Common bank supervision and profitability convergence in the EU

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Research objectives

- The scope of this study is to examine whether and to what extent European bank **profitability converges** during the years of preparation and implementation of the **Single Supervisory Mechanism (SSM).**
- Recent literature and empirical evidence indicate that financial conditions have become more favorable towards **financial integration** after the introduction of the SSM.
- We perform a formal convergence analysis and the findings will indicate whether the EU is moving towards financial integration, which has been among its **main objectives** from its early stages.

Literature

- The findings of **Avgeri, Dendramis and Louri (2021, 2022)** indicate that the SSM had **a positive effect on the profitability of the directly supervised banks**, while banks located in **periphery countries** were found to be more intensely affected. In addition the positive effect on profitability was more pronounced in the case of **weaker banks**.
- Studies that have focused on the integration of banking efficiency: **Tziogkidis, P, Philippas, D., Tsionas, M., (2020), Fujii, H., Managi, S., Matousek, R., Rughoo, A., (2018), Matousek, R., Rughoo, A., Sarantis, N., Assaf, G.A., (2015), Casu and Girardone (2010).**

Data and variables

- We use bank-specific and macroeconomic annual data for the period **2011-2017** from 18 member countries of the euro area.
- The sample comprises **247 banks**, of which 78 belong to the directly supervised group of banks (SSM banks) and 169 banks are still supervised by the National Competent Authorities (NCA banks) with the ECB having an oversight role.

Table 1 Variables and sources of data

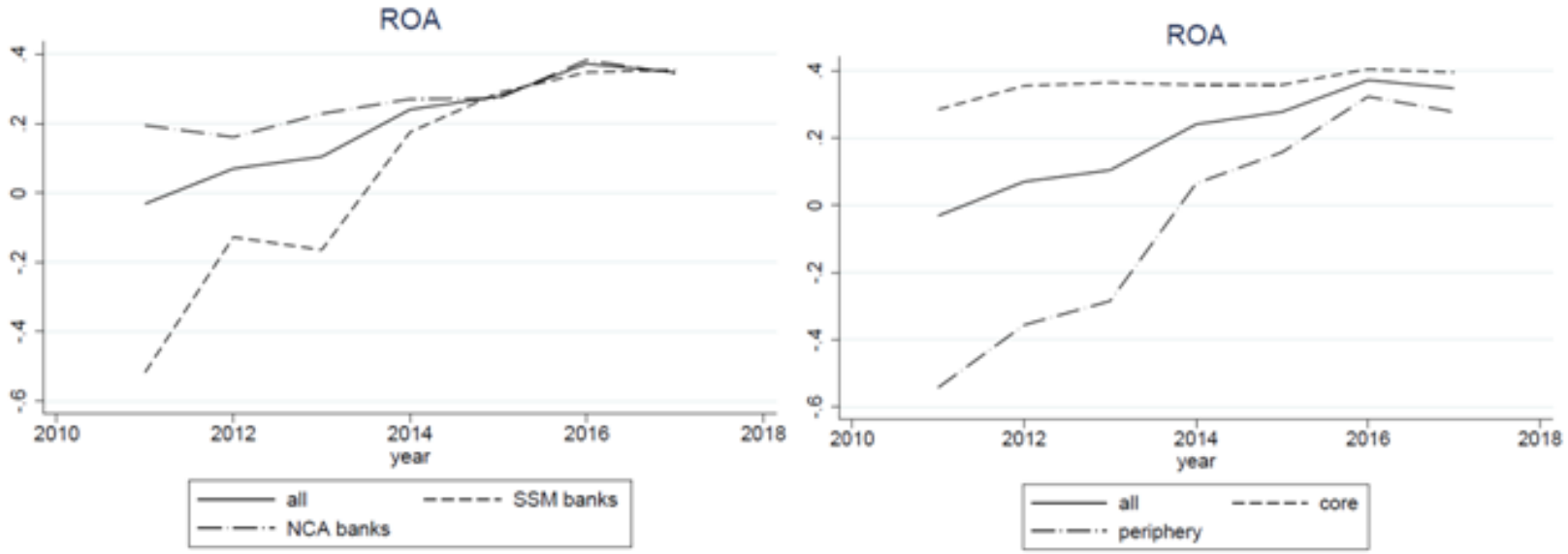
Variable	Definition	Source
ROA	Return on assets	BankFocus
ROE	Return on equity	BankFocus
tcar	Total capital adequacy ratio	BankFocus
growth	Growth rate of real GDP	AMECO

The evolution of profitability

- **Figures 1 and 2** illustrate the evolution of profitability for the groups of interest during 2011-2017.
- We observe a **converging behavior** for all of the examined groups, both for ROA and ROE.
- Furthermore, we see that **after the introduction of the SSM** in 2014 the **least profitable banks display increased profitability,** therefore the observed convergence can be interpreted as an indication of **improved efficiency**, i.e. the least profitable banks are **"catching-up"** with the more profitable ones.

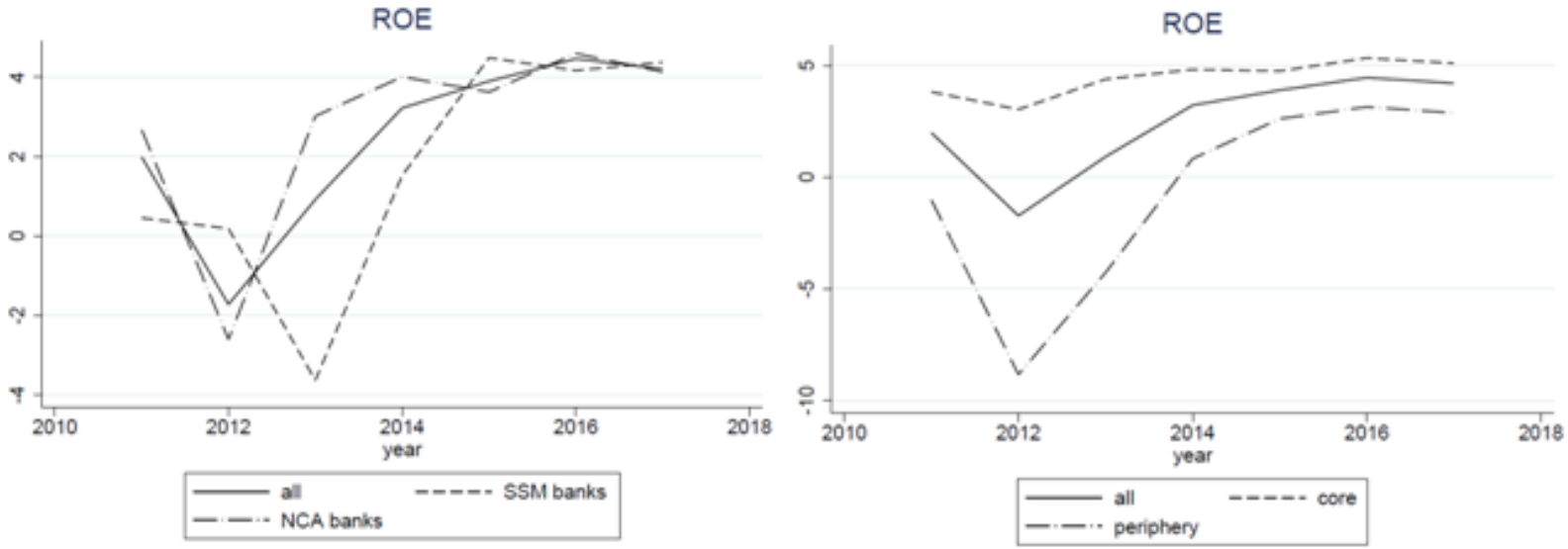
The evolution of ROA

Figure 1: The evolution of ROA



The evolution of ROE

Figure 2: The evolution of ROE



Phillips and Sul (2007) method

The method proposed by **Phillips and Sul (2007)** provides a framework to study the behavior of an individual transition path relative to the panel average, allowing for individual heterogeneity.

The first step of the proposed log t test regression is to construct the cross-sectional variance ratio, H_1/H_t, where $H_t = \frac{1}{N}\sum_{i=1}^{N}\left(h_{i,t} - 1\right)^2$

For this ratio, we need the relative transition coefficient $h_{i,t} = \frac{Y_{i,t}}{\frac{1}{N}\sum_{i=1}^{N} Y_{i,t}}$

The second step is to run the log t test regression:

$$\log (H_1 / H_t) - 2\log L(t) = \alpha + \beta \log t + u_i \qquad (1)$$

where $t = [rT], [rT+1], \ldots, T$, with $r > 0$ and $L(t) = \log (t+1)$.

The null hypothesis of convergence is rejected, using the 5% significance level, if the test statistic is < - 1.65.

Test of β-convergence

For robustness check, following the specification applied by Matousek et al. (2015), we conduct the test for β-convergence. The regression for β-convergence of the profitability indices is given by:

$$\boldsymbol{ln\,(Y_{i,t}) - ln\,(Y_{i,t-1}) = \alpha + \beta\, ln(Y_{i,t-1}) + A_i + \varepsilon_{i,t}} \qquad \textbf{(2)}$$

where $Y_{i,t}$ represents the profitability indices ROA and ROE of bank i at period t, $Y_{i,t-1}$ represents the profitability indices ROA and ROE of bank i at period t-1, A_i represents the bank fixed effects and $\varepsilon_{i,t}$ is the error term.

If the estimated coefficient $\boldsymbol{\beta}$ **is negative and statistically significant, $\boldsymbol{\beta}$-convergence is present**.

Empirical results – log t test

Tables 2 and 3 present the results of the empirical analysis using the Phillips and Sul (2007) convergence methodology, regarding both ROA and ROE.

The results indicate the **existence of convergence** at the 5% level for the two profitability indices **in all of the examined cases**.

In **Table 2** we see that the observed **convergence of the SSM group is stronger.**

In **Table 3**, the observed **convergence is stronger for the banks located in periphery countries**, both for ROA and ROE.

Table 2 Phillips and Sul log *t* convergence test on profitability indices of different groups of banks

	ROA			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)
	ALL	SSM	NCA	ALL	SSM	NCA
b	3.225	3.197	0.712	4.541	2.943	1.167
t-stat	4.800*	4.789*	1.004*	4.356*	3.640*	2.688*

*Indicates failure to reject the null hypothesis of convergence at the 5% significance level.

Table 3 Phillips and Sul log *t* convergence test on profitability indices of banks located in different groups of countries

	ROA			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)
	ALL	CORE	PERIPHERY	ALL	CORE	PERIPHERY
b	3.225	-1.123	1.781	4.541	-0.115	1.661
t-stat	4.800*	-1.343*	1.256*	4.356*	-0.124*	1.306*

*Indicates failure to reject the null hypothesis of convergence at the 5% significance level.

Empirical results – Test of β-convergence

Tables 4 and 5 present the results of the empirical analysis, applying the tests of β-convergence, for ROA and ROE.

Both tables reveal a **negative and statistically significant effect at the 1% level** for ROA and ROE.

This indicates the **presence of β-convergence** for ROA and ROE of all of the examined cases.

The results **remain robust irrespective of the estimation method** employed.

Table 4 Test of β-convergence of profitability indices of different groups of banks

ROA						
	OLS			**GMM**		
	(1)	(2)	(3)	(4)	(5)	(6)
	ALL	SSM	NCA	ALL	SSM	NCA
β	-0.992***	-0.962***	-1.007***	-0.823***	-1.013***	-0.660***
	(0.051)	(0.097)	(0.058)	(0.103)	(0.175)	(0.137)
N	1165	337	828	1165	337	828
R^2	0.584	0.561	0.594			
S-H				0.260	0.936	0.014
ROE						
	OLS			**GMM**		
	ALL	SSM	NCA	ALL	SSM	NCA
β	-1.017***	-1.015***	-1.018***	-0.814***	-0.936***	-0.665***
	(0.051)	(0.104)	(0.056)	(0.123)	(0.210)	(0.148)
N	1170	341	829	1170	341	829
R^2	0.593	0.566	0.609			
S-H				0.113	0.555	0.005

Table 5 Test of β-convergence of profitability indices of banks located in different groups of countries

	ROA					
	OLS			GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
	ALL	CORE	PERIPHERY	ALL	CORE	PERIPHERY
β	-0.992***	-0.923***	-1.068***	-0.823***	-0.948***	-0.745***
	(0.051)	(0.074)	(0.063)	(0.103)	(0.166)	(0.146)
N	1165	792	373	1165	792	373
R^2	0.584	0.519	0.646			
S-H				0.260	0.457	0.059
	ROE					
	OLS			GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
	ALL	CORE	PERIPHERY	ALL	CORE	PERIPHERY
β	-1.017***	-0.957***	-1.090***	-0.814***	-0.656***	-0.844***
	(0.051)	(0.075)	(0.062)	(0.123)	(0.128)	(0.188)
N	1170	794	376	1170	794	376
R^2	0.593	0.528	0.658			
S-H				0.113	0.139	0.065

The Z-score (I)

In this section the analysis expands to the Z-score. By applying the Phillips and Sul (2007) methodology **no evidence of convergence is identified for the Z-score**.

Table 6 Phillips and Sul log *t* convergence test on the Z-score

	(1)	(2)	(3)	(4)	(5)
	ALL	SSM BANKS	NCA BANKS	CORE	PERIPHERY
b	-1.413	-1.220	-1.395	-1.389	-1.360
t-stat	-25.249	-18.026	-22.959	-23.919	-18.496

The Z-score (II)

In **Tables 7 and 8** we see the results of the β-convergence tests, which display mixed patterns. **When OLS regression is employed, there is evidence of convergence, while the GMM estimation method reveals no indications of convergence.**

Since only the OLS estimation method provides evidence of convergence, our findings **suggest the existence of subgroups with diverging patterns**.

As the Z-score contains the mean and the standard deviation of the entire examined period, it could be **averaging out** any effects caused by the institutional reforms, which could otherwise have affected the converging behavior of the Z-score.

Table 7 Test of *β*-convergence of the Z-score of different groups of banks

	OLS			GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
	ALL	SSM	NCA	ALL	SSM	NCA
β	-0.455***	-0.607***	-0.326***	-0.035	0.047	-0.013
	(0.076)	(0.057)	(0.060)	(0.029)	(0.036)	(0.037)
N	1438	455	983	1438	455	983
R^2	0.350	0.374	0.360			
S-H				0.504	0.638	0.326

Table 8 Test of *β*-convergence of the Z-score of banks located in different groups of countries

	OLS			GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
	ALL	CORE	PERIPHERY	ALL	CORE	PERIPHERY
β	-0.455***	-0.305***	-0.545***	-0.035	-0.162	-0.010
	(0.076)	(0.073)	(0.072)	(0.029)	(0.170)	(0.055)
N	1438	866	572	1438	866	572
R^2	0.350	0.399	0.352			
S-H				0.504	0.771	0.589

Conditional convergence

In this section we include in the analysis first the **total capital adequacy ratio** (tcar) and next a macroeconomic variable, the **real GDP growth**.

Table 9 provides further indications of **absolute *β*-convergence** for ROA and ROE. Regarding the **Z-score**, the results are once again **mixed**, depending on the estimation method used.

In **Table 10**, there is **evidence of local equilibria of profitability** among banks located in countries with different GDP growth, for the case of **ROA**.

ROE, on the other hand, continues to display indications of **absolute convergence.**

Finally, the results regarding the Z-score, indicate the existence of **conditional convergence when we use OLS** estimation, while using **GMM estimation, there is evidence of absolute convergence**.

Table 9 Tests of *β*–convergence accounting for total capital adequacy ratio

	ROA		ROE		Z-score	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	GMM	OLS	GMM	OLS	GMM
β	-1.005***	-0.772***	-1.015***	-0.782***	-0.547***	0.010
	(0.051)	(0.117)	(0.056)	(0.124)	(0.078)	(0.025)
tcar	0.011	0.018	-0.004	-0.003	0.017***	-0.004***
	(0.007)	(0.007)	(0.009)	(0.005)	(0.004)	(0.001)
R^2/ *S-H*	0.603	0.208	0.596	0.405	0.444	0.570

Table 10 Tests of β–convergence accounting for real GDP growth

	ROA		ROE		Z-score	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	GMM	OLS	GMM	OLS	GMM
β	-0.999***	-0.789***	-1.017***	-0.770***	-0.493***	-0.028***
	(0.049)	(0.096)	(0.051)	(0.133)	(0.084)	(0.011)
GDP	0.029*	0.060**	0.001	0.020	0.022***	0.007
	(0.016)	(0.026)	(0.016)	(0.026)	(0.008)	(0.005)
R^2/ S-H	0.587	0.398	0.593	0.082	0.375	0.353

Conclusions

- The main findings of this part provide evidence towards the presence of **convergence for ROA and ROE**.
- We find evidence of **stronger converging behavior** for the profitability of the **SSM banks** in comparison to the group of NCA supervised banks.
- When banks are separated according to their location, **stronger profitability convergence** is observed for banks located in the **EU periphery countries**.
- The reforms introduced by the SSM were found to facilitate **convergence of profitability and overall bank performance.**

Thank you!