THE EFFECTS OF SSM ADOPTION ON BANK'S PROFITABILITY: A LONG-TERM EFFECTS DIFFERENCE-IN-DIFFERENCE ANALYSIS

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Summary

What we do This paper analyses the impact of the introduction of the Single Supervisory Mechanism on the **profitability** of European banks. Although the SSM does not explicitly aim to enhance profitability, as its policies are primarily oriented towards ensuring the resilience and the soundness of the banking system, it may have potential indirect effects on banks' profits. Using a **difference-in-difference** approach, we find a **positive effect** of SSM supervision on the profitability of directly supervised banks **protracted over time**. We use indeed a long-term effects difference-in-difference model which accounts for leads and lags, in order to analyze whether the treatment effect changes over time.

Motivations Over the past decade, **European banks have consistently shown lower profitability than their US counterparts** (Feng and Wang, 2018), so this issue has also become a source of concern for the ECB (ECB, 2018). In addition, profitability is a major concern for three other reasons (Elekdag et al., 2020):

- even if banks possess sufficient capital to absorb shocks, they require profits to **strengthen capital buffers** through retained earnings or by attracting new capital
- diminished profitability may encourage banks to engage in **excessive risk-taking** in pursuit of higher returns (gambling for resurrection) thereby exacerbating systemic risk
- a reduction in profits could result in banks reducing their asset base, which could **hamper credit intermediation to the real economy**

Empirical approach

Data We use an unbalanced panel dataset with annual measurements from 2011 to 2019, covering 2815 banks in 18 European countries. Among these, our **treated group** is composed of the **SIs**, a classification that applied to 76 banks in our dataset in 2014. The remaining banks (the LSIs, supervised by the NCAs) form the control group. **ROE using profit (loss) before tax** and **ROE using net income** are used as **alternative indicators of profitability**, while we control other balance sheet variables and for different structural macro variables.

Table 1: Descriptive statistics: complete sample

Statistic	N	Mean	St. Dev.	Source
Independent variables				
ROE using profit (loss) before tax	21,077	5.277	16.371	BankFocus
ROE using net income	21,077	3.165	14.598	BankFocus
Control variables				
Total assets	21,228	9,838,440.000	58,077,372.000	BankFocus
Common equit as percentage total assets	12,393	9.991	7.041	BankFocus
Cost-to-income ratio	21,059	75.507	406.588	BankFocus
Loan loss reserves to gross customer loans ratio	15,492	3.168	6.331	BankFocus
Tier 1 ratio	14,252	19.655	29.508	BankFocus
Government effectiveness	25,218	1.390	0.404	World Bank (WDI)
Inflation (CPI)	25,218	1.361	0.848	World Bank (WDI)
GDP growth	25,218	1.416	1.606	World Bank (WDI)
Profit tax	25,218	17.592	6.624	World Bank (WDI)

DiD In order to identify the effect of the adoption of the SSM on the profitability of directly supervised banks we consider first only observations in 2013 and 2014 and we esteem a **basic difference-in-difference model**:

$$p_{it} = \beta_0 + \beta_1 SSM_i + \beta_2 Post_t + \beta_3 (SSM * Post)_{it} + \gamma X_{it} + \eta_c + \tau_e + u_{it} \qquad (1)$$

where for bank i at time t, p_{it} is a profitability measure, SSM_i is a dummy and it is equal to 1 if a bank is directly supervised by the SSM in 2014 and 0 otherwise, $Post_t$ takes the value 1 in the year of introduction of the SSM (2014) and 0 before that (2013). Additional bank specific and structural control variables are collected in vector X_{it}. The parameters η_c represents the country-specific fixed effects and τ_e represents the type of entity fixed effects (credit institution, financial holding company or mixed financial holding company). u_{it} is the error term.

Long-term effects DiD As proposed by Autor (2003), we **include leads and lags** in the regression model, which makes it possible to analyse pre-treatment trends and, most importantly, whether the treatment effect changes over time after the treatment:

$$p_{it} = \sum_{r=-q}^{-1} \nu_r * SSM_i + \sum_{r=0}^{m} \nu_r * SSM_i + \gamma X_{it} + \alpha_i + \lambda_t + \eta_c + \tau_e + u_{it} \qquad (2)$$

The parameters α_i represents the bank-specific fixed effects while λ_t represents the time fixed effects. Treatment occurs in year 0 (i.e. 2014). In our case $q = 3$ anticipatory effects (lags) and $m = 5$ post treatment effects are included. We employ robust clustered standard errors in all regressions to ensure accurate inference.

Parallel trend assumption The key identifying assumption for the difference-in-difference approach is the so-called parallel trend assumption. We perform a **statistical test for differences in trends** (using only data from 2011 to 2013, i.e. before the treatment period) esteeming the following model:

$$p_{it} = \beta_1 SSM_i + \beta_2 (SSM_i * Year) + \alpha_i + u_{it} \qquad (3)$$

We find that β_{Year} is not significantly different from 0 in all the specifications.

Results

Firstly, we estimate the simple DiD model described in Equation 1. The results are always not significantly different from 0. Therefore, in order to **test for the presence of long-run effects**, we estimate a long-term effects difference-in-difference model (see Equation 2). The results of the two main specifications are shown in Figure 1, where the coefficients ν_r are reported with 95% confidence interval.
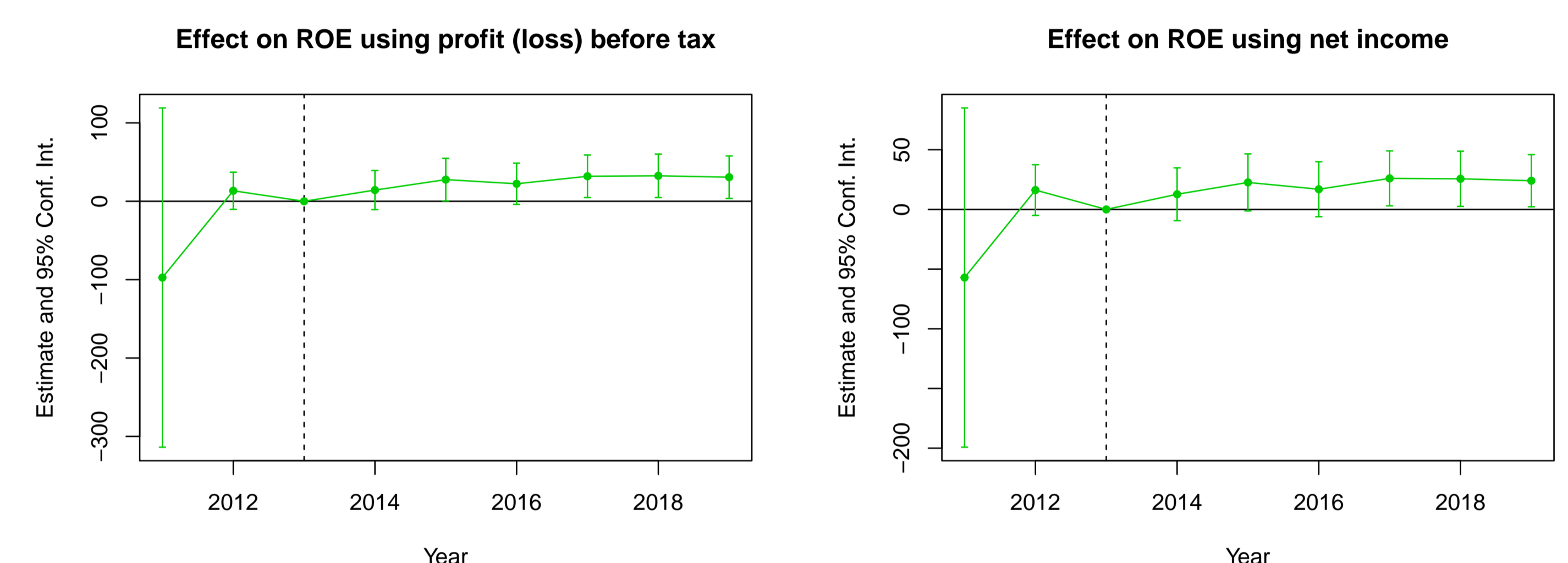
Figure 1: Point estimation and 95% standard errors of the effect of the SSM on the profitability of treated banks

We find a **significant positive effect** of direct supervision starting from the second year after the adoption of the SSM. At the same time, pre-treatment coefficients are non-significant, excluding the possibility of anticipatory effects and providing further evidence in favour of the parallel trends assumption described above. To give robustness to our results, we use a **simple matching technique** suggested by Avgeri et al. (2021): we exclude from the control group all the banks with a value of total assets less than the minimum value of total assets in the treated group in 2014. Results are unchanged. **Our findings align with recent research on the subject** (Avgeri et al., 2021; Hirtle et al., 2020; Raunig and Sigmund, 2022) and can be explained through **various channels**:

- increase in **transparency** and **credibility**, which leads to lower funding costs as markets expect lower returns from safer institutions (Feng and Wang, 2018)
- improved **risk management** Raunig and Sigmund (2022)
- efficient **managerial adjustments** (Fiordelisi et al., 2017)

Conclusion

Limitations A critical aspect to note is that our main results should be interpreted solely as the long-term impact of direct supervision by the SSM **in 2014** on bank profitability. Indeed, we don not consider data regarding changes in the list of SIs. This could raise an **endogeneity problem**, as the long-term effects of participation in the SSM in 2014, which we estimate, could be biased, since the fact of being directly supervised or not in later years could be considered an omitted variable, being potentially correlated with the dependent variables and, according to our hypothesis, a determinant of profitability. Furthermore, more **robustness checks** would also be needed, in particular:

- consider **other profitability indicators**, such as return on assets
- perform further **placebo tests**
- employ **more complex matching techniques**, such as propensity score matching

Finally, it would be worthwhile to examine the effects of direct supervision on other balance sheet variables and on systemic risks in Europe (network analysis).

Further research Preliminary analysis on the impact of the SSM on the European banking market on a wide range of balance sheet variables to get a **comprehensive view of the health of European banks** using a **novel estimation technique** proposed by Imai et al. (2023) for unbalanced panel data:

- **generalisation of the staggered adoption setting** (Callaway and Sant'Anna, 2021), as units are also allowed to vary in treatment over time
- the **idea** is to define a matched set for each treated bank, based on various notions of similarity between treated and untreated units, and then estimate the ATT
- more **robust** to model misspecification than the TWFE regression estimator (Imai and Kim, 2021)

Significant results protracted over time are found, consistent with the explicit objectives of the European supervisor. This can be interpreted as further evidence of the **effectiveness of the SSM**.