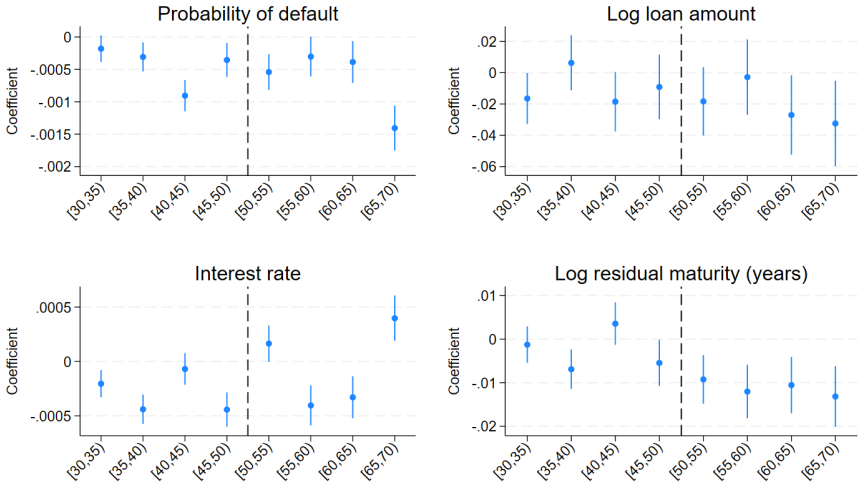
M: maturity

LGD: loss given default

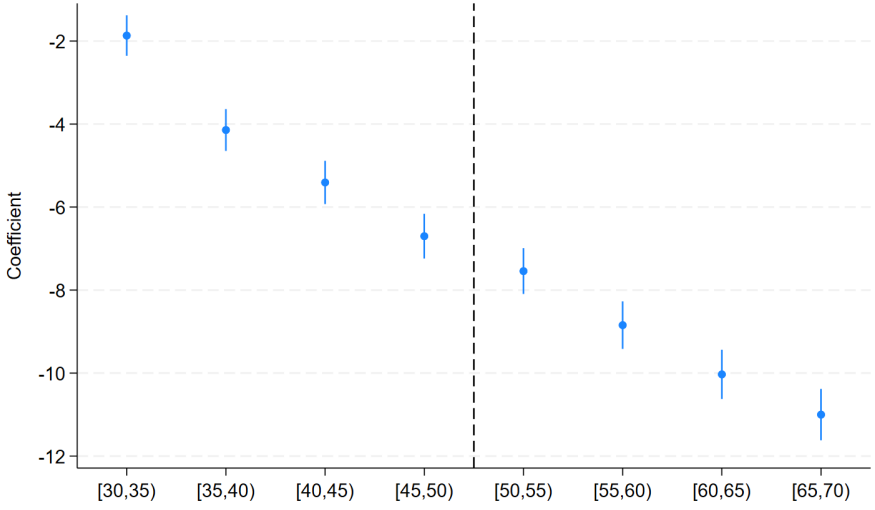
S: annual revenue

E: bank-firm exposure

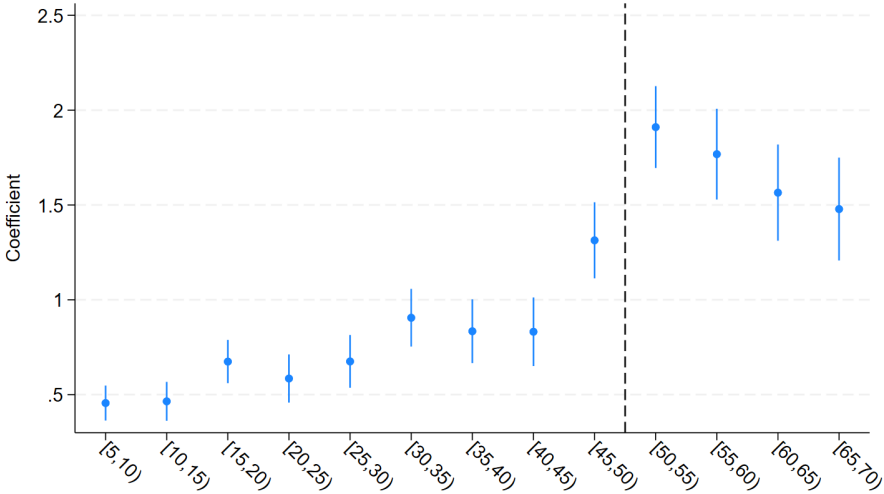
COVARIATES ARE SMOOTH



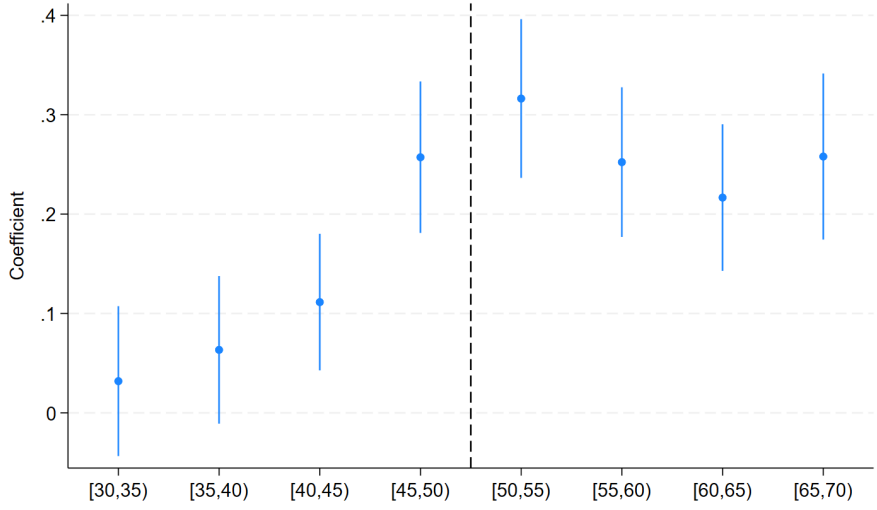
NUMBER OF LOANS ARE SMOOTH



Zooming out


Coefficient
2.5
2
1.5
1
.5
[5,10)
[10,15)
[15,20)
[20,25)
[25,30)
[30,35)
[35,40)
[40,45)
[45,50)
[50,55)
[55,60)
[60,65)
[65,70)

All loans



Revenue ↑ & bank-firm exposure ↑ ⇒ selection likelihood ↑

$$SRT\text{-}loan_{i,t} = \beta_1 Revenue_{i,t} + \beta_2 Log\ bank\text{-}firm\ exposure_{i,t} + \delta X_{i,t} + \varepsilon_{i,t}$$

	(1) SRT loan (= 100)	(2) SRT loan (= 100)	(3) SRT loan (= 100)	(4) SRT loan (= 100)
Revenue (million euros)	0.00661***	0.00661***	-0.000334	-0.000334
	(0.000134)	(0.00217)	(0.000264)	(0.000716)
Log bank firm exposure	0.0204***	0.0204**	-0.00223	-0.00223
	(0.000671)	(0.00975)	(0.00274)	(0.00503)
Mean	0.359	0.359	0.344	0.344
Revenue (million)	[0,50)	[0,50)	[50,100)	[50,100)
Fixed effects	FE	FE	FE	FE
SE cluster		Bank		Bank
Controls	PD, Loan rate, loan size bins × log loan amount	PD, Loan rate, loan size bins × log loan amount	PD, Loan rate, loan size bins × log loan amount	PD, Loan rate, loan size bins × log loan amount
Adj. R-squared	0.173	0.173	0.365	0.365
N	31,282,991	31,282,991	1,993,606	1,993,606
Frequency	Yearly	Yearly	Yearly	Yearly

FE: *Bank* × *year* × *loan type* × *interest rate type* × *loan purpose* × *borrower industry* × *residual maturity above 1 year*

Placebo tests with €40mn. and €60mn. thresholds

	(1)	(2)	(3)	(4)
	SRT loan (= 100)	SRT loan (= 100)	SRT loan (= 100)	SRT loan (= 100)
Revenue > 40 mn=1	-0.101		0.0269	
	(0.0842)		(0.0633)	
Revenue > 40 mn=1 × Log bank firm exposure	0.00605		-0.000116	
	(0.00514)		(0.00392)	
Revenue > 60 mn=1		0.0125		-0.135*
		(0.0928)		(0.0692)
Revenue > 60 mn=1 × Log bank firm exposure		-0.00102		0.00667*
		(0.00526)		(0.00401)
Mean	0.00389	0.301	0.431	0.330
Revenue (million)	[35,45]	[55,65]	[30,50]	[50,70]
Fixed effects	FE	FE	FE	FE
SE cluster	WCR: Bank PD, loan rate	WCR: Bank PD, loan rate	WCR: Bank PD, loan rate	WCR: Bank PD, loan rate
Controls	loan size bins × log loan amount	loan size bins × log loan amount	loan size bins × log loan amount	loan size bins × log loan amount
Adj. R-squared	0.400	0.448	0.366	0.406
N	794,296	530,886	1,618,225	1,021,100
Frequency	Yearly	Yearly	Yearly	Yearly

New lending is not capital expensive

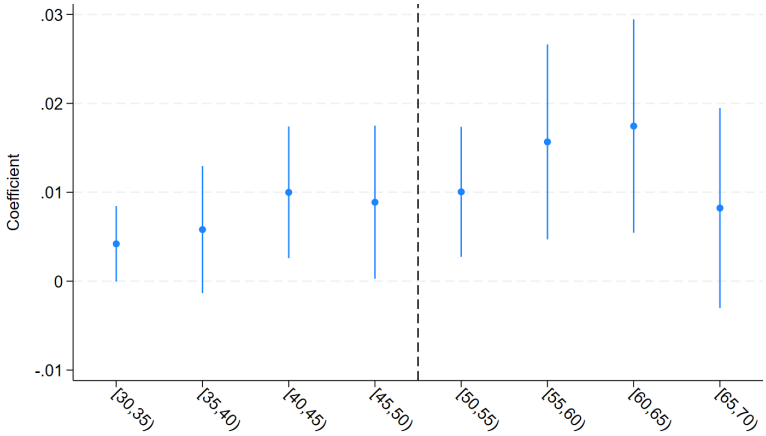
$$Net\ new\ lending_{i,t} = \beta_1 Risk\ weights_{i,t} + \delta X_{i,t} + \varepsilon_{i,t}$$

	(1) Net new lending (dummy)	(2) Net new lending (dummy)	(3) Net new lending (log amount)	(4) Net new lending (log amount)
Risk weight	-0.123***	-0.129***	-2.430***	-2.645***
	(0.0200)	(0.0265)	(0.299)	(0.461)
Mean	0.292	0.293	3.931	3.964
Estimation	OLS	OLS	OLS	OLS
Fixed effects	Bank × industry × year	Bank × industry × year, firm	Bank × industry × year	Bank × industry × year, firm
SE cluster	Bank	Bank	Bank	Bank
Controls	✓	✓	✓	✓
Adj. R-squared	0.142	0.425	0.223	0.545
N	4,664,364	4,379,871	3,735,019	3,422,281
Frequency	Yearly	Yearly	Yearly	Yearly

Controls: PD, revenue, log of outstanding loan amounts, avg loan rate, bank's firm exposure

New lending is not capital-expensive

$$\textit{Net new lending}_{i,t} = \beta_1 \textit{Borrower revenue bins}_{i,t} + \delta X_{i,t} + \varepsilon_{i,t}$$



Strategic loan selection – quantification

Calculate the *additional* benefit from the SME supporting factor with and without SRT:

$$
\begin{aligned}
\Delta\text{Cap. benefit}_{b,t} &= \text{Cap. benefit}_{b,t}^{\text{with SRT}} - \text{Cap. benefit}_{b,t}^{\text{without SRT}} \cdot \text{scaling factor}_{b,t} \\
&= \left(\widehat{CAP}_{b,t}^{\text{with SRT}} - \widetilde{CAP}_{b,t}^{\text{with SRT}} \right) \\
&\qquad - \left(\widehat{CAP}_{b,t}^{\text{without SRT}} - \widetilde{CAP}_{b,t}^{\text{without SRT}} \right) \cdot \frac{\widehat{CAP}_{b,t}^{\text{with SRT}}}{\widehat{CAP}_{b,t}^{\text{without SRT}}} \\
&= \widetilde{CAP}_{b,t}^{\text{without SRT}} \cdot \frac{\widehat{CAP}_{b,t}^{\text{with SRT}}}{\widehat{CAP}_{b,t}^{\text{without SRT}}} - \widetilde{CAP}_{b,t}^{\text{with SRT}} .
\end{aligned}
$$

$\Rightarrow$ Additional capital savings: 3% (median bank)

Back

Validation of monitoring measure

How to validate

- Monitoring banks have better information about firms
- Need to show: Updated PD estimates contain better information
- Better information = better ability to predict default

$\Rightarrow$ Show that updated PD estimates are better at predicting default

At the firm level

Updated PD estimate is more highly correlated with default of firm than constant PD estimate of same firm by second bank

At the bank-portfolio level

Banks that update the PD estimates of a larger share of their portfolio get the average default rate right

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UPDATED PD ESTIMATES CONTAIN MORE INFO—FIRM LEVEL

$$\textit{Firm defaults}_{f,b,t} = \textit{Average PD}_{f,b,t-4} \times \textit{Monitoring measure}_{f,b,t-4} + \gamma_f + \delta_b + \omega_t + \varepsilon_{f,b,t}$$

	(1)	(2)	(3)	(4)
	Firm defaults (= 100)	Firm defaults (= 100)	Firm defaults (= 100)	Firm defaults (= 100)
PD update=1 × Average PD	0.656***	0.839***		
	(0.223)	(0.260)		
Average PD × SD(PD)			6.702	17.05***
			(4.614)	(5.723)
Average PD	1.728***	0.626***	1.978***	0.895***
	(0.311)	(0.106)	(0.364)	(0.163)
PD update=1	0.0252*	0.00153		
	(0.0130)	(0.0107)		
SD(PD)			4.789***	1.441**
			(0.667)	(0.638)
Mean	0.447	0.412	0.438	0.404
Fixed effects	Firm, quarter, bank	Firm × quarter, bank	Firm, quarter, bank	Firm × quarter, bank
Adj. R-squared	0.156	0.653	0.158	0.655
N	71,585,011	24,065,545	70,259,711	23,685,075
Frequency	Quarterly	Quarterly	Quarterly	Quarterly

Updated PD estimates contain more info—portfolio level

$$\textit{Deviation from expected } PD_{p,t_{1-4}} = \beta\, \textit{Share of PD updates}_{p,t_0} + \gamma_p + \omega_t + \varepsilon_{p,t}$$

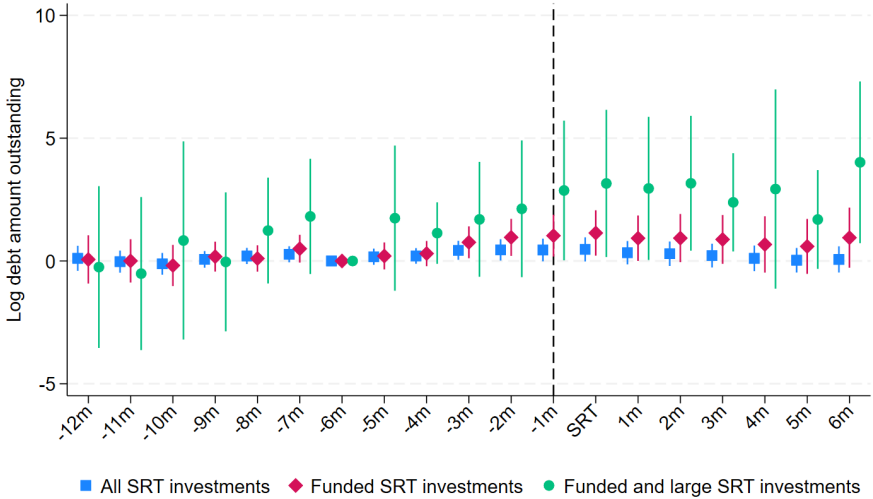
	(1) Deviation from expectation (percent)	(2) Deviation from expectation (percent)	(3) Deviation from expectation (percent)
Share of PD updates (percent)	-0.0480**	-0.0289*	-0.0307*
	(0.0242)	(0.0156)	(0.0170)
Mean	74.19	79.66	84.66
Fixed effects	Quarter	Quarter × industry	Quarter × industry × firm size
Portfolio	Bank	Bank-industry	Bank-industry-firm size
SE cluster	Bank	Bank	Bank
Adj. R-squared	0.0609	0.190	0.343
N	11,315	115,414	149,638
Frequency	Quarterly	Quarterly	Quarterly

Banks Sell SRTs to connected investors

- $SRT\ investment_{i,b,j,t} = \beta_1 Credit\ relationship_{b,j,t} + \delta_b + \eta_j + \omega_t + \varepsilon_{i,b,j,t}$
- i: SRT issue; b: bank; j: investor; t: year

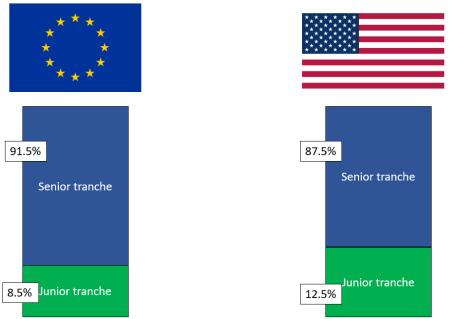
	(1) SRT transaction	(2) SRT transaction	(3) SRT transaction	(4) SRT transaction	(5) SRT transaction	(6) SRT transaction
Credit rel.	0.0409	0.176*		0.0853**	0.0743**	
	(0.0265)	(0.0886)		(0.0372)	(0.0291)	
Credit rel. (group)			0.229***			0.0855**
			(0.0700)			(0.0384)
Mean	0.171	0.165	0.165	0.135	0.130	0.130
Estimation	OLS	OLS	OLS	OLS	OLS	OLS
Fixed effects	Year	Bank, investor, year	Bank, investor, year	Year	Bank, investor, year	Bank, investor, year
Restriction				No Government/ EIF	No Government/ EIF	No Government/ EIF
SE cluster		Bank	Bank		Bank	Bank
Adj. R-squared	0.0242	0.153	0.163	0.0248	0.153	0.154
N	1,691	1,677	1,677	1,055	1,050	1,050

DEBT DYNAMICS: PRE-TRENDS



Predictions for the U.S.

Collins Amendment to the Dodd-Frank Act $\Rightarrow$ lower bound to the risk weights on assets

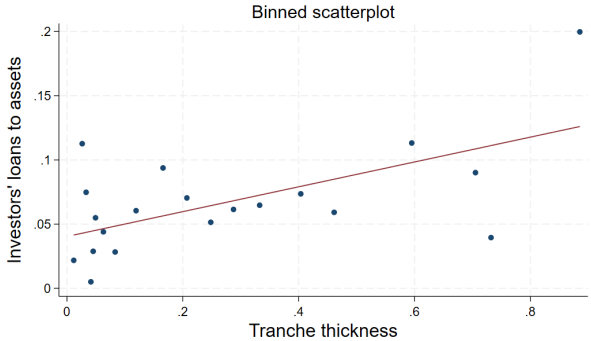


To get the same return

1. investors have to be more leveraged.
2. SRTs have to contain riskier loans.

THICKER JUNIOR TRANCHES ⇒ MORE LEVERAGED INVESTORS

- *Debt (loans) to assets*$_{s,b,j} = \beta_0 + \beta_1$ *Thickness tranche sold*$_{s,b,j} + \varepsilon_{s,b,j}$
- s: SRT issue; b: bank; j: investor

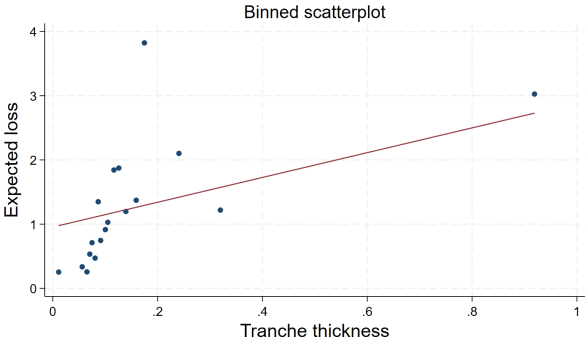


	(1) Bank debt to assets	(2) Bank debt to assets
Thickness of tranche sold	0.0969***	0.127
	(0.0290)	(0.0847)
Mean	0.0643	0.0295
Fixed effects	Investor type, country	Investor type, country
Restriction		No Gvrnmt/ EIF
SE cluster	Bank	Bank
Controls	SRT size, Avg PD	SRT size, Avg PD
Adj. R-squared	0.437	0.850
N	102	37

Thickness of tranche sold ↑ by 1 SD → *bank debt over assets* ↑ 48% Back

THICKER JUNIOR TRANCHES ⇒ RISKIER UNDERLYING LOANS

- $\textit{Expected loss}_{s,b,j} = \beta_0 + \beta_1 \textit{Thickness tranche sold}_{s,b,j} + \varepsilon_{s,b,j}$
- s: SRT issue; b: bank; j: investor

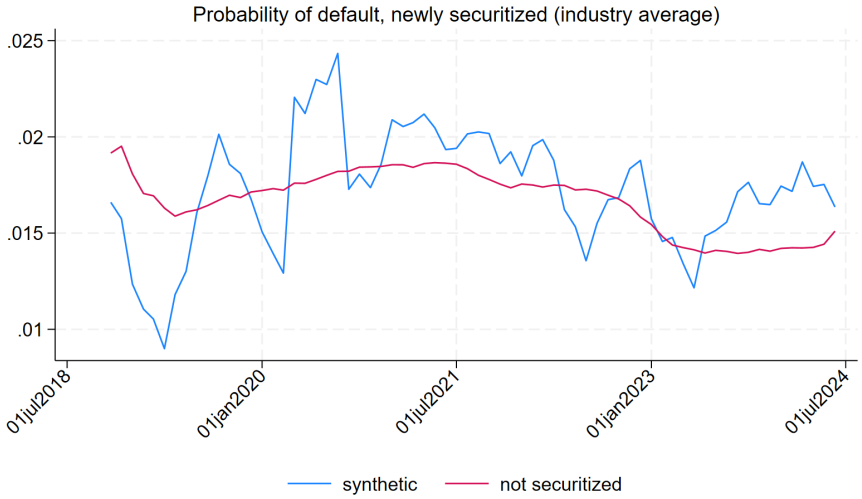


	(1) Expected losses	(2) Expected losses
Thickness of tranche sold (COREP)	0.114***	0.119***
	(0.0297)	(0.0200)
Mean	0.0141	0.0151
Fixed effects		Bank, year
Restriction		
SE cluster	Bank	Bank
Controls		SRT size
Adj. R-squared	0.405	0.761
N	103	92

Back

Other

Riskiness of synthetically securitized loans



From April 2021, SRT banks received more capital relief