

Restoring Confidence in Systemically Important Banks: SSM Effects on Bank Performance Burkhard Raunig and Michael Sigmund¹

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Eurosystem.

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SSM & Bank Performance

SSM I

- Single Supervisory Mechanism established in response to GFC 2007–2008 and European sovereign debt crisis.
- Operational since November 4, 2014.
- One of two/three pillars of the EU banking union:
 - 1. Single Supervisory Mechanism (SSM)
 - 2. Single Resolution Mechanism (SRM), since 2016
 - 3. European Deposit Insurance Scheme (EDIS), not implemented yet

- SSM tasks:
 - 1. Supervisory reviews, on-site inspections and investigations
 - 2. Grant or withdraw banking licenses
 - 3. Ensure compliance with EU prudential rules. Impose corrective measures and sanctions
- ECB currently supervises 109 significant banks (84% of total bank assets in euro area).
- Criteria for significance: size (total assets over €30 billion), economic importance (for country or EU economy), significant cross-border activities, direct assistance from the ESM.
- Significant banks (SSM banks for short) supervised by teams of ECB and national supervisors. Decisions made by SSM Supervisory Board and adopted by Governing Council under non-objection procedure.

Research Questions I

- Many large banks affected by GFC and European sovereign debt crisis. Return on assets of SSM banks often lower than of non-SSM banks.
 - 1. Did SSM help improve performance and soundness of SSM banks?
 - 2. Main sources of SSM effects?
- Investigate impact of SSM on
 - 1. Return on assets (ROA)
 - 2. Risk weight (RW): Risk weighted assets to total assets
 - 3. Return on risk-weighted assets (RORWA)
- To learn about sources of SSM effects, investigate effects on components of RORWA (income, lending and deposit rates, costs, risk-taking).

Contributions

- Estimate SSM effects on bank performance and risk-taking
- Estimate direct, indirect and total SSM effects
- Examine robustness of results (resampling, only large banks, core vs. non-core countries, placebo test, strategic self selection)
- Explore sources of SSM effects

Main Findings

- SSM has positive impact on return on assets of SSM banks.
- SSM has negative impact on risk weights of SSM banks.
- Positive combined impact of SSM on return on risk-weighted assets (i.e. more income, less risk-taking, or both).
- SSM effects are mainly direct effects (more confidence).
- Findings for components of RORWA suggest SSM increases confidence and improves risk management.

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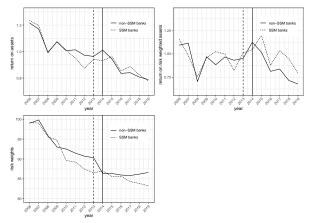
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Data Source I

- SNL Financial's database:
 - Annual unbalanced panel data from 2004–2019
 - ~2600 banks (~116 SSM banks) at unconsolidated level
 - Data cleaning: (1) Remove all banks reporting Tier 1 capital below 4%, (2) Remove a few banks reporting twice, (3) remove outliers and (4) drop banks reporting for less than 3 years
- Other sources: Bloomberg, Eurostat, ECB

Data: Dependent variables I

Figure 1: Size-adjusted group averages of return on assets, average risk weight, and return on risk-weighted assets.



This figure shows the evolution of group averages of size adjusted return on assets, size adjusted average risk weight, and size adjusted return on risk-weighted assets for SSM banks and non-SSM banks over the period 2006–2019.

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Summary Statistics: All Banks

	Min.	1 st Qu.	Median	Mean	3 rd Qu.	Max	Data Cov.
ROA	-1.56	0.58	0.85	0.88	1.15	3.27	58.10
RW	0.00	44.03	54.87	54.65	64.83	149.84	50.03
RORWA	-2.80	1.10	1.56	1.69	2.16	5.99	48.13
log(TA)	6.91	12.55	13.91	14.15	15.47	21.68	61.09
Deposit rate	0.00	0.57	1.25	1.74	2.29	9.53	54.71
Lending rate	0.00	3.44	4.56	5.02	6.08	15.97	46.49
NIM	-1.50	1.37	1.85	1.79	2.25	5.41	59.26
Net non-interest income ratio	-0.82	0.46	0.63	0.65	0.81	2.14	58.33
Net loan growth to non-banks	-29.57	-0.22	3.53	3.77	7.38	37.05	49.52
Non-bank deposit growth	-25.68	0.81	3.97	4.37	7.42	34.06	48.06
Operating expenses ratio	0.00	1.50	1.89	1.88	2.26	5.06	58.15
Loan loss reserve ratio	0.00	0.74	1.64	3.15	3.25	99.92	28.50
Total securities growth	-89.19	-9.80	0.00	0.83	10.90	90.31	49.43
TA growth	-25.21	-0.19	2.98	3.12	6.37	31.56	51.30
Labor Costs over TA	0.00	0.79	1.07	1.05	1.30	3.17	58.38
Tier 1 capital ratio	4.05	11.62	14.65	15.88	18.53	44.38	48.40
Leverage ratio (own)	0.00	6.03	8.00	8.45	10.18	25.23	48.09
Loans to TA	0.00	49.33	62.82	58.62	73.42	89.98	47.71
Loan-to-deposit ratio	0.00	71.73	92.10	99.39	118.85	302.51	45.17
Basel I	0.00	0.00	0.00	0.13	0.00	1.00	100.00
StA Approach	0.00	1.00	1.00	0.80	1.00	1.00	100.00
Mixed Approach	0.00	0.00	0.00	0.05	0.00	1.00	100.00
F-IRB	0.00	0.00	0.00	0.01	0.00	1.00	100.00
A-IRB	0.00	0.00	0.00	0.01	0.00	1.00	

Table 1: Summary statistics of bank-specific variables

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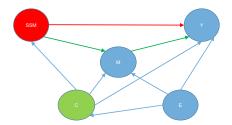
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Directed Acyclic Graph for SSM Effects

Figure 2: Directed Acyclic Graph (DAG) for SSM Effects.



Y is the outcome, SSM = 1 for SSM banks, otherwise SSM = 0, C are selection criteria, M are mediators, E are economic environment variables.

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Direct, Total, and Indirect Effects: Definition

- Indirect effects (SSM → M → Y) transmitted via key variables M under control of the bank. Example: SSM regulators force bank to hold more capital, which may affect outcome variable.
- ▶ Direct effect (SSM → Y) Example: Confidence effect. Customers and markets think SSM banks are safer than non-SSM banks - may attract deposits and enable cheaper funding.
- Total SSM effect = direct + indirect SSM effects

Causal Patterns, Blocking Rules, Backdoor Criterion I

- Causal patterns: Three random variables X, Y and Z. "Fork", X ← Z → Y, Z causes X and Y, leading to spurious correlation between X and Y. "Chain", X → Z → Y, Z mediates effect from X to Y. "Collider", X → Z ← Y, Z is the outcome of X and Y.
- Effect of conditioning: Fork, conditioning on Z (i.e., holding Z constant) blocks the path and eliminates spurious correlation between X and Y. Chain, conditioning on Z blocks the path and renders X and Y conditionally independent. Collider, conditioning on Z opens the path and produces spurious correlation between X and Y (selection bias).

Causal Patterns, Blocking Rules, Backdoor Criterion II

- Blocking rules: A path between random variables X and Y can be blocked by a set of conditioning variables Z as follows:
 (1) Along the path there is a chain ... → W → ... or a fork ... ← W → ..., and W is in Z. (2) Along the path there is a collider ... → W ← ..., and neither W nor any of its descendants are in Z.
- Backdoor criterion: Given an ordered pair of variables (X, Y) in a DAG, a set of variables Z satisfies the backdoor criterion relative to (X, Y) if no variable in Z is a descendant of X, and Z blocks every path between X and Y that contains an arrow into X.

Direct, Total, and Indirect Effects of SSM: Identification I

- ► Total SSM effect: Only requires conditioning on selection criteria C. Backdoor criterion requires blocking the paths SSM ← C ← E → Y, SSM ← C → Y, SSM ← C → M → Y, SSM ← C ← E → M → Y, and SSM → M ← E → Y. Conditioning on C blocks the first four paths. The last path is automatically blocked because M is a collider. Only the paths SSM → Y and SSM → M → Y remain open.
- ▶ **Direct SSM effect**: Requires conditioning on *C*, mediators *M*, and economic environment *E*. Conditioning on *C* and *M* closes backdoor paths and indirect paths $SSM \rightarrow M \rightarrow Y$, but opens $SSM \rightarrow M \leftarrow E \rightarrow Y$ because *M* is collider. Therefore, we must also condition on *E*. Only the path $SSM \rightarrow Y$ remains open.
- Indirect SSM effects: Indirect effects SSM → M → Y can be recovered as difference between total and direct SSM effects (by linearity).

SSM dummies and other effects I

- Single Resolution Mechanism (SRM): applies to all euro area banks, became effective on January 1, 2016. Find SSM effects since 2014, when SSM became effective.
- Low-interest rate environment: began earlier in 2012 and affected all banks. SSM effects persist when we control for low-interest rate environment.
- Basel III: introduced gradually since 2014. OSIIs buffers for large banks (except for Greece and Malta) not introduced before 2016. Many OSII banks not SSM banks, and vice versa. SSM effects remain strong when we control for Tier 1 capital ratio. Large banks may have distinct balance sheet structure compared to small banks. Some Basel III packages with changes in risk weights for certain assets. SSM effects persist when we control for risk-weighted assets and methodologies to compute them.

SSM dummies and other effects II

- TLTROs: accessible to all banks with ECB account. Over 500 banks in TLTRO programs before 2019. Most favorable TLTRO III program in September 2019, at the end of observation period. SSM effects persist when we include loan-to-deposit ratio to control for TLTRO effects.
- Large bank effects, catch-up effects: results hold for much smaller sample of 200 largest banks (120 non-SSM banks).
- Placebo test: fake treatment period from 2010 to 2011. Find no SSM effects in this period.
- Strategic self-selection: exclude all banks with total assets between 27 and 33 billion euros in 2013. SSM effects remain virtually unchanged.

Estimation of SSM Effects I

Three models:

1. Fixed effects (within-variation)

$$y_{it} = \mu_i + \lambda_t + \delta \cdot SSM_{it} + X'_{it}\beta + \epsilon_{it} , \qquad (1)$$

y_{it} outcome for bank i at time t, μ_i bank-specific fixed effect, λ_t time effect, ε_{it} error term. SSM_{it} dummy, 1 if bank i is SSM bank and SSM is effective, 0 otherwise. δ captures SSM effect.
2. FEIS (individually detrended within variation)

$$y_{it} = Z_i \alpha_i + \delta \cdot SSM_{it} + X'_{it}\beta + \epsilon_{it} , \qquad (2)$$

 y_{it} , SSM_{it} , X_{it} as in Eq. (1) and $Z_i = (1, t)$. Unobserved bank-specific effect $\alpha_{1i} + \alpha_{2i}t$ can change individually for each bank with time.

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Estimation of SSM Effects II

3. **DiD** (between-groups variation)

$$y_{igt} = \alpha + \gamma \cdot g_i + \lambda_t + \delta \cdot SSM_{it} + X'_{it}\beta + \epsilon_{it}, \qquad (3)$$

 y_{igt} outcome for bank *i* of group *g* in year *t*, λ_t time effect, ϵ_{it} error term. Group dummy g_i is 1 for SSM banks and 0 otherwise. $SSM_{it} = 1$ if bank *i* is SSM bank and SSM is effective, 0 otherwise. δ measures SSM effect.

Also estimate all models with time-varying SSM effects.

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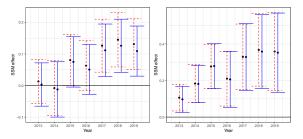
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Direct and Total SSM Effects on Return on Assets I

Figure 3: Direct and total SSM Effects on return on assets from FE and FEIS models.

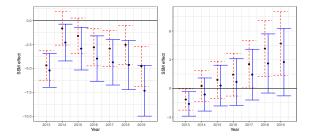


Direct SSM effects (red dashed line) and the total SSM effects (blue solid line) together with 90% confidence intervals.

- Direct SSM effects positive and often statistically significant.
- SSM effects mainly direct effects.
- Stronger effects in FEIS model with time-varying unobserved bank-specific effects.

Direct and Total SSM Effects on Total Risk Weight I

Figure 4: Direct and total SSM effects on the average risk weight from FE and the FEIS models.



Direct SSM effects (red dashed line) and the total SSM effects (blue solid line) together with 90% confidence intervals.

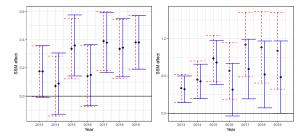
- Negative direct SSM effect on RWs in FE model/ positive but mostly insignificant in FEIS model.
- Negative announcement effect in 2013.

Direct and Total SSM Effects on Total Risk Weight II

- Insights from other bank-specific control variables:
 - Larger banks report on average lower risk weights
 - Banks with higher loan share have higher RWs
 - Riskier banks have higher RWs
 - RW approach matters: advanced IRB approach produces lowest RWs

Direct and Total SSM Effects on Return on Risk-Weighted Assets I

Figure 5: Direct and indirect SSM effects on the return on risk-weighted assets for the FE and the FEIS models.



Direct SSM effects (red dashed line) and the total SSM effects (blue solid line) together with 90% confidence intervals.

 Positive SSM effects on return on risk-weighted assets (indirect effects in FEIS from increasing risk weights).

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Robustness Checks (RORWA) I

- Large Banks Only: Catch-up and large banks effects. FEIS model using a smaller sample of 200 largest banks by total assets in 2013.
- Core and Peripheral Countries: Divide sample into core countries (Austria, Belgium, Estonia, Germany, Finland, France, the Netherlands, Slovakia) and peripheral countries (Cyprus, Greece, Ireland, Italy, Malta, Portugal, Slovenia, Spain). Classification from (Mesnard et al., 2016).
- Self-Selection: Certain banks with assets around the 30 Billion Euro threshold may have reduced assets in 2013 to evade future ECB oversight (Ben-David et al., 2018). To assess impact of possible strategic "self-selection", exclude banks with total assets between 27 and 33 billion Euro in 2013.

Robustness Checks (RORWA) II

- Placebo Test: SSM announced in December 2012 and effective in 2014. Should not find SSM effects before 2012. With data up to 2011 and fake treatment period of 2010-2011, no SSM effects.
- Resampling: Stability against influential observations. Resampling procedure akin to cross-validation. Randomly partition sample into 10 groups of similar size and estimate model 10 times, each time omitting a different group. Process repeated 1,000 times, gives 10,000 model estimates based on different combinations of 90% of the banks in the sample.

Robustness Checks for RORWA III

	Large Banks	Core C.	Non-core C.	Self-Selection	Placebo Effects
log(TA)	-0.2859^{**} (0.1254)	-0.3513** (0.1496)	0.2006 (0.3374)	-0.1181 (0.1433)	-0.4257 (0.3239)
SSM 2013	0.2167** (0.1052)	0.2813** (0.1361)	0.3715** (0.1776)	0.3252*** (0.1088)	
SSM 2014	0.3213 ^{**} (0.1291)	0.2728 [*] (0.1585)	0.6128*** (0.2360)	0.4794 ^{***} (0.1322)	
SSM 2015	0.5274 ^{***} (0.1681)	0.5774 ^{**} (0.2356)	0.8360 ^{***} (0.2789)	0.6581 ^{***} (0.1791)	
SSM 2016	0.1409 (0.1983)	0.3225 (0.2844)	0.3832 (0.3304)	0.3140 (0.2163)	
SSM 2017	0.4968 ^{**} (0.2194)	0.4604 (0.3433)	0.8052** (0.3494)	0.6027** (0.2452)	
SSM 2018	0.3426 (0.2457)	0.2340 (0.3881)	0.9199** (0.3829)	0.5209* (0.2748)	
SSM 2019	0.2667 (0.2630)	0.1692 (0.4310)	0.9032 ^{**} (0.3958)	0.4812 (0.2973)	
Placebo SSM 2010		. ,	. ,	. ,	0.1105 (0.0906)
Placebo SSM 2011					0.0252 (0.0933)
Bank fixed effects	yes	yes	yes	yes	yes
Time fixed effects Individual time effects	no yes	no yes	no yes	no yes	no yes
Number of obs. Number of groups	2,279 200	7, 450 968	1,664 233	8,801 1,162	^{2, 144} 549 EN

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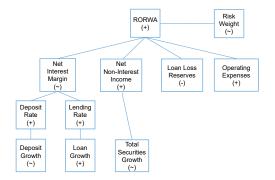
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Breakdown of RORWA: Total SSM Effects on Components

Figure 6: Breakdown of RORWA: Total SSM Effects on the Components



The figure shows the breakdown of the RORWA. The main components are ROA, which is mainly determined by the net interest margin, net non-interest income ratio, loan loss reserves and operating expenses, and RWs. Below each component, we insert the total SSM effect. A (+) means positive SSM effects, a (-) means negative SSM effects and a (~) means no significant SSM effects.



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Breakdown of RORWA: Income Components I

	DR	LR	NIM	NIIR
log(TA)	0.2725	0.0091	-0.6149***	-0.2888***
- ,	(0.3322)	(0.2001)	(0.0605)	(0.0296)
SSM 2013	0.0145	0.1624	-0.0359	0.0734***
	(0.1467)	(0.1111)	(0.0444)	(0.0186)
SSM 2014	0.0584	0.3722**	0.0048	0.1248***
	(0.2091)	(0.1466)	(0.0570)	(0.0248)
SSM 2015	0.0216	0.3742**	-0.0033	0.1790***
	(0.2662)	(0.1715)	(0.0709)	(0.0304)
SSM 2016	0.1732	0.3955*	-0.0466	0.1871***
	(0.3333)	(0.2039)	(0.0894)	(0.0382)
SSM 2017	0.5702	0.7695***	-0.0415	0.2512***
	(0.4109)	(0.2423)	(0.1102)	(0.0465)
SSM 2018	0.9292*	1.0852***	-0.0406	0.2809***
	(0.4782)	(0.2823)	(0.1260)	(0.0516)
SSM 2019	1.5659***	1.4829***	-0.1079	0.3075***
	(0.5598)	(0.3266)	(0.1370)	(0.0557)
R-squared	0.06	0.03	0.09	0.14
Adj. R-squared	0.06	0.03	0.09	0.14
Number of obs.	8,364	8,364	8,364	8,364
Number of groups	1,165	1,165	1,165	1,165
Average. Obs. group	7	7	7	7
Min. Obs. group	3	3	3	3
Max. Obs. Group	14	14	14	14

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Breakdown of RORWA: Income Components II

- Positive effects on lending and deposit rates, net effect close to zero (net interest margin largely unaffected by SSM).
- Positive impact on net non-interest income ratio.
- SNL data granularity enables identification of three non-interest income components (net fee and commission income, dividends from equity, other non-interest income). Most substantial positive SSM effect on net fee and commission income.

Breakdown of RORWA: Other components I

log(TA) SSM 2013 SSM 2014 SSM 2015 SSM 2016 SSM 2017 SSM 2018	Loan growth 4.9555** (1.9621) 2.2509* (1.1814) 10.1254*** (1.4067) 13.6286*** (1.9024) 17.1886*** (2.2378) 20.5512***	Deposit growth 10.1875*** (1.5942) 1.7383 (1.3039) 4.9101*** (1.5943) 7.0122*** (1.8428) 5.7082** (2.3573) 9.6666***	Operating expenses -0.6849*** (0.0693) 0.0550* (0.0312) 0.0256 (0.0377) 0.0843* (0.0485) 0.1468** (0.0644) 0.1602**	LLPR -2.6552*** (0.6641) 0.8934** (0.3831) -0.0147 (0.4327) -0.7132 (0.6424) -1.6551* (0.8881)	Security growth 21.1446*** (5.2300) -13.3890*** (3.9112) 2.2006 (3.8706) -13.1432*** (4.6217) -11.8594** (5.1756)
log(TA) SSM 2013 SSM 2014 SSM 2015 SSM 2016 SSM 2017 SSM 2018 SSM 2018	(1.9621) 2.2509* (1.1814) 10.1254*** (1.4067) 13.6286*** (1.9024) 17.1886*** (2.2378) 20.5812***	(1.5942) 1.7383 (1.3039) 4.9101*** (1.5943) 7.0122*** (1.8428) 5.7082** (2.3573)	$\begin{array}{c} (0.0693) \\ 0.0550^{\ast} \\ (0.0312) \\ 0.0256 \\ (0.0377) \\ 0.0843^{\ast} \\ (0.0485) \\ 0.1468^{\ast \ast} \\ (0.0644) \end{array}$	(0.6641) 0.8934^{**} (0.3831) -0.0147 (0.4327) -0.7132 (0.6424) -1.6551^{*} (0.8781)	(5.2300) -13.3890*** (3.9112) 2.2006 (3.8706) -13.1432*** (4.6217) -11.8594** (5.1756)
SSM 2014 SSM 2015 SSM 2016 SSM 2017 SSM 2018	2.2509* (1.1814) 10.1254*** (1.4067) 13.6286*** (1.9024) 17.1886*** (2.2378) 20.5812***	1.7383 (1.3039) 4.9101*** (1.5943) 7.0122*** (1.8428) 5.7082** (2.3573)	0.0550* (0.0312) 0.0256 (0.0377) 0.0843* (0.0485) 0.1468** (0.0644)	$\begin{array}{c} 0.8934^{**} \\ (0.3831) \\ -0.0147 \\ (0.4327) \\ -0.7132 \\ (0.6424) \\ -1.6551^{*} \\ (0.8781) \end{array}$	-13.3890 ^{***} (3.9112) 2.2006 (3.8706) -13.1432 ^{***} (4.6217) -11.8594 ^{**} (5.1756)
SSM 2014 SSM 2015 SSM 2016 SSM 2017 SSM 2018	(1.1814) 10.1254*** (1.4067) 13.6286*** (1.9024) 17.1886*** (2.2378) 20.5812***	(1.3039) 4.9101*** (1.5943) 7.0122*** (1.8428) 5.7082** (2.3573)	(0.0312) 0.0256 (0.0377) 0.0843^{*} (0.0485) 0.1468^{**} (0.0644)	(0.3831) -0.0147 (0.4327) -0.7132 (0.6424) -1.6551* (0.8781)	(3.9112) 2.2006 (3.8706) -13.1432*** (4.6217) -11.8594** (5.1756)
SSM 2015 SSM 2016 SSM 2017 SSM 2018	10.1254 ^{***} (1.4067) 13.6286 ^{***} (1.9024) 17.1886 ^{***} (2.2378) 20.5812 ^{***}	4.9101 ^{***} (1.5943) 7.0122 ^{***} (1.8428) 5.7082 ^{**} (2.3573)	0.0256 (0.0377) 0.0843* (0.0485) 0.1468** (0.0644)	$\begin{array}{c} -0.0147 \\ (0.4327) \\ -0.7132 \\ (0.6424) \\ -1.6551^{*} \\ (0.8781) \end{array}$	2.2006 (3.8706) -13.1432*** (4.6217) -11.8594** (5.1756)
SSM 2015 SSM 2016 SSM 2017 SSM 2018	(1.4067) 13.6286*** (1.9024) 17.1886*** (2.2378) 20.5812***	(1.5943) 7.0122*** (1.8428) 5.7082** (2.3573)	(0.0377) 0.0843* (0.0485) 0.1468** (0.0644)	(0.4327) -0.7132 (0.6424) -1.6551* (0.8781)	(3.8706) -13.1432*** (4.6217) -11.8594** (5.1756)
SSM 2016 SSM 2017 SSM 2018	13.6286 ^{***} (1.9024) 17.1886 ^{***} (2.2378) 20.5812 ^{***}	(1.5943) 7.0122*** (1.8428) 5.7082** (2.3573)	0.0843 [*] (0.0485) 0.1468 ^{**} (0.0644)	-0.7132 (0.6424) -1.6551^{*} (0.8781)	-13.1432^{***} (4.6217) -11.8594^{**} (5.1756)
SSM 2016 SSM 2017 SSM 2018	(1.9024) 17.1886*** (2.2378) 20.5812***	(1.8428) 5.7082** (2.3573)	(0.0485) 0.1468** (0.0644)	(0.6424) -1.6551* (0.8781)	(4.6217) -11.8594** (5.1756)
SSM 2017 SSM 2018	17.1886 ^{***} (2.2378) 20.5812 ^{***}	5.7082 ^{**} (2.3573)	0.1468 ^{**} (0.0644)	-1.6551* (0.8781)	-11.8594 ^{**} (5.1756)
SSM 2017 SSM 2018	(2.2378) 20.5812 ^{***}	(2.3573)	(0.0644)	(0.8781)	(5.1756)
SSM 2018	20.5812***	(2.3573) 9.6666***			
SSM 2018		9.6666***	0.1602**		
			0.1002	-3.0877***	-15.2801**
	(2.8046)	(2.5352)	(0.0683)	(1.0534)	(6.3488)
SSM 2019	25.9338***	10.0898***	0.1358*	-4.8279***	-8.2835
SSM 2019	(2.8304)	(2.9358)	(0.0785)	(1.2535)	(7.5548)
	30.5709***	12.4168***	0.1541*	-6.6395***	-4.5136
	(3.3368)	(3.1430)	(0.0916)	(1.3989)	(7.6456)
R-squared	0.08	0.03	0.12	0.04	0.02
Adj. R-squared	0.08	0.03	0.11	0.04	0.02
Number of obs. 8,	, 248	8,248	8,248	8,248	8,248
Number of groups 1,	, 151	1,151	1,151	1,151	1,151
Average. Obs. group	7	7	7	7	7
Min. Obs. group	3	3	3	3	3
Max. Obs. Group	14	14	14	14	14

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Breakdown of RORWA: Other components II

- Strong positive SSM effects on net non-bank loan and deposit growth, up to 30 pp. Because of pre-2014 trends: net non-bank loan growth for SSM banks declined to -3.56% in 2013. Had this trend continued at -3 pp from 2014 to 2019, net non-bank loan growth would have plummeted to about -22% by 2019. Actual growth rate for SSM banks in 2019 was 3.84%.
- Positive SSM effects on operating expenses ratio, 0.08 to 0.15 pp from 2015 onward. Average ratio of operating expenses to total assets of 1.40% for SSM banks, increase approximately 10%.
- Negative SSM effect on loan loss reserve ratio coupled with positive effect on bank lending suggests SSM banks can lend more without increasing exposure to riskier borrowers. Suggests improvements in risk management.

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Conclusions

- SSM has positive effects on return on assets.
- Negative/no effects on RWs.
- Positive SSM effects on return on risk-weighted assets of SSM banks.
- Impact of SSM on ROA and RORWA mainly direct (increased confidence and better risk management).
- Positive effects on profitability and risk management outweigh costs of stricter supervision.
- In sum, SSM improved performance and soundness of SSM banks and rebuild confidence, thereby contributing to stability and soundness of the banking system in the euro area.

Thank you for your attention!

If you have any questions and/or comments, please feel free to reach out!

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References I

- Ben-David, I., Cerulli, G., Fiordelisi, F., and Marques-Ibanez, D. (2018). Seeking my supervisor: Evidence from the centralization of banking supervision in europe. Technical report, working paper.
- Mesnard, B., Margerit, A., Power, C., and Magnus, M. (2016). Non-performing loans in the banking union: stocktaking and challenges. *Briefing EU Commission*.

	DiD 1	DiD 2	FE 1	FE 2	FEIS 1	FEIS 2
Intercept	1.4184***	1.4146***				
inter cope	(0.1010)	(0.1015)				
log(TA)	-0.0106	-0.0105	-0.0547	-0.0463	-0.1923***	-0.1733***
08()	(0.0067)	(0.0067)	(0.0391)	(0.0395)	(0.0628)	(0.0611)
SSM bank	-0.0563	-0.0544	(()	(0)	((
	(0.0741)	(0.0765)				
SSM dummy	0.0655	(0.0701*		0.1456***	
, o m,	(0.0422)		(0.0359)		(0.0466)	
SSM 2013		-0.0145		0.0033		0.0968**
		(0.0506)		(0.0417)		(0.0436)
SSM 2014		-0.0209		-0.0123		0.1810***
		(0.0583)		(0.0533)		(0.0621)
SSM 2015		0.0744		0.0751		0.2792***
		(0.0554)		(0.0485)		(0.0742)
SSM 2016		0.0518		0.0508		0.2062**
		(0.0519)		(0.0480)		(0.0926)
SSM 2017		0.0649		0.1118**		0.3285***
		(0.0597)		(0.0506)		(0.1110)
SSM 2018		0.1121 [*]		0.1261**		0.3581 ^{***}
		(0.0602)		(0.0512)		(0.1226)
SSM 2019		0.1068*		0.1093**		0.3522***
		(0.0590)		(0.0483)		(0.1318)
Bank FE	по	по	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	no	no
Ind. time E.	по	no	no	по	yes	yes
R-squared	0.04	0.04	0.68	0.68	0.01	0.01

Total SSM Effects on the ROA

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Total SSM Effects on the RW

	DiD 1	DiD 2	FE 1	FE 2	FEIS 1	FEIS 2
Intercept	90.6280*** (3.9835)	89.4636*** (4.0427)				
log(TA)	-1.9631***	(4.0427) -1.9420^{***}	-8.8945***	-9.3465***	-11.7294***	-11.4240**
	(0.2550)	(0.2554)	(1.7354)	(1.7750)	(2.5186)	(2.6043)
SSM bank	-1.7877	-0.5214				
CCM June 1	(2.4415) -2.9154*	(2.5400)	-2.8487**		0.2887	
SSM dummy	(1.5015)		(1.1522)		(0.8007)	
	(1.5015)		(1.1322)		(0.0001)	
SSM 2013		-6.7884***		-5.1226***		-1.6284^{**}
		(1.6373)		(1.0637)		(0.7752)
SSM 2014		-3.2684**		-2.2708*		-0.6408
		(1.5278)		(1.1650)		(1.0530)
SSM 2015		-2.6155		-2.9953**		0.2982
		(1.7078)		(1.3521)		(1.2969)
SSM 2016		-3.9169**		-4.0429***		0.6845
		(1.7998)		(1.4411)		(1.4857)
SSM 2017		-5.3618***		-4.3604***		1.4472
		(2.0181)		(1.4428)		(1.6162)
SSM 2018		-4.1025**		-4.6380***		2.6143
		(2.0473)		(1.5551)		(1.8811)
SSM 2019		-6.7855***		-7.3236***		2.7603
		(2.0840)		(1.6136)		(2.1507)
Bank fixed effects	no	по	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	no	no
Individual time effects	по	no	no	no	yes	yes
R-squared	0.12	0.12	0.86	0.86	0.05	0.05

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Total SSM Effects on the RORWA

	DiD 1	DiD 2	FE 1	FE 2	FEIS 1	FEIS 2
Intercept	1.3837***	1.4055***				
	(0.2087)	(0.2100)				
log(TA)	0.0445***	0.0442***	0.1837^{*}	0.2028**	-0.1580	-0.1384
	(0.0129)	(0.0130)	(0.1010)	(0.1024)	(0.1388)	(0.1384)
SSM bank	-0.0644	-0.0953				
	(0.1169)	(0.1175)				
SSM dummy	0.2221**		0.2359**		0.3241***	
	(0.0899)		(0.0937)		(0.1091)	
SSM 2013		0.1872*		0.1754		0.3215**
		(0.1138)		(0.1113)		(0.1082)
SSM 2014		0.0732		0.0890		0.4277**
		(0.1270)		(0.1319)		(0.1398)
SSM 2015		0.3358**		0.3595***		0.6808**
		(0.1311)		(0.1315)		(0.1794)
SSM 2016		0.1239		0.1498		0.3163
		(0.1211)		(0.1326)		(0.2146)
SSM 2017		0.3070**		0.3793***		0.5925**
		(0.1311)		(0.1291)		(0.2430)
SSM 2018		0.3253***		0.3437***		0.5203*
		(0.1233)		(0.1256)		(0.2725)
SSM 2019		0.3979***		0.3810***		0.4840
		(0.1141)		(0.1153)		(0.2948)
Bank fixed effects	по	по	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	no	no
Individual time effects	по	по	no	no	yes	yes
R-squared	0.04	0.04	0.61	0.61	0.00	0.01

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