Transnational banking supervision, distance-to-distress and credit risk: the SSM case

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Abstract

We assess the impact of adopting a transnational supervisor on the distance-to-distress and credit risk of large and complex banks, exploring the establishment of the Single Supervisory Mechanism (SSM) in 2014 as a quasi-natural experiment. Using a differences-in-differences approach, we compare SSM banks *vis-à-vis* banks with a similar size and complexity operating in European countries outside the SSM. Our results suggest that adopting a transnational supervisor increases the distance-to-distress, particularly for banks operating in countries with larger banking sectors, higher market concentration and greater supervisory discretion. We also show that SSM banks reduced loan loss reserves and NPLs significantly more than non-SSM banks, but only among the most capitalized banks – which is consistent with the notion that well-capitalized banks are better able to weather haircuts induced by credit risk reduction initiatives. Interestingly, we find that SSM banks from countries with greater supervisory discretion saw their NPLs increase in the first years of the SSM, which could reflect the elimination of national idiosyncrasies in credit risk accounting. In general, the evidence presented in our paper suggests that transnational supervision bears a superior ability to increase the distance-to-distress, reduce credit risk, and harmonize supervisory practices among large and complex banks.

JEL classification: G20; G21; G28; G32.

Keywords: banking; supervision; distance-to-distress; credit risk; ONDs.

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1. Introduction

While the main goal of banking supervision is arguably universal (i.e., to ensure the soundness of banks and the banking system), how to attain it, and subsequent outcomes, can differ substantially across countries (e.g., Barth *et al.*, 2004; Khan & Dewan, 2013; Sohn & Vyshnevskyi, 2017) – begging the question: would the establishment of a transnational supervisor for large and complex banks, rather than the 'one country, one supervisor' approach, help to increase the soundness of banks, for instance via the increase of distance-to-distress and/or reduction of credit risk?

On the one hand, a transnational supervisor could implement the regulation more coherently and effectively across jurisdictions, namely by ensuring a better grasp of cross-border activities (Duijm & Schoenmaker, 2021), implementing best practices (Cuong & Pahm, 2021), fending off government pressures (Calomiris & Haber, 2014) and handling complex crisis cases (Véron, 2007). But, on the other hand, a transnational (and therefore more distant) supervisor may tend to follow "prescriptive supervisory rules (…) leaving little room for a judgment-led style of supervision" that considers material national idiosyncrasies (Ferran & Vabis, 2013: p.265). As such, whether or not implementing a transnational banking supervisor increases the distance-to-distress and/or reduces credit risk seems an important question.

In this paper, we analyze the effects of establishing the Single Supervisory Mechanism (SSM) at the end of 2014 and compare the distance-to-distress and credit risk proxies of SSM banks *vis-à-vis* banks that, having a similar size and complexity to SSM banks outside the Euro Area (non-SSM banks), remained under the supervision of national authorities.

2. Recent empirical literature

Studies addressing the establishment of the SSM have focused on a variety of phenomena. Our

study draws closer to Fiordelisi *et al.* (2017) and Avignone *et al.* (2021), which empirically investigate the impact of the launch of the SSM on bank riskiness employing a differences-in-differences approach. Both studies focus on Euro Area banks: the treated banks are significant institutions directly supervised by the ECB (SIs), and the control banks are less significant institutions supervised by national competent authorities (LSIs). Fiordelisi *et al.* (2017) show that, during the SSM's launch period (2011-2014), SIs increased capitalization and reduced credit risk *vis-à-vis* LSIs. Furthermore, the authors show that such pre-SSM reduction in credit risk occurred chiefly among undercapitalized banks – which is viewed as evidence of "a general expectation that the ECB's direct supervision would be less lenient than the NSAs' supervision in the past" (Fiordelisi *et al.*, 2017: p.2823). Avignone *et al.* (2021), on the other hand, focus on the pre- and post-SSM periods (2011-14, 2015-18) and document that, in the post-SSM period, SIs significantly increased the distance-to-distress and reduced credit risk when compared to LSIs. Both studies provide evidence suggesting that the differences in bank riskiness between SIs and LSIs are stable in the pre-SSM period, hence meeting the pre-condition to invoke the 'parallel trend assumption', i.e., that, absent the establishment of the SSM, the differences in bank riskiness between SIs and LSIs may be expected to remain stable.

This paper aims to contribute to this stream of the literature by using a control group of large and complex banks domiciled outside the SSM. This methodological option makes it possible to control the potential effects of regulatory changes targeted at large and complex banks (and not LSIs). Notice, for instance, that the 'too-big-to-fail' regulatory requirements ('TBTF regulation'), which are specific to large and complex banks, came into effect during the post-SSM period. A case in point is the transition period of the capital buffers for systemically important institutions (SII and O-SII), which occurred between 2016 and 2019. In this context, using a sample of large

and complex banks may allow a better control for TBTF regulation, which is typically negotiated in international *fora*, such as the Financial Stability Board, and hence cross-jurisdictional.

Nevertheless, a legitimate concern with our sample is that it may be subject to country-specific events, such as the UK Brexit, the Italian bank crisis (2015-16) or the 2014 Russian-Ukraine war. In this regard, we argue that a significant share of banks in our sample has a strong international presence, making them relatively less dependent on domestic events. Moreover, our regressions include bank and year-fixed effects to control for key macroeconomic events, and we perform robustness checks related to the country composition of our sample. Nonetheless, we view our approach as complementary to the approach followed by Fiordelisi *et al.* (2017) and Avignone *et al.* (2021), as our main goal is to shed light on the impact of the SSM on bank riskiness using a slightly different, yet relevant, perspective.

3. Data and methodology

In contrast to the cited literature, we compare the performance of banks under the direct supervision of the ECB (SSM banks) with banks of a similar size and complexity located in other European countries (non-SSM banks). The sample of SSM banks is based on the list of significant institutions published by the ECB at the end of 2014. The non-SSM sample consists of European banks outside the Euro Area, with total assets above €30bln or among the three largest banks in each country. For both samples, we retained the banks with full data coverage in the Moody's Analytics BankFocus dataset for at least three out of the four years of each sub-period (2011-2014 and 2015-18). The final sample consists of 148 banks: 81 SSM and 67 non-SSM, wherein the countries with the largest representation are the UK (17.6%) and Germany (10.1%)[1].

[1] The sample includes banks from 29 countries: 17 SSM countries (Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, and

We assess the impact of the establishment of the SSM on bank riskiness by estimating the following differences-in-differences model:

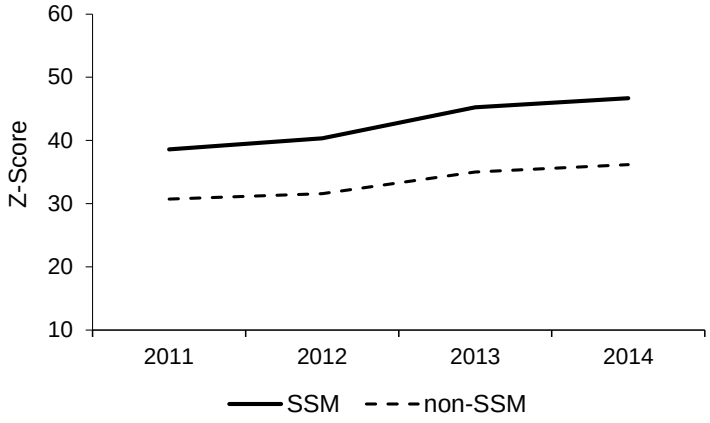
$$Y_{it} = \alpha_0 + \beta_1(SSM_i * BU_t) + \beta_2 SIZE_{it} + \beta_3 DIV_{it} + \beta_4 DEP_{it} + \beta_5 LOAN_{it} + \beta_6 NPL_{it} + \beta_7 CTI_{it} + \boldsymbol{\delta}_i + \boldsymbol{\varphi}_t + \varepsilon_{it}$$

wherein Y_{it} is the outcome variable, including the ZSCORE, given by the sum of total equity to total assets (CAR) plus net income to total assets (ROA) divided by the full period standard deviation of ROA (SDROA), as well as its sub-components: RACAR (CAR divided by SDROA), and RAROA (ROA divided by SDROA); furthermore, two credit risk variables studied in the literature (Fiordelisi *et al.*, 2017; Avignone *et al.*, 2021) are also used as left-hand side variables: loan loss reserves (LLR) and non-performing loans (NPL), both divided by gross loans to customers; α_0 is the model constant; SSM_i is a dummy that takes on the value one if bank i falls under the supervision of the ECB; BU_t is a dummy that identifies if year t belongs to the post-Banking Union period (2015-18); the remaining right-side variables are bank controls used in literature (size, income diversification, customer deposits, gross loans customers, non-performing loans, cost to income), which are divided by total assets except size (log of total assets); we control for unobserved time-invariant confounders at the bank-level (δ_i) and time-variant shocks over the same period (φ_t); α and β are the regression coefficients; and $\varepsilon_{i,t}$ is the disturbance term. The left hand-side variables that are found to be skewed (i.e., ZSCORE, RATEA, RAROA) are transformed using the natural logarithm (e.g., Laeven & Levine, 2009).

As required by the differences-in-differences approach (Imbens & Wooldridge, 2009), **Figure 1** shows a parallel trend in the evolution of the main outcome variable (ZSCORE) for both groups of banks (SSM and non-SSM) before the establishment of the SSM.

Spain) and 12 non-SSM countries (Bulgaria, Croatia, Czech Republic, Denmark, Hungary, Liechtenstein, Norway, Poland, Romania, Sweden, Switzerland, and United Kingdom).

Figure 1. Evolution of the Z-score before the establishment of the SSM



Notes: Z-score weighted by total assets, in SSM and non-SSM countries.

To check whether our baseline results are sensitive to market and institutional factors (e.g., Khan & Dewan, 2013), we compare the main coefficient of interest (β_1) for sub-samples of banks that, in the pre-Banking Union period, operated in countries with (i) large *vs* small banking sectors, (ii) high *vs* low market concentration, and (iii) high *vs* low supervisory discretion. The countries are separated using the median value of the following dimensions, respectively: (i) ratio of total assets held by banks in our sample to GDP, (ii) Herfindahl-Hirschman Index (World Bank's Global Financial Development Database), and (iii) level of supervisory options and national discretions for each country as assessed by Maddaloni & Scopelliti (2019).

4. Results

Table 1 suggests that before the Banking Union (2011-14) SSM banks recorded a significantly higher distance-to-distress than non-SSM banks, mainly due to higher capitalization. As for the post-Banking Union period (2015-16), the distance-to-distress gap increased further between SSM and non-SSM banks, backed by a significant increase of the risk-adjusted capital and risk-adjusted

profitability[2]. These results generally align with the baseline regressions reported in columns (1) to (3) of **Table 2**, as well as with the literature focused on the comparison between SIs (centrally supervised) and LSIs (locally supervised) (Fiordelisi *et al.*, 2017; Avignone *et al.*, 2021).

Table 1. Comparison of means

	Pre-Banking Union (2011-14)			**Post-Banking Union (2015-18)**		
	SSM	**Non-SSM**	**Diff.**	**SSM**	**Non-SSM**	**Diff.**
ZSCORE	42.6	33.4	9.2***	52.7	42.1	10.6***
RACAR	46.5	31.7	14.8**	56.0	40.0	16.0***
RAROA	1.81	1.71	0.10	2.81	2.10	0.71***
LLR	3.45	1.92	1.53***	2.83	1.00	1.83***
Sub-sample: MC	5.52	5.44	0.09	3.26	4.21	-0.95
Sub-sample: LC	2.67	0.82	1.85***	2.14	0.43	1.71***
NPL	6.04	4.10	1.94***	4.85	1.94	2.91***
Sub-sample: MC	9.22	8.71	0.51	5.38	5.81	-0.43
Sub-sample: LC	4.83	1.23	3.60***	3.78	0.92	2.87***

Notes: Weighted mean values. Variables winsorized at 1 and 99 percentiles. ZSCORE is the sum of CAR plus ROA divided by the full period standard deviation of ROA (SDROA), RACAR is Total equity to total assets divided by SDROA, RAROA is Net income to total assets divided by SDROA, LLR (Loan loss reserves) and NPL (Non-Performing Loans) are divided by Gross Loans to Customers. MC (Most capitalized) and LC (Least capitalized) correspond to the top and bottom quartiles of banks in CAR for the pre-Banking Union period, respectively. We compute Welch's t-test for the comparison of weighted means (Pasek, 2020). ***, ** and * indicate significance at the 1%, 5% and 10%, respectively.

With respect to credit risk, **Table 1** shows that SSM banks recorded significantly higher values of credit risk (LLR and NPL) in the pre-Banking Union period, with no material change taking place after the establishment of the Banking Union (in fact, the mean comparisons show a slight increase in the 'SSM vs non-SSM' gap). In line with this, columns (4) and (5) of **Table 2** show that the coefficient for the 'SSM*Post-BU' dummy on LLR and NPL is not statistically significant. Such results offer a new perspective on the evidence collected by the literature, which document a negative impact of the SSM on SI's credit risk *vis-à-vis* LSIs (Fiordelisi *et al.*, 2017; Avignone *et*

[2] Untabulated results show that the improvement in ROA of SSM banks steams from an increase in the generation of fees and commissions that more than cover the higher operating expenses. While bank performance is not the main topic of this paper, we highlight three aspects possibly underlying such results. Firstly, SSM banks' superior profitability in the post-Banking Union period may reflect the fact that profitability and business model sustainability was adopted as a critical supervisory priority in the SSM since its onset (ECB, 2016). Secondly, the higher operating costs of SSM banks could reflect compliance costs stemming from tighter supervisory requirements (Ayadi *et al*, 2016); on the other hand, in the current context of staff and branch reduction, such cost add-ons may reflect the efforts to digitalize business processes and one-shot expenses with voluntary retirement schemes.

al., 2021). Namely, the lack of significant effect of the Banking Union on the credit risk of SSM's large and complex banks relative to their non-SSM peers, coupled with a significant drop in LLR and NPLs for both groups (see **Table 1**), may reflect the fact that NPL transactions, which represent one of the key mechanisms for credit risk reduction among larger banks (Angelini, 2018), peaked around 2014-18 for both SSM and non-SSM countries (Boulding & Thomson, 2020).

Table 2. Baseline regressions: Z-score decomposition

	ZSCORE (1)	**RACAR** (2)	**RAROA** (3)	**LLR** (4)	**NPL** (5)	**LLR** (6)	**NPL** (7)
SSM*Post-BU	**0.047****	**0.048****	**0.036***	**-0.002**	**0.001**	**0.001**	**0.006***
SSM*Post-BU*MC						**-0.015*****	**-0.020*****
SSM*Post-BU*LC						**-0.000**	**-0.002**
Size	-1.336***	-1.293***	-0.271***	-0.006	-0.003	-0.004	-0.000
Customer deposits	-0.324**	-0.663***	0.221*	-0.044***	-0.098***	-0.041***	-0.094***
Gross loans to custom.	0.048	0.071	0.007	0.043***	0.064***	0.040***	0.060***
Income diversification	-0.054	-0.081	0.024	0.028***	0.046***	0.029***	0.047***
Non-performing loans	-0.535**	0.034	-0.927***				
Cost to income	-0.452***	-0.233***	-0.705***	0.009***	-0.002	0.009***	-0.002
Observations	1171	1171	1171	1171	1171	1171	1171
R-square	0.502	0.522	0.283	0.203	0.240	0.229	0.255

Notes: OLS regressions with bank fixed effects and controls. ZSCORE is the natural log (ln) of the sum of CAR plus ROA divided by the full period standard deviation of ROA (SDROA), RACAR is ln(Total equity to total assets divided by SDROA), RAROA is ln(Net income to total assets divided by SDROA), LLR (Loan loss reserves) and NPL (Non-Performing Loans) are divided by Gross Loans to Customers. MC (Most capitalized) and LC (Least capitalized) correspond to the top and bottom quartiles of banks in CAR for the pre-Banking Union period, respectively. Size is log of Total assets, Customer deposits and Gross loans to customers are divided by Total Assets. Income diversification is the Herfindahl-Hirschman Index of operating revenues (Marques and Alves, 2021). ***, ** and * indicate significance at the 1%, 5% and 10%, respectively.

On the other hand, **Table 1** and columns (6) and (7) of **Table 2** show that, in the post-Banking Union period, the most capitalized banks in the SSM significantly reduced LLR and NPL when compared to their non-SSM peers. In our view, such result is not entirely surprising, as more capitalized banks should be better prepared to weather the haircuts implicit in credit reduction strategies (i.e., NPL transactions). Moreover, we see our results as complementing those found in the literature. Effectively, the finding that (i) undercapitalized SIs preemptively reduced credit risk more than LSIs in the pre-SSM period (2013-14) in preparation for a 'less lenient supervision' by the ECB (Fiordelisi *et al.*, 2017), may be seen as complemented by our evidence that (ii) in the

post-Banking Union period, more capitalized SIs reduced credit risk more rapidly than non-SSM banks.

Table 3. Sensitivity analyses

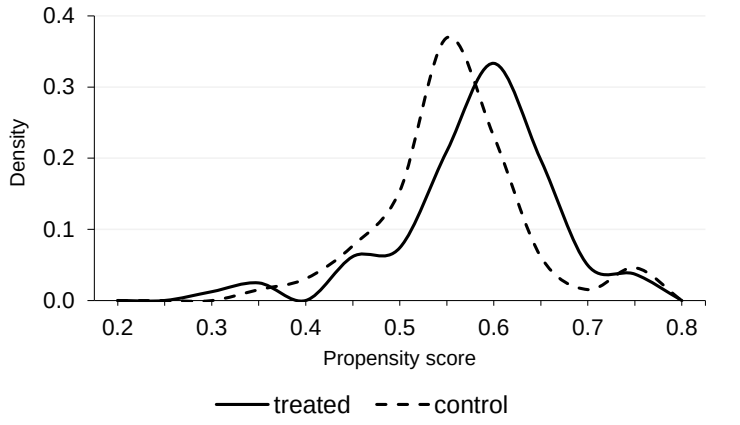
	High	Low	Diff.
Panel A: Size of banking sector (total assets of SIs to GDP)			
ZSCORE	**0.095*** **	**0.027**	**0.068** **
LLR	**-0.007*** **	**-0.003**	**-0.004*** **
NPL	**-0.006** **	**0.001**	**-0.007*** **
Observations	597	574	
Panel B: Market concentration (Herfindahl-Hirschman Index)			
ZSCORE	**0.087** **	**0.011**	**0.076*** **
LLR	**-0.008*** **	**-0.003**	**-0.005** *
NPL	**-0.010** **	**0.009*** **	**-0.019** **
Observations	566	605	
Panel C: Supervisory discretion (options and national discretions)			
ZSCORE	**0.068** *	**-0.007**	**+0.075*** **
LLR	**0.001**	**-0.010**	**+0.011**
NPL	**0.010** **	**-0.015*** **	**+0.025** **
Observations	571	443	

Notes: OLS regressions using ZSCORE, LLR and NPL as dependent variables, with bank fixed effects and controls. 'High' and 'Low' columns represent above and below median, respectively, computed using four country-level variables: in Panel A, the ratio of total assets held by banks in our sample to GDP; in Panel B, the Herfindahl-Hirschman Index (World Bank, Global Financial Development Database); in Panel C, the level of supervisory options and national discretions for each country as assessed by Maddaloni & Scopelliti (2019) (Panel D). The dependent variable in all regressions is the natural log of Z-score. For brevity reasons, only the coefficient of the main independent variable (β_1) is reported. In the last column we compute the Chi-Square Test for the equality of coefficients. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Finally, we check for heterogeneous effects of establishing the SSM for banks operating in different market and institutional settings. The results in **Table 3** show that the positive effects of the SSM on distance-to-distress (increase) and credit risk (decrease) are significantly more felt for banks operating in countries with larger banking systems and higher market concentration – suggesting that a transnational supervisor may be better able to resist government pressures (Calomiris & Haber, 2014). Regarding supervisory discretion, on one hand the results suggest that the SSM increased the distance-to-distress of banks operating with high supervisory discretion; on the other hand, we find that NPLs increased for banks operating in countries with high supervisory discretion. This result is not entirely surprising, as credit risk constitutes an important part of the

'Options and National Discretions' (ONDs) (Maddaloni & Scopelliti, 2019). We conjecture that the centralized supervisor is likely to have pushed for a harmonized implementation of NPLs and LLRs (for instance, via credit reviews), moving the credit risk measures upward in such countries immediately after the Banking Union. To test this hypothesis, we interact the 'SSM' dummy with a 'short-term post-Banking Union' dummy (2015-16). Untabulated results show that, indeed, the positive effect of the SSM on NPLs was driven by the first years of the Banking Union.

Figure 2. Propensity score for the matched samples



Notes: Propensity score for the matched sample (n=146). Banks matched radius matching on four inputs (pre-SSM mean values): (i) total assets, (ii) assets diversification (i.e., 1-gross loans to customers divided by total assets), (iii) funding diversification (wholesale funding divided by total assets), and (iv) income diversification (Herfindahl-Hirschman Index of operating revenues).

Furthermore, to mitigate potential concerns regarding the suitability of our controls, we apply propensity score matching as a robustness check. As inputs, we use the pre-SSM mean values of the following proxies for the size and complexity of banks (Marques & Alves, 2021): (i) total assets, (ii) assets diversification, (iii) funding diversification, and (iv) income diversification. Relative to our original sample, the matched sample only excludes two banks from the control sample (both on the extremes of the distribution). Also, untabulated results show no significant differences in the mean values of the inputs (pre-SSM) between the treated and control samples. The visual inspection of **Figure 2**, which depicts the estimated probability for direct supervision,

indicates a significant overlap region of the density functions of both samples. By computing the average effect of the treatment on the growth of distance-to-distress, using radius matching, we find a positive and significant effect of the treatment – in line with our baseline results.

Finally, to address concerns related to country-specific events that took place during our sample period, such as the UK Brexit, the Italian bank crisis (2015-16) or the 2014 Russian-Ukraine war, we run the baseline regressions iteratively excluding from the sample banks from (i) the UK, (ii) countries in the border with Ukraine (Romania, Hungary, Poland, and Slovakia) and (iii) Italy and Greece. We find that the main coefficients of interest are not significantly affected by the change in sample composition.

5. Conclusions

The heterogeneity of supervisory practices and outcomes across countries has fueled the debate over the costs and benefits of transnational supervision. Using the establishment of the SSM as an empirical setting, we compare the distance-to-the distress and credit risk of large and complex banks under the direct supervision of the ECB with similarly large and complex banks operating outside the SSM. Our results suggest that, since its establishment, the SSM has been relatively successful in increasing the distance-to-distress of supervised entities, particularly for those operating in countries with larger banking sectors, higher market concentration and greater supervisory discretion. Regarding credit risk, we show that, compared to their non-SSM counterparts, the most capitalized banks in the SSM cut LLR and NPL considerably. Such a result, in our opinion, is not wholly unexpected, since well-capitalized banks should be better able to weather the haircuts that come with credit risk reduction initiatives (i.e., NPL transactions). Interestingly, we find that NPLs increased for banks operating in countries with high supervisory discretion in the short run, which we interpret as reflecting the elimination of national

idiosyncrasies in credit risk measurement, and, therefore, a movement toward a higher degree of harmonization. In sum, the results in our paper may be interpreted as suggesting that transnational supervision seems to bear a superior ability to increase to the distance-to-distress, reduce credit risk, and harmonize best supervisory practices.

References

Angelini, P. (2018). *Non-performing loans: the market, the rules and a stronger system*. Speech by the Deputy Director General for Financial Supervision and Regulation at the Bank of Italy. NPL Conference: Challenges and Opportunities. Regulatory requirements, strategies of banks and new operators. Rome, October 9th, 2018.

Avignone, G., Altunbas, Y., Polizzi, S., & Reghezza, A. (2021). Centralized or decentralized banking supervision? Evidence from European banks. *Journal of International Money and Finance*, *110*(1), 1-14.

Ayadi, R., Naceur, S. B., Casu, B., & Quinn, B. (2016). Does Basel compliance matter for bank performance?. *Journal of Financial Stability*, *23*(1), 15-32.

Barth, J. R., Caprio Jr, G., & Levine, R. (2004). Bank regulation and supervision: what works best?. *Journal of Financial intermediation*, *13*(2), 205-248.

Boulding, R., & Thomson, R. (2020). *€150 billion of non performing loan portfolios expected to trade over the next 2 years across Europe*. PricewaterhouseCoopers, Financial Services Lead Advisory. UK, London.

Calomiris, C. W., & Haber, S. H. (2014). *Fragile by design*. New Jersey: Princeton University Press.

Cuong, L. K., & Pham, H. (2021). Direct and indirect impacts of European banks' regulation. *Finance Research Letters*, *40*(1), 1-11.

Duijm, P., & Schoenmaker, D. (2021). European banks straddling borders: Risky or rewarding?. *Finance Research Letters*, *38*(1), 1-7.

ECB. (2016). *ECB Banking Supervision: SSM priorities 2016*. European Central Bank, Frankfurt.

Ferran, E., & Babis, V. S. (2013). The European single supervisory mechanism. *Journal of Corporate Law Studies*, *13*(2), 255-285.

Fiordelisi, F., Ricci, O., & Stentella Lopes, F. S. (2017). The unintended consequences of the launch of the single supervisory mechanism in Europe. *Journal of Financial and Quantitative Analysis*, *52*(6), 2809-2836.

Imbens, G. W., & Wooldridge, J. M. (2009). Recent developments in the econometrics of program evaluation. *Journal of Economic Kiterature*, *47*(1), 5-86.

Khan, A. H., & Dewan, H. (2013). Who should supervise banks for the banking sector stability?. *Applied Economics Letters*, *20*(17), 1531-1537.

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, *93*(2), 259-275.

Maddaloni, A., & Scopelliti, A. (2019). *Rules and discretion (s) in prudential regulation and supervision: evidence from EU banks in the run-up to the crisis*. ECB Working Paper Series, No 2284, May 2019.

Marques, B. P., & Alves, C. F. (2021). The profitability and distance to distress of European banks: do business choices matter?. *The European Journal of Finance, forthcoming*.

Pasek, J. (2020). *Weights: "Weighting and Weighted Statistics"*. R package version 1.0.1.

Sohn, W., & Vyshnevskyi, I. (2017). The 'Twin Peaks' model of post-crisis banking supervision. *Applied Economics Letters*, *24*(8), 571-574.

Véron, N. (2007). Is Europe ready for a major banking crisis?. *Bruegel Policy Brief*, *3*, 1-8.