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ORIGINAL ARTICLE

Implementing the Single Supervisory Mechanism in the Euro Area: Effects on Deposit Structure of Banks

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Abstract

In this paper we investigate whether the banks which fall under direct supervision by the European Central Bank (ECB) are more likely to be considered more stable and trustworthy by the depositors due to the stricter supervisory activities performed since the implementation of the Single Supervisory Mechanism (SSM). Under the SSM, significant banks switched from national supervisors to ECB, whereas the remaining banks remained under national supervisory authorities (NSAs). Using the difference-in-difference (DID) method, we have found evidence of increased depositors' trust in significant banks after the SSM implementation. Additionally, in anticipation of the SSM launch and the comprehensive assessment, we have found evidence of increased depositors' trust in the banks which were expected to be supervised by the ECB.

Keywords: Deposits, Interbank deposits, Banking supervision, Single Supervisory Mechanism

JEL classification: G2

Introduction

The SSM is a system of banking supervision which was implemented in 2014 in the euro area as the first pillar of the European Banking Union. The second and third pillars of the European Banking Union are the Single Resolution Mechanism and the common deposit guarantee scheme (ECB, 2018, p. 3). Before the SSM, the supervision of the banks in the euro area was performed inconsistently by national institutions in each country. The heterogeneity of bank regulation and supervisory practices across the countries caused difficulties for implementing measures to respond to the crisis in 2009 (Barth et al., 2013; Financial Crisis Inquiry Commission, 2011). Therefore, in 2012, the European Commission proposed the implementation of the SSM, aiming for consistent supervisory practices, increased safety and stability of the banks and restored trust in the banking sector (ECB, 2014b, 2016). The proposal for implementing the SSM was approved in 2013 by the Council of the European Union (Council of the European Union, 2013b; European Commission, 2012; ECA, 2014). Under the SSM, the ECB as the main decision body developed criteria for classifying banks as significant or less significant. The most significant banks, which represent more than 80% of the total assets in the euro area, switched from national supervisors to the ECB, whereas the remaining banks remained under NSAs (ECB, 2014b). In October 2014, as a preparatory step for the banking supervision activities under the SSM, a comprehensive assessment was performed by the ECB on 130 banks which comprised 81.6% of the total assets in the euro area (ECB, 2014a). The comprehensive assessment involved an asset quality review and stress test exercise. The asset quality review was aimed to assess the value of the banks' assets, and the stress test to examine bank resilience (ECB, 2014a).

The aim of this study is to inspect the effect of SSM on depositors' trust measured via the total-deposits-to-total-assets and interbank-deposits-to-total-assets ratios. This is because improved bank stability is the

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primary goal of the SSM (ECB, 2014b). Therefore, we expect increased depositors' trust in significant banks, which switched from national supervisors to the ECB, in comparison to less significant banks, which remained under national supervisors. We expect this trust effect to be more pronounced in short-term interbank deposits and less pronounced in insured deposits. Additionally, we investigate the immediate trust effect of depositors in banks which were expected to be supervised by the ECB and to be evaluated under the comprehensive assessment. For that purpose, we address the following research questions in this study: 1) whether the SSM implementation affected depositors' trust in significant banks compared to less significant banks; and 2) whether the anticipation of the SSM launch and the comprehensive assessment affected depositors' trust in the banks which were expected to be supervised by ECB, compared to the banks which were expected to remain under supervision by their NSAs.

We provide empirical evidence of increased depositors' trust in significant banks after the SSM implementation. The trust effect of the depositors is strongly demonstrated with the short-term interbank deposits, which are based on trust and are not collateralized. Long-term deposits are collateralized more frequently and are therefore considered safer. These results imply that the SSM has improved the credibility of significant banks, which in turn implies that the SSM is fulfilling its main priority, which is increased safety and stability of banks (ECB, 2014b). Additionally, we provide empirical evidence of increased depositors' trust in significant banks in anticipation of the SSM and the expected comprehensive assessment. The trust effect of the depositors is strongly demonstrated with the short-term interbank deposits with a maturity of up to 3 months. These results imply that the ECB is perceived as a stricter supervisory authority compared to the NSAs and are consistent with the literature that investigates supervision architecture (Colliard, 2020; Fiordelisi et al., 2017).

We performed various robustness checks to assess the validity of our results. First, we applied placebo tests where, by creating a fictional time dummy variable, we assumed that the SSM had been implemented in 2012. We did not find any differences in the interbank-deposits-to-total-assets ratio between significant and less significant banks in 2012, the year before the announcement of the SSM. These results imply that the change of the interbank deposits structure of significant banks is associated with the SSM implementation rather than any other past events. Second, we found no evidence of changes in the share of interbank deposits in the period of SSM implementation (2014) in banks in the European countries which are not part of the euro area and do not participate in the SSM. These results imply that there are no other factors that could have affected the interbank deposits structure of the euro area banks apart from the implementation of the SSM. Third, we tested our results for sample selection bias, by removing France from our dataset. Our results are consistent with our main findings and confirm the absence of sample selection bias. Fourth, on this subsample without France, we applied placebo tests where, by creating a fictional time dummy variable, we assumed that the SSM had been implemented in 2012. We confirmed our results that the change of the interbank deposits structure of significant banks is associated with the SSM implementation. Fifth, we inspected the effect of the fixed interest rate on main refinancing operations on our DID coefficient, by adding it as a control variable in the model. We confirmed our results that increased depositors' trust in the significant banks is associated with SSM implementation.

Moreover, we performed an additional analysis to inspect both the impact of SSM implementation and SSM anticipation on banks' interbank deposits structure by different maturities. In this analysis, we applied placebo tests where, by creating a fictional time dummy variable, we assumed that the SSM had been implemented in 2012. We found no differences in the share of interbank deposits of any maturity between significant and less significant banks in 2012, the year before the announcement of the SSM. This implies that the changes of the interbank deposits structure by maturity are associated with the SSM implementation and not with other events.

We did observe differences in the portion of total assets funded with total deposits between significant and less significant banks in the period of SSM implementation as well as in the period of SSM anticipation. However, our robustness checks warned about the existence of other factors that might have affected those differences rather than the SSM. Therefore, we cannot confirm that the implementation of the SSM and the anticipation of the SSM launch affected those differences. A possible explanation for this is the presence of customer deposits and saving accounts in the total deposits of the banks, which cannot be affected by institutional changes such as the implementation of the SSM.

This paper contributes to the recent literature stream on the SSM and to the established literature on supervision. In this respect, this study is related to Altunbaş et al. (2022); Alves et al. (2023); Avgeri et al. (2021); Avignone et al. (2021); Cuadros-Solas et al. (2023); Fiordelisi et al. (2017). These works provide evidence of reduced credit risk exposure (Avignone et al., 2021), lower sovereign risk (Cuadros-Solas et al.,

2023), increased profitability (Avgeri et al., 2021), worsened risk disclosure practices (Altunbaş et al., 2022), and adjusted lending behaviour (Fiordelisi et al., 2017) of significant banks compared to less significant banks, as well as evidence of improved asset quality of SSM-supervised banks in terms of decreased nonperforming loans and loan loss reserves (Alves et al., 2023). Our study contributes to this literature by providing empirical evidence of increased depositors' trust in the significant banks due to the SSM implementation and SSM anticipation. Our empirical results also have important policy implications for policy makers and supervisory authorities as they confirm that the SSM has improved the credibility of significant banks and is fulfilling its main priority, which is increased safety and stability of banks and the overall banking sector (ECB, 2014b).

The remainder of this paper is structured as follows: Section 1 reviews the literature, Section 2 describes the data and the methodology, Section 3 covers the empirical results along with the robustness checks, and Section 4 concludes the article.

1 Literature review and theoretical framework

1.1 Liquidity funding

Liquidity funding is important for the riskiness of the overall banking sector, as it directly affects the risk profile of each individual bank and its probability of failure (Bologna, 2011). A diversified funding structure leads to stable banks and a stable banking sector (Oura et al., 2013).

Deposits are the optimal form of bank funding. First, this is because they help banks transform illiquid assets in their balance sheets (Diamond & Dybvig, 2000), and second, because they are a cheaper source of funding compared to equity capital (Allen et al., 2015). Moreover, deposits are an important source of liquid liabilities, because with them, banks provide liquidity in the economy (Kundu et al., 2021). On the other hand, deposits can be a source of bank vulnerability. For instance, multinational banks are exposed to vulnerabilities by transmitting shocks as they collect deposits from countries in which they operate and allocate them as loans in other countries (Kundu et al., 2021). Deposit withdrawals, which happen in case of absence of depositor's trust in the banking sector, also represent a source of bank vulnerability (Martin et al., 2018).

Interbank deposits are another form of bank funding, which happens on the interbank market and is based on trust. To participate on the interbank market, which has a crucial economic role for the movement of savings (Bruche & Suarez, 2010), banks need to demonstrate their creditworthiness (Allen et al., 2020). Their risk taking is monitored (Dinger & Hagen, 2009) and reflected in the interbank interest rates (Furfine, 2001). Interbank lenders tend to be better capitalized (Angelini et al., 2011), whereas interbank borrowers tend to engage in less risky activities (Dinger & Hagen, 2009). Both interbank lending and interbank borrowing can decrease bank riskiness via diversification (Dietrich & Hauck, 2020) and via extending maturity periods (Dinger & Hagen, 2009), respectively. On the other hand, the interbank market is highly contagious and can be a source of instability and systemic risk (Allen et al., 2020; Bernard & Bisignano, 2000; Furfine, 2001).

1.2 Banking supervision and SSM

A significant amount of research has been done to investigate banking supervisory architecture. Conflicting opinions exist regarding centralized and decentralized supervisory practices. Decentralized supervisory practices, where banks are supervised by different authorities in different countries, lead to increased liquidity risk and lower capital ratios of banks (Barth et al., 2002). On the other hand, centralized supervisory frameworks, which have one main decision-making body, promote incentives for moral hazard (Barth et al., 2004). Moreover, centralized supervision where central banks have the role of supervisory authority can lead to increased riskiness in the banking sector due to higher nonperforming loans (Barth et al., 2002). On the contrary, centralized supervision reduces possibilities for information asymmetry and arbitrage (Ampudia et al., 2019). Moreover, centralized supervision is claimed to be the better option for multinational banks as decentralized supervision can lead to accumulated risk and bank failures. According to Calzolari et al. (2019), multinational banks supervised under decentralized supervisory frameworks tend to adjust their organizational structure by converting subsidiaries to branches in order to decrease their supervisory monitoring. Moreover, centralized supervision can accelerate cross-border activities of the supervised banks, as centrally supervised banks have lower funding costs and can easily obtain foreign funds (Colliard, 2020). Dual supervisory systems, on the other hand, are based on both centralized and decentralized supervisory practices. In dual supervisory frameworks inconsistent implementation of identical rules is possible due to differences in the institutional design and the incentives of supervisory authorities (Agarwal et al., 2014). Moreover, in dual supervisory

frameworks, aligned incentives and goals between the supervisory authorities are needed for achieving effective supervision and consequently a stable and resilient banking sector (Carletti et al., 2021). The supervisory architecture affects the regulatory powers of supervisory authorities (Näther & Vollmer, 2019). However, regardless of the institutional design, all supervisory practices must be based on timely information disclosure and absence of moral hazard. Moreover, they should ensure proper implementation of rules and regulations in order to increase stability and trust in the banking sector (Barth et al., 2004; De Larosière, 2009).

The SSM is a dual supervisory framework based on centralized and decentralized supervision. It is centralized because the ECB is the main body for supervising significant banks and decentralized because NSAs supervise less significant banks by performing supervisory tasks over which the ECB has no direct hierarchical control (Zeitlin, 2023). Recent literature analyses its institutional design and the division of supervisory tasks and actions of the ECB and NSAs (Gortsos, 2023; Quaglia & Verdun, 2023). The SSM implementation is not anachronistic (Mansson, 2014). The literature provides little evidence regarding the effectiveness of its implementation. The SSM has proved to be effective in reducing the riskiness of the overall banking sector measured in terms of credit risk (Avignone et al., 2021) and sovereign risk (Cuadros-Solas et al., 2023). Moreover, it has proved to be effective in improving banks' performance measured in terms of increased profitability (Avgeri et al., 2021) and improved banks' asset quality (Alves et al., 2023). Additionally, it has proved to be effective in increasing the competitiveness of SSM banks located in weak economies such as Portugal and Greece (Sigmund & Raunig, 2023). On the other hand, the SSM has negatively affected banks' efficiency in the early years of its implementation (Moura et al., 2023). Other weaknesses of the SSM are the possibility of agency problems due to the inefficient information flow between the ECB and NSAs, regulatory weaknesses due to separation of supervision and regulation, and worsened risk disclosure practices of significant banks (Altunbaş et al., 2022; Ferrarini, 2015). The SSM also affects banks' stock returns (Loipersberger, 2018), investors' response, which signals fear of regulatory inconsistencies (Abad et al., 2020; Carboni et al., 2017), and third parties, such as creditors and clients (Möslein, 2015).

Strong banking supervision reduces the overall risk in the banking sector (Buch & DeLong, 2008; Delis & Staikouras, 2011). Closer supervision of banks' funding structure leads to reduced riskiness of the banks and improved safety and resilience of the overall banking sector (Bologna, 2011). One of the main priorities of the SSM is increased safety and stability of the banks (ECB, 2014b). Therefore, banks which are supervised by the ECB are likely to be considered safer due to the stricter supervision, compared to banks which have remained under supervision by their NSAs. Consequently, we expect an increase of depositors' trust in banks supervised by the ECB, compared to banks supervised by NSAs. This kind of depositors' perception should be especially identifiable in case of non-protected deposits such as interbank deposits, which are based on trust, and less pronounced in case of deposits covered by deposit insurance schemes. Therefore, we expect a positive effect of the SSM implementation on depositors' trust and have developed the following hypothesis: The implementation of the SSM has led to increased depositors' trust in significant banks compared to less significant banks.

A preparatory step for the supervision activities under the SSM included a comprehensive assessment. The comprehensive assessment involved an asset quality review and stress test exercise performed on 130 banks which comprised 81.6% of the total assets in the euro area (ECB, 2014a). It was publicly announced for the first time in February 2013 and was performed in October 2014 on banks' balance sheet data as of 31 December 2013 (Constancio, 2012, 2013; ECB, 2014a). The criteria with which ECB was going to select the banks on which it was going to perform the comprehensive assessment were publicly known in December 2012 (European Commission, 2012). Therefore, we argue that it was possible to identify the banks which were going to be assessed with the comprehensive assessment and which were going to be supervised by the ECB. Moreover, the aim of the comprehensive assessment was to evaluate the asset quality of the most significant banks in the euro area and to check if they had an adequate capital buffer for withstanding shocks (ECB, 2014a). The literature provides evidence that banks which take part in stress test exercises decrease their credit risk exposure (Kok et al., 2023) and adjust their lending behaviour (Fiordelisi et al., 2017). Therefore, we argue that banks which were going to be assessed with the comprehensive assessment and which were going to be supervised by the ECB were considered safer due to stricter supervision. Consequently, we expect an increase in depositors' trust in significant banks compared to less significant banks. Therefore, we have developed the following hypothesis: The anticipation of the SSM launch and the comprehensive assessment has led to increased depositors' trust

in the banks which were expected to be supervised by the ECB and to participate in the comprehensive assessment.

2 Data and methodology

2.1 Data

The empirical research is built on a sample of panel data for 290 euro area banks which fall under the scope of the SSM, covering the period from 2011–2018. Effects from changes in supervisory architecture are visible in the medium to long run (Fiordelisi et al., 2017). Therefore, in line with recent and expanding literature which investigates the effects of the SSM on the banking sector (Altunbaş et al., 2022; Avgeri et al., 2021; Avignone et al., 2021), we chose a narrow timeframe concentrated around the years of the SSM implementation, which allowed us to capture the impact of the SSM on intrabank and total deposits. An additional reason why we excluded the years 2019–2021 from the analysis is the possible effects of the pandemic-related economic crisis. In that period, the ECB implemented both supervisory and monetary policy measures aimed to restore banks' safety and resilience (Quaglia & Verdun, 2023). The sample covers universal commercial banks, retail and wholesale, located in: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, and Spain. Banks located in Lithuania and in Croatia and Bulgaria were excluded from the analysis because these countries had only become members of the SSM and the euro area in January 2015 and in October 2022 (ECB, 2015, 2022), respectively. Moreover, central banks and investment banks were excluded from the analysis due to differences in the business model. Banks with missing observations of the dependent variables were also excluded from the analysis. Consolidated bank-specific data (prepared under the IFRS reporting standard, on a yearly basis), were retrieved from the Fitch Connect database, and macroeconomic data from the World Economic Outlook database (International Monetary Fund); both were applied on constructed models.

According to the ECB, banks are classified as significant if they fulfil one of the significance criteria[1] (Council of the European Union, 2013a; ECB, 2014b; European Commission, 2012). In the sample, banks were classified as significant or less significant according to the ECB significance criteria (ECB, 2014c). Most of the banks were classified as significant or less significant by considering the total assets criteria, with the exception of banks located in smaller economies (Malta, Slovenia, Slovakia, Estonia, Latvia, and Cyprus), which were classified by considering other significance criteria (total assets above 20% of GDP, significant cross-border activities, and being one of the three largest credit institutions in the country) because they are smaller (ECB, 2014b). The classification of banks in the sample resulted in 121 significant banks, which fall under direct supervision of the ECB (treatment group), and 169 less significant banks, which fall under supervision of their NSAs (control group)[2]. Table A1 in the Appendix lists banks located in smaller economies and the criteria for their classification.

Table 1 displays all variables used in our analysis, and Table 2 displays the summary statistics. The ratio of total deposits to total assets (DA) indicates the share of total assets which are funded with total deposits. As visible from Table 2, the mean and median values of the ratio of both significant and less significant banks were higher after the SSM implementation. This indicates increased overall reliance on total deposits for funding bank assets after the SSM implementation. The maximum value of the ratio increased for both groups of banks in the period after the SSM implementation, which indicates increased reliance of individual banks on total deposits for funding bank assets. The minimum value of the ratio of significant banks increased, whereas that of less significant banks decreased in the period after the SSM implementation. This implies that there are individual banks within the group of significant banks that decreased their reliance on total deposits for funding bank assets after the SSM implementation. Furthermore, it implies that there are individual banks among the less significant banks that did not use deposits as a funding source in the period after the SSM implementation.

The ratio of interbank deposits to total assets (BDTA) indicates the share of total assets which are funded with interbank deposits. As visible from Table 2, both the mean and median values of the ratio for both groups of banks, significant and less significant, were slightly lower in the period after the SSM implementation. However, the maximum value of the ratio in the period after the SSM implementation slightly increased for both group of banks, while

[1] The ECB developed the following significance criteria for classifying banks as significant: 1) bank size: total assets exceeding EUR 30 billion; 2) ratio of total assets to gross domestic product of the country in which the bank operates exceeding 20%; 3) the economic importance of the bank for the economy—one of the three largest banks in the domestic economy; 4) possible direct public financial assistance; and 5) cross-border activities.

[2] Banks in the sample kept their significance status stable during the analysed period.

Table 1. Variables and sources of data.

Variable	Abbreviation	Source
Dependent variables		
Total deposits to total assets	DA	Fitch Connect database
Interbank deposits to total assets	BDTA	Fitch Connect database
Interbank deposits >5 years to total assets	IDmore5yTA	Fitch Connect database
Interbank deposits 1–5 years to total assets	ID1to5yTA	Fitch Connect database
Interbank deposits 3–12 months to total assets	ID3to12mTA	Fitch Connect database
Interbank deposits <3 months to total assets	IDless3mTA	Fitch Connect database
Independent variables		
Bank-specific variables		
Return on average assets	ROAA	Fitch Connect database
Equity to total assets	ETA	Fitch Connect database
Liquid assets to total assets	LATA	Fitch Connect database
Macroeconomic variables		
Growth of the gross domestic product	GDP	World Economic Outlook database
Unemployment	UNE	World Economic Outlook database
Inflation	INF	World Economic Outlook database
Dummy variables		
Treated	treated	Dummy variable Significant = 1 and Less Significant = 0
Time	time	Dummy variable Before SSM = 0 and After SSM = 1
DID	did	Composite variable of the two dummy variables *treated* and *time*

Source: Authors' calculations.

the minimum value remained unchanged (zero). This indicates that while the overall reliance on interbank deposits for funding decreased for both groups of banks in the period after the SSM implementation, there are individual banks within each group that substantially increased their reliance on interbank deposits, and that there are individual banks that did not use interbank deposits at all in both periods.

As visible from Table 2, both groups of banks had higher mean values of the ratio of return on average assets and the equity-to-total-assets ratio in the period after the SSM implementation. This indicates improved profitability and bank capitalization of both group of banks after the SSM implementation. The mean value of the ratio of liquid assets to total assets of significant banks slightly increased in the period after the SSM implementation, which implies improved liquidity of significant banks. On the contrary, the mean value of the liquidity ratio of less significant banks decreased after the SSM implementation,

Table 2. Summary statistics of control and treatment group, before and after the implementation of the SSM.

	Before the SSM implementation						After the SSM implementation					
Variables	*n*	mean	*SD*	median	min	max	*n*	mean	*SD*	median	min	max
Treatment group (significant banks)												
DA	374	42.79	21.17	44.05	0.17	91.65	591	50.28	21.85	53.66	0.25	94.59
BDTA	374	0.14	0.15	0.10	0.00	0.83	589	0.12	0.13	0.09	0.00	0.84
LnTA	374	11.64	1.46	11.45	8.09	14.75	591	11.55	1.44	11.37	7.96	14.74
ROAA	372	0.12	1.71	0.36	−14.31	3.06	591	0.65	0.74	0.59	−3.71	5.88
ETA	374	6.19	3.33	5.76	0.86	21.18	591	7.37	3.46	6.62	1.73	25.26
LATA	374	18.80	13.76	15.82	1.10	85.53	591	18.88	13.85	15.88	1.09	86.73
GDP	374	0.51	2.03	0.46	−6.55	7.26	591	2.28	2.45	1.84	−1.83	25.18
INF	374	2.25	0.89	2.29	0.01	5.08	591	0.90	0.85	0.71	−1.54	3.65
UNE	374	10.56	5.55	9.22	4.88	26.09	591	9.52	4.49	9.44	3.40	24.44
Control group (less significant banks)												
DA	476	46.88	22.85	49.91	0.03	95.23	846	50.98	23.64	55.16	0.00	96.71
BDTA	474	0.25	0.21	0.19	0.00	0.84	842	0.22	0.21	0.15	0.00	0.89
LnTA	476	8.92	1.10	9.29	4.77	10.29	846	8.92	1.05	9.21	5.32	10.31
ROAA	461	0.75	1.70	0.74	−9.07	10.38	846	0.86	1.50	0.76	−16.20	12.49
ETA	476	10.03	4.74	9.61	0.61	41.79	846	11.08	6.83	9.97	1.54	84.37
LATA	476	16.02	14.86	11.08	0.69	82.76	846	15.61	14.72	10.73	0.74	95.78
GDP	476	0.42	1.93	0.62	−10.15	7.26	846	1.94	1.77	1.67	−0.49	25.18
INF	476	2.20	0.86	2.29	−0.85	5.08	846	0.86	0.82	0.62	−1.39	3.65
UNE	476	10.81	5.24	9.77	4.88	27.48	846	10.33	4.30	10.05	3.40	26.50

Source: Authors' calculations.

implying worsened liquidity of the banks. The macroeconomic variables indicate improved economic conditions in the period after the SSM implementation, reflected in increased economic growth and decreased inflation and unemployment.

2.2 Methodology

To investigate the effect of implementing the SSM on banks' deposit structure we used the DID method, which is widely used in the literature for inspecting the effects of SSM on bank behaviour (Altunbaş et al., 2022; Alves et al., 2023; Avgeri et al., 2021; Avignone et al., 2021; Fiordelisi et al., 2017), as well as for inspecting effects of directives and regulations (Li & Marinč, 2018; Pancotto et al., 2018). The DID estimator evaluates the impact of a treatment on outcome Y over a population. It requires a control group of population—the population that has not received the treatment—and treatment group—the population that has received the treatment. In our case, the treatment group is the significant banks, which switched from national supervisors to the ECB, and the control group is the less significant banks, which have remained under supervision by their NSAs. We have used the following econometric model:

$$Y_{it} = \alpha_0 + \alpha_1 time_{it} + \alpha_2 treated_{it} + \alpha_3 (time_{it} \times treated_{it}) + \alpha_4 B_{it} + \alpha_5 M_{it} + \varepsilon_{it} \quad (1)$$

where the dependent variable Y_{it} is one of the following variables measured at time t for bank i: 1) total deposits to total assets (DA) and 2) interbank deposits to total assets (BDTA). The DA and BDTA ratios represent comparative metrics of the relative dependence of banks on deposits and interbank deposits as funding sources. The DA ratio (DA) reflects the portion of total assets which are funded with total deposits and indicates depositors' trust (Koroleva et al., 2021). The BDTA ratio reflects the portion of total assets which are funded with interbank deposits and indicates (interbank) depositors' trust.

The dummy variable $time_{it}$ indicates the period when the SSM was implemented (from 2014 onwards), by taking values 1 for the period after the implementation of the SSM and 0 for the period before the implementation of the SSM. The dummy variable $treated_{it}$ takes the value of 1 for significant banks that fall under direct supervision of the ECB or 0 for less significant banks that fall under supervision by their NSAs. The coefficient of our interest is the composite variable $time_{it} \times treated_{it}$, which takes the value of 1 for directly supervised banks in the period after the implementation of SSM or 0 for the period before implementing the SSM regardless of the significance of the banks. The slope of this composite variable indicates the effect of implementing the SSM on bank behaviours. If the slope is positive, the causal effect in our dependent variable will be positive, and vice versa.

We ran each model three times. In the first run we did not use any control variables, we ran the DID model on our dependent variables using the two dummy variables and the composite variable (*did*). In the second run, besides the two dummy variables and the composite variable (*did*), we added bank-specific variables to control for bank differences, consistent with the recent and expanding literature stream which analyses the effects of the SSM on the banking sector (Altunbaş et al., 2022; Avgeri et al., 2021; Fiordelisi et al., 2017). Significant banks located in smaller economies are smaller and have total assets bellow EUR 30 billion, compared to significant banks located in bigger economies. Therefore, we controlled for size differences in the sample by including the variable of natural logarithm of total assets (LnTA) in the model. We expected a positive relation between the coefficient of the bank size variable and the dependent variable of total deposits to total assets. Larger banks hold more deposits compared to smaller banks (Kaufman, 1972; Valahzagharda & Kashfib, 2014). Moreover, we used the variable of return on average assets (ROAA) as a measure of banks' profitability, the ratio of equity to total assets (ETA) as a measure for banks' capitalization, and the ratio of liquid assets to total assets (LATA) as a measure for banks' liquidity. The profitability of the banks is affected by the wideness of the loan–deposit interest spread (Chang et al., 2011). Therefore, the relation of the coefficient of the profitability variable with the dependent variable is ambiguous. We expected a negative relation of the coefficient of the capitalization variable with the dependent variable. This is because well capitalized banks are less dependent on external funding (Oura et al., 2013). We expected a positive relation of the coefficient of the liquidity variable with the dependent variable. This is because banks with more demand deposits should have more liquid assets relative to total assets (Kashyap et al., 2002).

We expected a positive relation between the coefficient of the bank size variable and the dependent variable of interbank deposits to total assets. Banks which are financed with interbank deposits are monitored, therefore tending to engage in less risky lending activities and consequently being less risky (Dinger & Hagen, 2009). On the other hand, interbank deposits are not insured and pose a risk for the lender because in case of bank bankruptcy, they are most likely to be lost (Furfine, 2001). However, according to the "too big to fail" theory, large banks are systemically

important and their failure would inflict serious damage to the overall economy and the banking sector. Consequently, governments assist them in times of difficulties to prevent their default (Stern & Feldman, 2004). Therefore, we expected larger banks to be more engaged on the interbank market and to have more interbank deposits. In order to participate on the interbank market, banks should establish themselves as creditworthy institutions (Acharya et al., 2012; Allen et al., 2020). Since profitability, capitalization, and liquidity positively affect the creditworthiness of banks, we expected a positive relation of the coefficients of these variables with the dependent variable.

In the third run, besides the two dummy variables, the composite variable (*did*), and the bank-specific variables, we added the following macroeconomic variables to control for macroeconomic and country differences: inflation (INF), growth of gross domestic product (GDP), and unemployment (UNE). A country's economic and macroeconomic factors can affect depositors' tendency to place money in the banking system. Growth of gross domestic product positively affects bank deposits—increase of income boosts savings and investment (Thao & Thanh, 2021; Valahzagharda & Kashfib, 2014). Inflation can have an adverse effect on deposits. When inflation rises, deposits become less attractive due to a drop of real interest rates (Valahzagharda & Kashfib, 2014). Therefore, we expected a positive relation of the coefficient of the inflation variable and the coefficient of the variable of growth of gross domestic product with the dependent variable of total deposits to total assets. Unemployment can have an adverse effect on deposits—drops in income decrease savings (Thao & Thanh, 2021). Therefore, we expected a negative relation of the coefficient of the unemployment variable with the dependent variable.

Although the interbank market differs across countries, the main reason for those differences is the country-specific trust in the banking sector (Allen et al., 2020). The economic cycle affects the level of economic activity and consequently the interbank transactions. Growth of gross domestic product can positively affect interbank deposits, since the increase of economic activity can boost demand for financial services including interbank transactions. Unemployment can have an adverse effect on interbank deposits due to the decreased economic activity. Inflation can positively affect interbank deposits—to counter inflation, central banks increase interest rates, and consequently, interbank deposits become more attractive (Grandi & Guillet, 2021; Md-Yusuf & Md-Zain, 2020). Therefore, we expected a positive sign of the coefficients of inflation and growth of gross domestic product and a negative sign of the coefficient of the unemployment variable with the dependent variable.

In Equation (1) B_{it} refers to a vector of bank-specific control variables, and M_{it} refers to a vector of macroeconomic variables. Each model was tested with the Hausman test to check whether a fixed or random effects model was appropriate for the panel data.

3 Empirical results

3.1 Preliminary data inspection

The DID model must satisfy the parallel trend assumption. This assumption requires that, in the absence of the treatment, the unobserved difference between the treatment and control groups be constant over time. If this assumption is not fulfilled, the results of the DID model might be biased. There is no statistical test for the parallel trend assumption. A visual inspection is the best way for verifying this assumption (Bertrand et al., 2004; Hill et al., 2018). Fig. 1 displays the visual inspection of the parallel trend of the dependent variables: 1) total deposits to total assets and 2) interbank deposits to total assets. Fig. 1 confirms that there is no differential trend between the total deposits and the interbank deposits in the period before the implementation of the SSM.

3.2 Main results

Table 3 and Table 4 display the results of the empirical analysis from estimating Equation (1) for the two dependent variables. We ran each model three times. In the first run we did not use any control variables, we ran the DID model on our dependent variables using the two dummy variables $time_{it}$ and $treated_{it}$ and the composite variable *did*. Please note that the dummy variable $time_{it}$ indicates the period when the SSM was implemented (from 2014 onwards), by taking values 1 for the period after the implementation of the SSM and 0 for the period before. The dummy variable $treated_{it}$ takes a value of 1 for significant banks or 0 for less significant banks. The composite variable *did* takes a value of 1 for directly supervised banks in the period after the implementation of SSM or 0 for the period before implementing the SSM regardless of the significance of the banks. In the second run, besides the two dummy variables and the composite variable *did*, we controlled for bank differences by adding bank-specific control variables in the models. In the third run, besides the two dummy variables and the composite variable *did*, we controlled for both bank and country and macroeconomic differences by adding bank-specific and macroeconomic control variables. Each model was tested with the

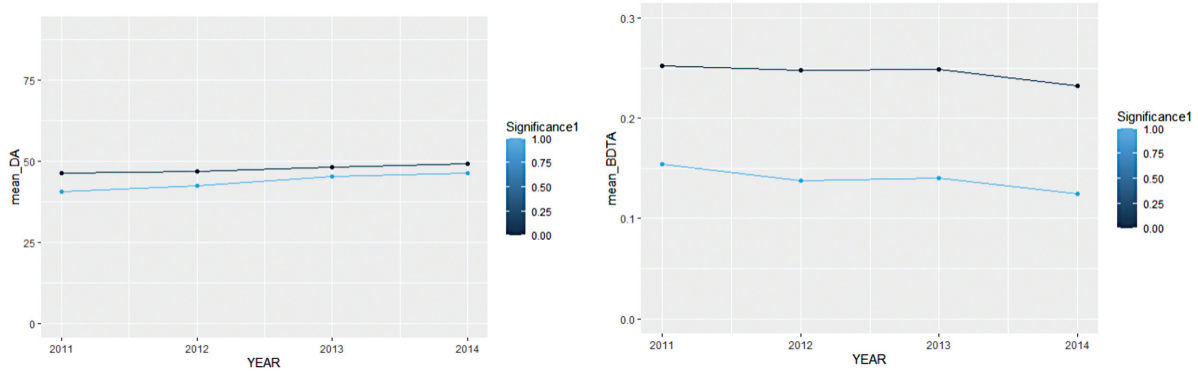

Fig. 1. Visual inspection of the parallel trend assumption.

Hausman test to check whether a fixed or random effects model was appropriate for the panel data. We were interested in the statistical significance of the coefficient α_3, which represents the average difference in the dependent variable between the significant banks (treatment group), which are supervised by the ECB, and less significant banks (control group), which are supervised by NSAs. The coefficient of the variable $treated_{it}$ is the estimated mean difference in the dependent variable between the treatment and

Table 3. Impact of SSM implementation on depositors' trust.

	Model 1a DA	Model 2a DA	Model 3a DA	Model 4a BDTA	Model 5a BDTA	Model 6a BDTA
(Intercept)	46.351***					
	(1.354)					
treated	−2.388**	−2.106*	−1.855^{+}	−0.004	−0.025**	−0.026**
	(0.880)	(0.993)	(0.982)	(0.008)	(0.009)	(0.009)
time	4.838***	4.996***	4.387***	−0.031***	−0.025***	−0.022***
	(0.333)	(0.333)	(0.422)	(0.003)	(0.003)	(0.004)
did	1.453**	1.158*	0.916^{+}	0.016***	0.019***	0.019***
	(0.512)	(0.513)	(0.508)	(0.005)	(0.005)	(0.005)
LnTA		−3.736***	−3.717***		0.015*	0.015*
		(0.752)	(0.750)		(0.007)	(0.007)
LATA		0.061*	0.056*		−0.0005*	−0.0005*
		(0.024)	(0.023)		(0.0002)	(0.0002)
ROAA		0.395**	0.232^{+}		−0.004**	−0.003**
		(0.124)	(0.126)		(0.001)	(0.001)
ETA		−0.408***	−0.403***		−0.003***	−0.003***
		(0.051)	(0.051)		(0.0005)	(0.0005)
GDP			0.157*			0.0001
			(0.076)			(0.0007)
UNE			−0.482***			0.002^{+}
			(0.085)			(0.0008)
INF			−0.084			0.002
			(0.168)			(0.002)
n	2287	2270	2270	2279	2262	2262
R^2	.181	.226	.247	.060	.115	.117
Hausman test						
χ^2	0.87854	40.533	698.5	27.34	111.37	33.529
df	3	7	10	3	7	10
p value	.8386	9.95e−07	2.2e−16	4.99e−06	2.2e−16	.0002219

Note. This table displays the results from the difference-in-difference model. The dependent variables are total deposits to total assets (DA) and interbank deposits to total assets (BDTA).
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

Table 4. Impact of comprehensive assessment and SSM launch on depositors' trust.

	Model 1b DA	Model 2b DA	Model 3b DA	Model 4b BDTA	Model 5b BDTA	Model 6b BDTA
(Intercept)	46.256***		98.976***			
	(1.370)		(5.605)			
treated	−3.978***	−2.560*	−1.718+	0.002	−0.025**	−0.025**
	(0.946)	(1.059)	(1.007)	(0.009)	(0.009)	(0.009)
time	4.579***	5.045***	5.523***	−0.026***	−0.022***	−0.016***
	(0.382)	(0.382)	(0.491)	(0.003)	(0.003)	(0.005)
did	2.284***	1.620**	1.539**	0.010*	0.015**	0.015**
	(0.581)	(0.580)	(0.562)	(0.005)	(0.005)	(0.005)
LnTA		−5.271***	−4.694***		0.020**	0.016*
		(0.759)	(0.537)		(0.007)	(0.007)
LATA		0.054*	0.039+		−0.0005*	−0.0005*
		(0.024)	(0.023)		(0.0002)	(0.0002)
ROAA		0.517***	0.248*		−0.004**	−0.003*
		(0.125)	(0.125)		(0.001)	(0.001)
ETA		−0.460***	−0.463***		−0.003***	−0.003***
		(0.052)	(0.047)		(0.0005)	(0.0005)
GDP			0.418***			−0.0008
			(0.073)			(0.0007)
UNE			−0.483***			0.002**
			(0.078)			(0.0008)
INF			0.502**			0.003+
			(0.183)			(0.002)
n	2287	2270	2270	2279	2262	2262
R^2	.154	.208	.241	.036	.101	.107
Hausman test						
χ^2	0.38477	48.813	0.47018	29.141	198.111	32.22
df	3	7	10	3	7	10
p value	.9434	2.469e−08	1	2.091e−06	2.22e−16	.000368

Note. This table displays the results from the difference-in-difference model. The dependent variables are total deposits to total assets (DA) and interbank deposits to total assets (BDTA).
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

control groups prior the treatment. It shows the differences that existed between the groups of significant and less significant banks before the treatment period (SSM implementation). In the group of less significant banks (control group), the expected mean change in the dependent variable after the implementation of the SSM corresponds to the coefficient of the variable $time_{it}$. In the group of significant banks (treatment group), the expected mean change in the dependent variable after the implementation of the SSM is the sum of the coefficients of $time_{it}$ and *did*.

3.2.1 Impact of SSM implementation on depositors' trust

Table 3 displays the results of the empirical analysis from estimating Equation (1) for inspecting the impact of the SSM implementation on deposit structure. In Models 1a, 2a, and 3a, we inspected the impact of the SSM implementation on depositors' trust measured via the dependent variable of total deposits to total assets. In Model 1a we observed a positive and statistically significant effect on depositors' trust in the significant banks compared to the less significant banks. The coefficient of the composite variable *did* shows that the expected mean change in deposits to total assets from before to after the implementation of the SSM is different in the control and treatment groups. The statistical significance of the coefficient of the variable *did* was not affected by adding control variables; however, we observed small differences in the estimated coefficients between the models.

Model 2a reports the results of the DID model using the two dummy variables, *time* and *treated*, and the composite variable *did* together with bank-specific variables. We have observed a positive and statistically significant effect on depositors' trust and statistically significant bank-specific variables. Specifically, we have observed a positive relation of the coefficients of liquidity and profitability with the dependent variable, and an inverse relation of bank size and bank capitalization with the dependent

variable. In Model 3a we show the results of the DID model using the two dummy variables, *time* and *treated*, and the composite variable *did* together with bank-specific and macroeconomic variables. Again, we have observed a positive and statistically significant effect on depositors' trust (at a statistical level of 10%), statistically significant bank-specific variables and statistically significant macroeconomic variables, with the exception of the coefficient of inflation, which is statistically insignificant. Specifically, we have observed a positive relation of the coefficient of growth of gross domestic product with the dependent variable and an inverse relation of the coefficient of unemployment with the dependent variable.

In Models 4a, 5a, and 6a, we have inspected the impact of the SSM implementation on (interbank) depositors' trust measured via the dependent variable of interbank deposits to total assets. In Model 4a we have observed a positive and statistically significant effect on (interbank) depositors' trust in the significant banks compared to the less significant banks. The coefficient of the composite variable *did* shows that the expected mean change in interbank deposits to total assets from before to after the implementation of the SSM is different in the control and treatment groups. The coefficient of the variable *treated* corresponds to the estimated mean difference in interbank deposits to total assets between the treatment and control groups prior the treatment. It shows the differences that existed between the groups before implementing the SSM. It is statistically insignificant, showing no difference existed between the significant and less significant banks before the SSM implementation. The statistical significance of the coefficient of the variable *did* is not affected by adding control variables; however, we have observed small differences in the estimated coefficients between the models. Model 5a reports the results of the DID model using the two dummy variables, *time* and *treated*, and the composite variable *did* together with bank-specific variables. We have observed a positive and statistically significant effect on (interbank) depositors' trust and statistically significant bank-specific variables. Specifically, we have observed an inverse relation of the coefficients of liquidity and profitability and bank capitalization with the dependent variable and a positive relation of bank size with the dependent variable. In Model 6a we show the results of the DID model using the two dummy variables, *time* and *treated*, the composite variable *did* together with bank-specific and macroeconomic variables. In this model, we have observed a positive and statistically significant effect on (interbank) depositors' trust, statistically significant bank-specific variables and statistically insignificant macroeconomic variables.

The positive and statistically significant effect on both the total-deposits-to-total-assets and interbank-deposits-to-total-assets ratios of the significant banks compared to the less significant banks implies that changes in the deposit structure are associated with the SSM implementation. These results indicate that the SSM implementation has positively affected depositors' trust in the significant banks, measured via both the total-deposits-to-total-assets and interbank-deposits-to-total-assets ratios. This implies improved trustworthiness and credibility of the banks supervised by the ECB.

3.2.2 *Impact of comprehensive assessment and SSM launch on depositors' trust*

Table 4 displays the results of the empirical analysis from estimating Equation (1) for inspecting the impact of the comprehensive assessment and SSM launch on deposit structure. In Models 1b, 2b, and 3b, we have inspected the impact of the comprehensive assessment and SSM launch on depositors' trust measured via the dependent variable of total deposits to total assets. In Model 1b we have observed a positive and statistically significant effect on depositors' trust in the significant banks, which were expected to be supervised by the ECB, compared to the less significant banks, which were expected to remain under NSAs' supervision. The coefficient of the composite variable *did* shows that the expected mean change in total deposits to total assets from before to after the treatment period is different in the control (less significant banks) and treatment (significant banks) groups. The statistical significance of the coefficient of the variable *did* was not affected by adding control variables; however, we observed small differences in the estimated coefficients between the models. Model 2b reports the results of the DID model using the two dummy variables, *time* and *treated*, and the composite variable *did* together with bank-specific variables. We have observed a positive and statistically significant effect on depositors' trust, and statistically significant bank-specific variables. Specifically, we have observed a positive relation of the coefficients of liquidity and profitability with the dependent variable and an inverse relation of bank size and bank capitalization with the dependent variable. In Model 3b we show the results of the DID model using the two dummy variables, *time* and *treated*, the composite variable *did* together with bank-specific and macroeconomic variables. We have observed a positive and statistically significant effect on depositors' trust, statistically significant bank-specific variables and statistically significant macroeconomic variables.

Specifically, we have observed a positive relation of the coefficients of growth of gross domestic product and inflation with the dependent variable and an inverse relation of the coefficient of unemployment with the dependent variable.

In Models 4b, 5b, and 6b, we have inspected the impact of the comprehensive assessment and SSM launch on (interbank) depositors' trust measured via the dependent variable of interbank deposits to total assets. In Model 4b we have observed a positive and statistically significant effect on (interbank) depositors' trust in the significant banks, which were expected to be supervised by ECB, compared to the less significant banks, which were expected to remain under NSAs' supervision. The coefficient of the composite variable *did* shows that the expected mean change in interbank deposits to total assets from before to after the treatment effect is different in the control (less significant banks) and treatment (significant banks) groups. The coefficient of the variable *treated* corresponds to the estimated mean difference in interbank deposits to total assets between the treatment and control groups prior to the treatment. It is statistically insignificant, showing no difference existed between the significant and less significant banks in the period before the comprehensive assessment and SSM launch. The statistical significance of the coefficient of the variable *did* was not affected by adding control variables; however, we observed small differences in the estimated coefficients between the models. Model 5b reports the results of the DID model using the two dummy variables, *time* and *treated*, and the composite variable *did* together with bank-specific variables. We have observed a positive and statistically significant effect on (interbank) depositors' trust, and statistically significant bank-specific variables. Specifically, we have observed an inverse relation of the coefficients of liquidity and profitability and bank capitalization with the dependent variable, and a positive relation of bank size with the dependent variable. In Model 6b we show the results of the DID model using the two dummy variables, *time* and *treated*, and the composite variable *did* together with bank-specific and macroeconomic variables. In this model, we have observed a positive and statistically significant effect on (interbank) depositors' trust, statistically significant bank-specific variables and statistically significant macroeconomic variables, with the exception of the coefficient of gross domestic product, which is statistically insignificant. Specifically, we have observed a positive relation of the coefficients of unemployment and inflation (statistically significant at 10%) with the dependent variable.

The positive and statistically significant effect on both the total-deposits-to-total-assets and interbank-deposits-to-total-assets ratios of the significant banks, which were expected to be supervised by the ECB, compared to the less significant banks, which were expected to remain under NSAs' supervision, implies that changes in the deposit structure are associated with the anticipation of the SSM launch and the expected comprehensive assessment. This implies that the ECB was perceived as a stricter supervisory authority compared to the NSAs. Consequently, banks which were going to be assessed with the comprehensive assessment and which were going to be supervised by the ECB were considered safer due to stricter supervision and consequently encountered increased depositors' trust.

3.3 Robustness checks

3.3.1 Placebo test: changing the year of the SSM implementation

In order to investigate for other factors that might have affected depositors' trust in significant banks compared to less significant banks, before the implementation of SSM, we performed this robustness check, where we created a fictional time dummy variable assuming that the SSM had been implemented in 2012. Please note the dummy variable *time* indicates the fictional period when the SSM was implemented (from 2012 onwards), by taking values 1 for the period after the fictional implementation of the SSM and 0 for the period before. Here we have examined whether in the period up to the SSM implementation, the significant banks, which were expected to be supervised by the ECB, encountered changes in their deposit structure compared to the less significant banks.

Table 5 displays the results of our robustness check with the fictional time dummy variable assuming that the SSM was implemented in 2012. From Table 5 (Models 1c, 2c, and 3c) it is evident that there is a statistically significant effect on the total-deposits-to-total-assets ratio of significant banks compared to less significant banks. This result points to the existence of other factors which affected the total-deposits-to-total-assets ratio of the significant banks compared to the less significant banks in the period before the SSM implementation (2012). These results do not support our claim that the increase of depositors' trust in the significant banks is associated with the SSM implementation, but rather imply that it is associated with other past events.

Table 5 (Models 4c, 5c, and 6c) shows that there is no evidence of a statistically significant effect on the interbank-deposits-to-total-assets ratio in 2012. This implies that there were no differences in the interbank deposits structure of significant banks compared to less significant banks, assuming the SSM was

Table 5. Placebo test: changing the year of the implementation of the SSM (2012).

	Model 1c DA	Model 2c DA	Model 3c DA	Model 4c BDTA	Model 5c BDTA	Model 6c BDTA
(Intercept)	46.339***		98.553***			
	(1.421)		(5.642)			
treated	−5.112***	−3.151*	−2.362**	0.009	−0.020^{+}	−0.020^{+}
	(1.121)	(1.231)	(1.141)	(0.010)	(0.011)	(0.010)
time	4.050***	4.604***	4.418***	−0.024***	−0.022***	−0.019***
	(0.528)	(0.527)	(0.560)	(0.005)	(0.005)	(0.005)
did	2.745***	2.008*	2.104**	0.003	0.009	0.008
	(0.797)	(0.789)	(0.745)	(0.007)	(0.007)	(0.007)
LnTA		−5.925***	−4.403***		0.019**	0.014*
		(0.792)	(0.540)		(0.007)	(0.007)
LATA		0.049*	0.034		−0.0005*	−0.0004*
		(0.025)	(0.023)		(0.0002)	(0.0002)
ROAA		0.651***	0.156		−0.004***	−0.003*
		(0.131)	(0.127)		(0.001)	(0.001)
ETA		−0.434***	−0.417***		−0.003***	−0.003***
		(0.055)	(0.047)		(0.0005)	(0.0005)
GDP			0.697***			−0.001
			(0.076)			(0.0007)
UNE			−0.639***			0.002***
			(0.078)			(0.0007)
INF			−0.457**			0.003*
			(0.152)			(0.001)
n	2287	2270	2270	2279	2262	2262
R^2	.083	.131	.218	.023	.095	.107
Hausman test						
χ^2	0.10721	56.489	14.072	30.141	40.554	40.175
df	3	7	10	3	7	10
p value	.991	7.551e−10	.1697	1.289e−06	9.86e−07	1.579e−05

Note. This table displays the results from the difference-in-difference model. The dependent variables are total deposits to total assets (DA) and interbank deposits to total assets (BDTA).
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

implemented in 2012. These results support our claim that the increase of (interbank) depositors' trust of significant banks is associated with the SSM implementation rather than any other previous events.

3.3.2 *Robustness check: countries outside the euro area*

In order to inspect if there had been other factors that affected depositors' trust in Europe in 2014 besides the implementation of the SSM, we performed another robustness check. We chose banks located in European countries which are not part of the euro area and of the SSM (Poland, Denmark, Hungary, Czech Republic, Romania). We divided the banks in two groups, significant and less significant, according to their size. If the total assets of a bank exceeded 30 billion EUR, it was classified as significant. The sample consisted of 46 banks, out of which 11 were classified as significant and 35 were classified as less significant. The dataset covers the period 2018–2021 and has the same bank-specific and macroeconomic variables. Table 6 displays the results of this robustness check.

In Table 6 all three models with the dependent variable of total deposits to total assets (Models R1, R2, and R3) have statistically significant coefficients of the composite variable *did*. These results do not support our claim that the increase of the depositors' trust in significant banks is associated with the SSM implementation, but rather imply the existence of other factors that have affected the deposit structure of European banks apart from the implementation of the SSM.

From Table 6 it is clear that in all three models with the dependent variable of interbank deposits to total assets (Models R4, R5, and R6), the coefficient of the composite variable *did* is statistically insignificant. This result supports our claim that the increase of the (interbank) depositors' trust in the significant banks is associated with the SSM implementation and that there are no other factors that could have affected the

Table 6. Robustness check: countries outside the Euro area.

	Model R1 DA	Model R2 DA	Model R3 DA	Model R4 BDTA	Model R5 BDTA	Model R6 BDTA
(Intercept)	62.813***		270.048***	0.099***	−0.104	−0.233
	(2.152)		(25.307)	(0.010)	(0.157)	(0.149)
treated	0.170	4.871*	3.495^{+}	−0.030*	−0.044**	−0.037*
	(2.178)	(2.126)	(1.985)	(0.015)	(0.016)	(0.016)
time	5.378***	7.439***	1.910	−0.037***	−0.039***	−0.005
	(0.731)	(0.749)	(1.251)	(0.006)	(0.006)	(0.010)
did	−6.134***	−6.647***	−6.511***	0.017	0.016	0.015
	(1.553)	(1.430)	(1.371)	(0.012)	(0.012)	(0.012)
LnTA		−8.379***	−8.224***		0.010	0.011^{+}
		(1.506)	(1.059)		(0.007)	(0.006)
LATA		−0.198***	−0.254***		0.001**	0.001***
		(0.048)	(0.043)		(0.0003)	(0.0003)
ROAA		0.680*	0.591*		−0.006**	−0.005*
		(0.272)	(0.264)		(0.002)	(0.002)
ETA		−0.168	−0.094		−0.005**	−0.004**
		(0.204)	(0.190)		(0.002)	(0.001)
GDP			0.146			0.00005
			(0.245)			(0.002)
UNE			−1.425***			0.009***
			(0.249)			(0.002)
INF			−0.572*			0.004*
			(0.233)			(0.002)
n	361	358	358	361	358	358
R^2	.140	.301	.386	.124	.237	.281
Hausman test						
χ^2	6.1152	24.281	6.6238	2.7015	11.598	59.855
df	3	7	10	3	7	10
p value	.1061	.001017	.7604	.44	.1146	3.861e−09

Note. This table displays the results from the difference-in-difference model. The dependent variables are total deposits to total assets (DA) and interbank deposits to total assets (BDTA).
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

interbank deposits structure of the European banks apart from the implementation of the SSM.

3.3.3 *Subsample: removing France from the dataset*

With this robustness check we tested our results for sample selection bias. Since most of the banks in our dataset were from France (98 banks, out of which 31 are significant and 67 are less significant), we removed them from our sample. The subsample without France resulted in 192 banks, out of which 90 are significant and 102 are less significant.

Table 7 displays the results of this robustness check performed on the dependent variable of total deposits to total assets. In Models 1, 2, and 3 (Table 7), we have inspected the impact of the SSM implementation on depositors' trust measured via the dependent variable of total deposits to total assets. These results, with the exception of Model 1, which has a positive and statistically significant coefficient of the *did* variable, do not support our claim that changes in the deposit structure of significant banks are associated with the SSM implementation.

In Models 4, 5, and 6 (Table 7), we have inspected the impact of the comprehensive assessment and SSM launch on depositors' trust measured via the dependent variable of total deposits to total assets. All models have positive and statistically significant coefficients of the *did* variable. These results support our claim about depositors' trust in the significant banks compared to the less significant banks in anticipation of the SSM and the comprehensive assessment and further confirm absence of sample selection bias.

In Models 7, 8, and 9 (Table 7) we have performed a placebo test by creating a fictional time dummy variable assuming that the SSM was implemented in 2012. Please note the dummy variable *time* indicates the fictional period when the SSM was implemented (from 2012 onwards), by taking values 1 for the period after the fictional implementation of the SSM and 0 for the period before. Here we have examined whether in the

Table 7. Subsample: removing France from the dataset. Dependent variable total deposits to total assets.

	Impact of SSM implementation			Impact of CA and SSM launch			Placebo test (2012)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
(Intercept)	52.677***			53.010***			53.801***		
	(1.613)			(1.645)			(1.735)		
treated	−4.533***	−2.065	−1.712	−6.901***	−3.122*	−2.671+	−8.970***	−4.355**	−4.120**
	(1.194)	(1.343)	(1.332)	(1.290)	(1.431)	(1.387)	(1.532)	(1.662)	(1.564)
time	5.760***	5.666***	5.181***	5.144***	5.557***	5.994***	3.879***	4.634***	4.033***
	(0.474)	(0.467)	(0.624)	(0.548)	(0.532)	(0.691)	(0.762)	(0.733)	(0.777)
did	1.371*	0.748	0.630	2.581***	1.499*	1.459*	3.805***	2.457*	2.677**
	(0.683)	(0.674)	(0.668)	(0.782)	(0.761)	(0.737)	(1.080)	(1.039)	(0.976)
LnTA		−7.878***	−7.912***		−9.565***	−9.335***		−10.475***	−8.966***
		(0.949)	(0.941)		(0.950)	(0.935)		(0.992)	(0.948)
LATA		0.086**	0.083**		0.091**	0.083**		0.100**	0.089**
		(0.029)	(0.028)		(0.029)	(0.028)		(0.030)	(0.029)
ROAA		0.530***	0.404**		0.691***	0.436**		0.821***	0.347*
		(0.139)	(0.141)		(0.140)	(0.139)		(0.146)	(0.142)
ETA		−0.673***	−0.681***		−0.752***	−0.776***		−0.728***	−0.727***
		(0.074)	(0.073)		(0.075)	(0.073)		(0.078)	(0.074)
GDP			0.093			0.313***			0.541***
			(0.086)			(0.081)			(0.086)
UNE			−0.413***			−0.514***			−0.701***
			(0.094)			(0.088)			(0.087)
INF			0.079			0.545*			−0.461*
			(0.214)			(0.228)			(0.189)
n	1508	1497	1497	1508	1497	1497	1508	1497	1497
R^2	.209	.284	.301	.173	.269	.319	.093	.195	.293
Hausman test									
χ^2	0.40558	55.73	23.48	0.59059	58.592	78.006	0.4988	71.201	80.917
df	3	7	10	3	7	10	3	7	10
p value	.9391	1.068e−09	.009108	.8986	2.882e−10	1.233e−12	.9192	8.445e−13	3.319e−13

Note. This table displays the results from the difference-in-difference model. The dependent variable is total deposits to total assets (DA). CA = comprehensive assessment.
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

period up to the SSM implementation, the significant banks, which were expected to be supervised by the ECB, encountered changes in their deposit structure compared to the less significant banks. All models have positive and statistically significant coefficients of the *did* variable. These results confirm the existence of other factors which affected the deposit structure of significant banks compared to less significant banks in the period before the SSM implementation (2012). These results also confirm absence of sample selection bias.

Table 8 displays the results of this robustness check performed on the dependent variable of interbank deposits to total assets. In Models 1, 2, and 3 (Table 8), we have inspected the impact of the SSM implementation on (interbank) depositors' trust measured via the dependent variable of interbank deposits to total assets. All models have positive and statistically significant coefficients of the *did* variable. These results further support our claim that the implementation of the SSM has led to increased (interbank) depositors' trust in significant banks compared to less significant banks and confirm the absence of sample selection bias.

In Models 4, 5, and 6 (Table 8), we have inspected the impact of the comprehensive assessment and SSM launch on (interbank) depositors' trust measured via the dependent variable of interbank deposits to total assets. The statistical significance of the coefficient of the variable *did* in all models implies that in 2013 in anticipation of the SSM and the expected stress test exercise under the comprehensive assessment, the significant banks, which were expected to be supervised by ECB, encountered increased (interbank) depositors' trust, compared to the less significant banks. This result further supports our claim that banks which were going to be assessed with the comprehensive assessment and which were going to be supervised by the ECB were considered safer due to stricter supervision and consequently encountered

Table 8. Subsample: removing France from the dataset. Dependent variable: interbank deposits to total assets.

	Impact of SSM implementation			Impact of CA and SSM launch			Placebo test (2012)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
(Intercept)	0.151***		0.107*	0.149***		0.087+	0.145***		0.095*
	(0.009)		(0.047)	(0.010)		(0.046)	(0.011)		(0.046)
treated	−0.026**	−0.033**	−0.042***	−0.020+	−0.034**	−0.042***	−0.008	−0.025+	−0.033*
	(0.010)	(0.012)	(0.011)	(0.011)	(0.013)	(0.012)	(0.012)	(0.014)	(0.013)
time	−0.042***	−0.034***	−0.031***	−0.034***	−0.030***	−0.019**	−0.026***	−0.026***	−0.018*
	(0.004)	(0.004)	(0.006)	(0.005)	(0.005)	(0.006)	(0.007)	(0.006)	(0.007)
did	0.025***	0.028***	0.027***	0.018*	0.024***	0.022**	0.004	0.013	0.010
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)	(0.009)
LnTA		0.016+	0.007		0.022**	0.007+		0.022*	0.007
		(0.009)	(0.004)		(0.009)	(0.004)		(0.009)	(0.004)
LATA		−0.0008**	−0.0005*		−0.0009***	−0.0005*		−0.0009***	−0.0005*
		(0.0003)	(0.0002)		(0.0003)	(0.0002)		(0.0003)	(0.0002)
ROAA		−0.005***	−0.005***		−0.005***	−0.004***		−0.005***	−0.004**
		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
ETA		−0.003***	−0.003***		−0.003***	−0.003***		−0.003***	−0.003***
		(0.0007)	(0.0006)		(0.0007)	(0.0006)		(0.0007)	(0.0006)
GDP			0.0002			−0.0006			−0.001
			(0.0008)			(0.0007)			(0.0008)
UNE			0.001			0.002*			0.002*
			(0.0007)			(0.0007)			(0.0007)
INF			0.002			0.004*			0.004**
			(0.002)			(0.002)			(0.002)
n	1500	1489	1489	1500	1489	1489	1500	1489	1489
R^2	.069	.134	.120	.039	.116	.107	.019	.104	.104
Hausman test									
χ^2	31.985	14.368	14.257	3.2894	18.021	17.487	0.85822	18.536	16.328
df	3	7	10	3	7	10	3	7	10
p value	.362	.045	.1616	.3491	.01187	.06427	.8355	.009774	.09061

Note. This table displays the results from the difference-in-difference model. The dependent variable is interbank deposits to total assets (BDTA). CA = comprehensive assessment.
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

increased depositors' trust. These results also confirm absence of sample selection bias.

In Models 7, 8, and 9 (Table 8), we have performed a placebo test by creating a fictional time dummy variable assuming that the SSM was implemented in 2012. Here we have examined whether in the period up to the SSM implementation, the significant banks, which were expected to be supervised by ECB, encountered changes in the share of interbank deposits compared to the less significant banks. The statistical insignificance of the coefficient of the variable *did* in all models implies that there were no differences in the share of the interbank deposits of significant banks compared to less significant banks in 2012. These results further support our claim that the (interbank) depositors' trust in the significant banks is associated with the SSM implementation rather than any other previous events and confirm the absence of sample selection bias.

3.3.4 Robustness check: fixed rate on the main refinancing operations

Changes in the policy rates affect liquidity holdings and liquidity transfers on the interbank market (Näther, 2019). One of the three key interest rates used by the ECB for controlling the money supply and the overall liquidity in the banking sector is the rate on the main refinancing operations. This rate is mainly used for short-term lending from the ECB at times of temporary liquidity shortages (ECB, 2011). Therefore, to inspect for effects of money supply and overall liquidity on the interbank deposits, we performed a robustness check where we added the fixed interest rate on main refinancing operations (MROF) as a control variable in the model.

Table 9 displays the results of this robustness check. In Model IR we show the estimated coefficients of our model where we included the fixed interest rate of main refinancing operations (MROF) as a control

Table 9. Robustness check: fixed rate on the main refinancing operations.

	Model 4a BDTA	Model 5a BDTA	Model 6a BDTA	Model IR BDTA
treated	−0.004	−0.025**	−0.026**	−0.026**
	(0.008)	(0.009)	(0.009)	(0.009)
time	−0.031***	−0.025***	−0.022***	−0.014***
	(0.003)	(0.003)	(0.004)	(0.005)
did	0.016***	0.019***	0.019***	0.020***
	(0.005)	(0.005)	(0.005)	(0.005)
LnTA		0.015*	0.015*	0.018*
		(0.007)	(0.007)	(0.007)
LATA		−0.0005*	−0.0005*	−0.000*
		(0.0002)	(0.0002)	(0.000)
ROAA		−0.004**	−0.003**	−0.003**
		(0.001)	(0.001)	(0.001)
ETA		−0.003***	−0.003***	−0.003***
		(0.0005)	(0.0005)	(0.000)
GDP			0.0001	−0.001
			(0.0007)	(0.001)
UNE			0.002+	0.001+
			(0.0008)	(0.001)
INF			0.002	0.000
			(0.002)	(0.002)
MROF				0.013*
				(0.006)
n	2279	2262	2262	2262
R^2	.060	.115	.117	.119
Hausman test				
χ^2	27.34	111.37	33.529	34.244
df	3	7	10	11
p value	4.99e−06	2.2e−16	.0002219	.0003299

Note. This table displays the results from the difference-in-difference model. The dependent variable is interbank deposits to total assets (BDTA).
DID coefficient rounded to four decimals is: Model 6a: 0.0192; Model IR: 0.0196.
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

variable. For comparison, in the same table we also present the results of our main models (Models 4a, 5a, 6a). As visible from Table 9, adding the fixed interest rate of main refinancing operations as a control variable in the model has had a minimal effect on some coefficients and their statistical significance. Moreover, we have observed a positive and statistically significant relation of the MROF variable with the dependent variable. This indicates that an increase of the fixed rate on the main refinancing operations is associated with an increase of the interbank-deposits-to-total-assets ratio for both groups of banks, significant and less significant, all else being equal. In other words, at times of an increased rate on the main refinancing operations, banks have a higher portion of total assets funded with interbank deposits. As regards the coefficient of the *did* variable, we have observed a positive and statistically significant effect. However, there is a minor difference in the estimated coefficient of the variable *did* in Model IR, where we added MROF as a control variable (0.0196), in comparison to the *did* coefficient estimated in our main model (0.0192; Model 6a, Tables 3 and 9), whereas the statistical significance of the coefficient is not affected. These results indicate that adding the MROF as a control variable in the model has a minimal effect on the *did* coefficient (a change in the *did* coefficient of 0.0004), therefore further supporting our claim that the increased (interbank) depositors' trust in the significant banks is rather associated with the SSM implementation than changes in the monetary policy.

3.4 Additional analysis: interbank deposits by maturity

We performed an additional analysis in order to inspect both the impact of the SSM implementation and the impact of the comprehensive assessment and SSM launch on the share of the interbank deposits of significant banks in comparison to less significant banks, by using alternative interbank deposit variables as dependent variables: interbank deposits with a maturity of less than 3 months to total assets (IDless3mTA), interbank deposits with a maturity of 3–12 months to total assets (ID3to12mTA), interbank deposits with a maturity of 1–5 years to total assets (ID1to5yTA), and interbank deposits with a maturity of more than 5 years to total assets (IDmore5yTA). For this analysis, we had to remove from our sample all banks with missing data for the dependent variables (listed above). This subsample is composed of 115 banks, out of which 31 are significant and 84 are less significant, and covers the period 2011–2018.

The results from this additional analysis are shown in Tables 10, 11, 12 and 13. In each table, Models 1, 2, and 3 display the impact of the SSM implementation on banks' deposit structure, Models 4, 5, and 6 display the impact of the comprehensive assessment and SSM launch on banks' deposit structure, and Models 7, 8, and 9 display the results from the placebo test, where, by creating a fictional time dummy variable, we assumed that the SSM had been implemented in 2012.

Table 10 displays the results of this analysis performed on the dependent variable of interbank deposits with a maturity of less than 3 months to total assets. Models 1, 2, and 3 display the impact of the SSM implementation on the share of interbank deposits. Results show a positive and statistically significant coefficient of the composite variable *did* in Model 1, implying that significant banks had increased the portion of total assets funded with interbank deposits with a maturity of less than 3 months after the SSM implementation, compared to the less

Table 10. Interbank deposits by maturity. Dependent variable: interbank deposits of less than 3 months to total assets.

	Impact of SSM implementation			Impact of CA and SSM launch			Placebo test (2012)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
(Intercept)	0.093***			0.098***		0.135	0.097***		
	(0.005)			(0.006)		(0.093)	(0.006)		
treated	−0.027***	−0.014	−0.015	−0.027**	−0.015	−0.030**	−0.010	0.004	0.001
	(0.008)	(0.011)	(0.011)	(0.009)	(0.011)	(0.010)	(0.011)	(0.013)	(0.013)
time	−0.029***	−0.026***	−0.025***	−0.030***	−0.025***	−0.026***	−0.024***	−0.018***	−0.017**
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)
did	0.016**	0.017**	0.019**	0.010	0.013+	0.012+	−0.011	−0.007	−0.006
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)
LnTA		0.000	−0.001		−0.007	−0.001		−0.018*	−0.008
		(0.008)	(0.009)		(0.008)	(0.004)		(0.008)	(0.009)
LATA		0.000	0.000		0.000	0.000		0.000	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
ROAA		0.001	0.001		0.001	0.001		0.001	0.002
		(0.002)	(0.002)		(0.002)	(0.002)		(0.002)	(0.002)
ETA		−0.003***	−0.003***		−0.004***	−0.003***		−0.004***	−0.004***
		(0.001)	(0.001)		(0.001)	(0.000)		(0.001)	(0.001)
GDP			0.001			−0.001			−0.004*
			(0.001)			(0.001)			(0.002)
UNE			0.002			0.002			0.002
			(0.002)			(0.001)			(0.002)
INF			0.002			0.001			0.005**
			(0.002)			(0.002)			(0.002)
n	852	852	852	852	852	852	852	852	852
R^2	.106	.175	.178	.092	.162	.140	.049	.127	.154
Hausman test									
χ^2	46.339	23.469	26.183	3.724	23.207	17.746	0.71718	30.202	28.528
df	3	7	10	3	7	10	3	7	10
p value	.2007	.001412	.003502	.2928	.001568	.05941	.8692	8.72e−05	.001485

Note. This table displays the results from the difference-in-difference model. The dependent variable is interbank deposits of less than 3 months to total assets (IDless3mTA). CA = comprehensive assessment.
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

significant banks. The statistical significance and the sign of the coefficient of the *did* variable have not been affected by adding control variables in the model (Models 2 and 3). These results are consistent with our claim that the implementation of the SSM has led to increased (interbank) depositors' trust in the significant banks compared to the less significant banks.

Models 4, 5, and 6 (Table 10) display the impact of the comprehensive assessment and SSM launch on the share of the interbank deposits. Results show positive and statistically significant coefficients (at a significance level of 10%) of the variable *did* in Models 5 and 6 (Table 10) and a statistically insignificant coefficient in Model 4 (Table 10). These results imply that significant banks, which were expected to be supervised by the ECB, had increased the portion of total assets funded with interbank deposits with a maturity less than 3 months compared to less significant banks, which were expected to remain under NSAs' supervision, in anticipation of the SSM and the comprehensive assessment.

Models 7, 8, and 9 (Table 10) display the results from the placebo test where, by creating a fictional time dummy variable, we assumed that the SSM was implemented in 2012. These models in Table 10 show that there is no evidence of a statistically significant effect on the interbank deposits with a maturity of less than 3 months to total assets. This implies that there were no differences in the portion of total assets funded with interbank deposits with a maturity of less than 3 months between significant and less significant banks, assuming the SSM was implemented in 2012. These results imply that the increased portion of total assets funded with interbank deposits with a maturity of less than 3 months in significant banks is associated with the SSM implementation rather than any other past events.

Table 11. Interbank deposits by maturity. Dependent variable: interbank deposits with a maturity of 3–12 months to total assets.

	Impact of SSM implementation			Impact of CA and SSM launch			Placebo test (2012)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
treated	−0.002	−0.008	−0.009	0.002	−0.002	−0.005	0.003	0.004	0.001
	(0.006)	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)	(0.013)	(0.013)	(0.013)
time	0.005*	0.005**	−0.001	0.009***	0.010***	0.003	−0.024***	−0.018***	−0.017**
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)	(0.005)	(0.006)
did	−0.006	−0.005	−0.005	−0.010*	−0.010*	−0.009*	−0.009	−0.007	−0.006
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.010)	(0.010)	(0.010)
LnTA		0.007	0.014**		0.005	0.011*		−0.018*	−0.008
		(0.005)	(0.005)		(0.005)	(0.005)		(0.008)	(0.009)
LATA		0.000*	0.000+		0.000*	0.000*		0.000	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
ROAA		−0.003**	−0.003**		−0.003**	−0.003**		0.001	0.002
		(0.001)	(0.001)		(0.001)	(0.001)		(0.002)	(0.002)
ETA		−0.001	0.000		−0.001+	0.000		−0.004***	−0.004***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.001)	(0.001)
GDP			0.000			0.000			−0.004*
			(0.001)			(0.001)			(0.002)
UNE			0.001			0.001			0.002
			(0.001)			(0.001)			(0.002)
INF			−0.005***			−0.004**			0.005**
			(0.001)			(0.001)			(0.002)
n	825	825	825	825	825	825	852	852	852
R^2	.011	.041	.076	.027	.059	.079	.049	.127	.154
Hausman test									
χ^2	10.764	79.152	91.022	10.991	85.661	90.252	11.232	72.944	84.741
df	3	7	10	3	7	10	3	7	10
p value	.01308	2.051e−14	3.358e−15	.01177	9.601e−16	4.774e−15	.01053	3.748e−13	5.872e−14

Note. This table displays the results from the difference-in-difference model. The dependent variable is interbank deposits of 3–12 months to total assets (ID3to12mTA). CA = comprehensive assessment.
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

Table 11 displays the results of this analysis performed on the dependent variable of interbank deposits with a maturity of 3–12 months to total assets. From Models 1, 2, and 3, which display the impact of the SSM implementation on the share of the interbank deposits, it is evident that the coefficient of the variable *did* is statistically insignificant. This implies that there were no differences in the portion of total assets funded with interbank deposits with a maturity of 3–12 months between significant and less significant banks which could be associated with the SSM implementation. Models 4, 5, and 6 (Table 11) display the impact of the comprehensive assessment and SSM launch on the share of the interbank deposits. Results show a negative and statistically significant coefficient of the composite variable *did* in Model 4, implying that significant banks, which were expected to be supervised by ECB, had decreased their portions of total assets funded with interbank deposits with a maturity of 3–12 months in anticipation of the comprehensive assessment and the SSM launch, compared to the less significant banks, which expected to remain under NSAs' supervision. The sign and the statistical significance of the coefficient of the *did* variable has not been affected by adding control variables in the model (Models 2 and 3). These results are consistent with our claim that in anticipation of the SSM and the comprehensive assessment, the banks which were expected to be classified as significant and to be supervised by the ECB encountered changes in their share of interbank deposits compared to the less significant banks, which were expected to remain under NSAs' supervision. Models 7, 8, and 9 (Table 11) display the results from the placebo test where, by creating a fictional time dummy variable, we assumed that the SSM had been implemented in 2012. These models show that there is no evidence of a statistically significant effect on the-interbank-deposits-with-a-maturity-of-3–12-months-to-total-assets ratio of significant banks compared to less significant banks, assuming the SSM was implemented in 2012. These results imply that

Table 12. Interbank deposits by maturity. Dependent variable: interbank deposits with maturity of 1–5 years to total assets.

	Impact of SSM implementation			Impact of CA and SSM launch			Placebo test (2012)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
(Intercept)	0.092***			0.093***					
	(0.007)			(0.007)					
treated	0.006	0.004	0.005	0.007	0.004	0.006	0.007	−0.005	−0.006
	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
time	0.005*	0.003	0.009**	0.003	0.001	0.011**	0.001	−0.003	0.009*
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
did	−0.017***	−0.013**	−0.013**	−0.016**	−0.012*	−0.012*	−0.002	0.003	0.006
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)
LnTA		0.013*	0.006		0.014*	0.006		0.015*	0.006
		(0.006)	(0.006)		(0.006)	(0.006)		(0.006)	(0.006)
LATA		0.000	0.000		0.000	0.000		0.000	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
ROAA		−0.006***	−0.007***		−0.006***	−0.007***		−0.007***	−0.007***
		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
ETA		0.000	−0.001		0.000	−0.001		0.000	−0.001
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
GDP			0.001			0.002+			0.004**
			(0.001)			(0.001)			(0.001)
UNE			0.000			0.000			0.001
			(0.001)			(0.001)			(0.001)
INF			0.005***			0.006***			0.005***
			(0.002)			(0.002)			(0.001)
n	823	823	823	823	823	823	823	823	823
R^2	.009	.096	.121	.004	.093	.119	.001	.085	.116
Hausman test									
χ^2	73.516	18.743	52.46	71.125	16.424	52.791	82.691	16.769	42.097
df	3	7	10	3	7	10	3	7	10
p value	.0615	.009031	9.379e−08	.0684	.02151	8.143e−08	.04077	.01895	7.207e−06

Note. This table displays the results from the difference-in-difference model. The dependent variable is interbank deposits of 1–5 years to total assets (ID1to5yTA). CA = comprehensive assessment.
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

the decreased portion of total assets funded with interbank deposits with a maturity of 3–12 months in significant banks is associated with the impact of the comprehensive assessment and the SSM launch, rather than any other past events.

Table 12 displays the results of this analysis performed on the dependent variable of interbank deposits with a maturity of 1–5 years to total assets. Models 1, 2, and 3 display the impact of SSM implementation on the share of interbank deposits in total assets. Results show a negative and statistically significant coefficient of the composite variable *did* in Model 1, implying that significant banks decreased their portions of total assets funded with interbank deposits with a maturity of 1–5 years after the SSM implementation, compared to less significant banks. The statistical significance and the sign of the coefficient of the *did* variable have not been affected by adding control variables in the model (Models 2 and 3). These results are consistent with our claim that due to the implementation of the SSM, significant banks encountered increased (interbank) depositors' trust compared to less significant banks. Models 4, 5, and 6 (Table 12) display the impact of the comprehensive assessment and SSM launch on the share of interbank deposits in total assets. Results show a negative and statistically significant coefficient of the composite variable *did* in Model 4, implying that significant banks, which were expected to be supervised by ECB, had decreased their portions of total assets funded with interbank deposits with a maturity of 1–5 years in anticipation of the comprehensive assessment and the SSM launch, compared to less significant banks, which were expected to remain under NSAs' supervision. The sign and the statistical significance of the coefficient of the *did* variable have not been affected by adding control variables in the model (Models 2 and 3).These results are consistent with our claim that

Table 13. Interbank deposits by maturity. Dependent variable: interbank deposits with a maturity of more than 5 years to total assets.

	Impact of SSM implementation			Impact of CA and SSM launch			Placebo test (2012)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
(Intercept)	0.062***	0.058		0.064***			0.068***	0.080	0.042
	(0.005)	(0.068)		(0.005)			(0.005)	(0.067)	(0.068)
treated	−0.008	−0.010^{+}	0.000	−0.009^{+}	−0.001	−0.001	−0.008	−0.010	−0.011
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
time	−0.005**	−0.006***	−0.007**	−0.007***	−0.006**	−0.009**	−0.010***	−0.011***	−0.015***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)
did	−0.001	0.000	−0.002	−0.001	0.000	−0.001	−0.001	0.000	0.000
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
LnTA		0.001	−0.007		−0.007	−0.007		0.000	0.002
		(0.003)	(0.005)		(0.004)	(0.005)		(0.003)	(0.003)
LATA		−0.001***	0.000		0.000	0.000		−0.001***	−0.001***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
ROAA		−0.001	−0.003*		−0.003*	−0.003*		−0.002	−0.002
		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
ETA		0.000	−0.001*		−0.001*	−0.001*		0.000	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
GDP			0.002**			0.001^{+}			−0.001^{+}
			(0.001)			(0.001)			(0.001)
UNE			−0.002			−0.001			0.001
			(0.001)			(0.001)			(0.001)
INF			−0.002^{+}			−0.002^{+}			0.000
			(0.001)			(0.001)			(0.001)
n	776	776	776	776	776	776	776	776	776
R^2	.007	.033	.062	.016	.056	.066	.019	.045	.051
Hausman test									
χ^2	73.357	34.009	41.802	66.855	15.432	31.351	70.515	0.61405	17.552
df	3	7	10	3	7	10	3	7	10
p value	.06193	.8456	8.134e−06	.08263	.03084	.0005133	.07027	.9989	.063

Note. This table displays the results from the difference-in-difference model. The dependent variable is interbank deposits of more than 5 years to total assets (IDmore5yTA). CA = comprehensive assessment.
Statistical significance: $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Source: Authors' calculations.

in anticipation of the SSM and the expected comprehensive assessment, the banks which were expected to be classified as significant and to be supervised by the ECB encountered increased (interbank) depositors' trust compared to less significant banks, which were expected to remain under NSAs' supervision.

Models 7, 8, and 9 (Table 12) display the results from the placebo test where, by creating a fictional time dummy variable, we assumed that the SSM had been implemented in 2012. These models show that there is no evidence of a statistically significant effect on the interbank-deposits-with-a-maturity-of-1–5-years-to-total-assets ratio of significant banks compared to less significant banks, assuming the SSM was implemented in 2012. These results imply that the decrease of the portions of total assets funded with interbank deposits with a maturity of 1–5 in significant banks is associated with the SSM implementation, rather than any other past event. Additionally, these results imply that significant banks had decreased their portions of total assets funded with interbank deposits with a maturity 1–5 years in anticipation of the comprehensive assessment and the SSM launch, rather than any other past event.

Table 13 displays the results of this analysis performed on the dependent variable of interbank deposits with a maturity of more than 5 years to total assets. From Models 1, 2, and 3, which display the impact of the SSM implementation on the share of interbank deposits in total assets, measured via the dependent variable of interbank deposits with a maturity of more than 5 years to total assets, it is evident that the coefficient of the variable *did* is statistically insignificant. This implies that there were no differences in the portion of total assets funded with interbank deposits with a maturity of more than 5 years between significant and less significant banks which could be associated with the SSM implementation. From

Models 4, 5, and 6 (Table 13), which display the impact of the comprehensive assessment and SSM launch on the share of interbank deposits in total assets, it is evident that the coefficient of the variable *did* is statistically insignificant. This implies that there were no differences in the portions of total assets funded with interbank deposits with a maturity of more than 5 years between significant and less significant banks which could be associated with the anticipation of the comprehensive assessment and of the SSM. Models 7, 8, and 9 (Table 13) display the results from the placebo test, where, by creating a fictional time dummy variable, we assumed that the SSM had been implemented in 2012. These models show that there is no evidence of a statistically significant effect on the interbank-deposits-with-a-maturity-of-more-than-5-years-to-total-assets ratio of significant banks compared to less significant banks, assuming the SSM was implemented in 2012. These results imply that the interbank-deposits-with-a-maturity-of-more-than-5-years-to-total-assets ratio was affected neither by the SSM implementation, nor by the banks' anticipation of the comprehensive assessment and of the SSM, nor by any other past events.

To sum up, results from this analysis show that due to the implementation of the SSM, significant banks had increased their portions of total assets funded with short-term interbank deposits with a maturity of less than 3 months and decreased their portions of total assets funded with long-term interbank deposits, with a maturity of 1–5 years. No differences between the significant and less significant banks were identified in the portion of total assets funded with interbank deposits with a maturity of 3–12 months and interbank deposits with a maturity of more than 5 years. These results imply that the trust effect of the interbank depositors is strongly demonstrated with the short-term interbank deposits, which are based on trust and are not collateralized. Long-term deposits are collateralized more frequently and therefore are considered safer. These results indicate that (interbank) depositors' trust in significant banks, which are supervised by the ECB, increased significantly after the SSM implementation. These findings further support our hypothesis that the SSM implementation in fact improved the credibility of significant banks.

Additionally, we have found evidence that in 2013 in anticipation of the SSM and the comprehensive assessment, the banks which were expected to be classified as significant and to be supervised by ECB increased their portions of total assets funded with interbank deposits with a maturity of up to 3 months (at a statistical significance of 10%), compared to less significant banks, which were expected to remain under NSAs' supervision. Moreover, results show that significant banks decreased their portions of total assets funded with interbank deposits with maturities of 3–12 months and 1–5 years in anticipation of the SSM and the comprehensive assessment. No differences between the significant and less significant banks were identified in the interbank-deposits-with-a-maturity-of-more-than-5-years-to-total-assets ratio. These results are consistent with our claim that banks which were going to be assessed with the comprehensive assessment and which were going to be supervised by the ECB were considered safer due to stricter supervision and consequently encountered increased (interbank) depositors' trust. On this subsample we applied placebo tests, where, by creating a fictional time dummy variable, we assumed that the SSM had been implemented in 2012. We did not find any differences in the portion of total assets funded with interbank deposits of any maturity between the significant and less significant banks in 2012, the year before the announcement of the SSM. This implies that the changes in the interbank deposits structure by maturity we have identified arise from the SSM implementation and not from any other past event.

4 Conclusion

The SSM as a supervisory framework was implemented in 2014, when the most significant banks in the euro area, which comprise 80% of the total banking assets, switched from national supervisors to the ECB and the remaining banks remained under national supervisors (NSAs). A preparatory step to the SSM implementation was the comprehensive assessment of the banks which fulfilled the criteria for significance and expected to switch to the ECB as the main supervisory body. Since the ultimate goal of the SSM is increased bank safety and resilience (ECB, 2014b), the significant banks which are supervised by the ECB are likely to be considered safer. Consequently, we have examined changes in depositors' trust in the significant banks compared to less significant banks, which remained under supervision by their NSAs. The effects of institutional changes such as the SSM implementation can be visible in the medium to long run (Fiordelisi et al., 2017). However, we have also inspected the immediate trust effect of depositors caused by the SSM anticipation and the expected comprehensive assessment.

With this paper we contribute to the recent literature stream on the SSM and to the established literature on supervision and bank regulation. The main contribution is in providing insight into how depositors' trust changed due to the implementation of the SSM and due to the anticipation of the SSM launch and the comprehensive assessment. Our main finding

is that depositors' trust in significant banks increased significantly after the SSM implementation. We have provided empirical evidence that significant banks, which are supervised by the ECB, increased their shares of interbank deposits in their total assets after the SSM implementation, compared to less significant banks, which are supervised by NSAs. More specifically, the significant banks increased their shares of short-term interbank deposits with a maturity of less than 3 months and decreased their shares of long-term interbank deposits, with a maturity of 1–5 years, compared to the less significant banks. These results provide empirical evidence of the effectiveness of SSM as a supervisory framework to improve the credibility and trustworthiness of significant banks and in turn to achieve its primary objective—improved bank stability (ECB, 2014b). Additionally, we have provided empirical evidence that in 2013, in anticipation of the SSM and the expected comprehensive assessment, significant banks, which were expected to be supervised by the ECB, increased their shares of interbank deposits in their total assets compared to less significant banks. More specifically, the banks which were expected to be classified as significant and to be supervised by the ECB increased their shares of interbank deposits with a maturity of up to 3 months (at a statistical significance of 10%) in their total assets and decreased their shares of interbank deposits with maturities of 3–12 months and 1–5 years in their total assets compared to the less significant banks. This implies that the ECB was perceived as a stricter supervisory authority compared to the NSAs. This finding is in line with the existing literature that explores supervisory frameworks and their structure (Colliard, 2020; Fiordelisi et al., 2017).

We have found no evidence that the SSM implementation and the SSM launch affected the share of total deposits in total assets of significant banks. A possible explanation for this could be that institutional changes such as the SSM implementation do not impact customer deposits and saving accounts, which are included in banks' total deposits.

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Appendix

Table A1. List of banks located in smaller economies and criteria used for classification.

Bank	Country	Criteria for classification
Nova Ljubljanska banka d.d.	Slovenia	Total assets (TA) above 20% of GDP
Nova Kreditna banka Maribor d.d.	Slovenia	Among the three largest credit institutions in the country
Vseobecna Uverova Banka, a.s.	Slovakia	Among the three largest credit institutions in the country
Slovenska sporitelna, a.s.	Slovakia	Among the three largest credit institutions in the country
Tatra Banka	Slovakia	Among the three largest credit institutions in the country
AS SEB Pank	Estonia	TA above 20% of GDP
Swedbank AS	Estonia	TA above 20% of GDP
AS SEB Banka	Latvia	Among the three largest credit institutions in the country
Swedbank AS (Latvia)	Latvia	TA above 20% of GDP
Hellenic Bank Public Company Limited	Cyprus	TA above 20% of GDP
Bank of Cyprus Public Company Limited	Cyprus	TA above 20% of GDP
ABLV Bank AS	Latvia	Among the three largest credit institutions in the country
Sberbank Europe AG	Austria	Significant cross-border activities
HSBC Bank Malta p.l.c.	Malta	TA above 20% of GDP
Bank of Valletta p.l.c.	Malta	TA above 20% of GDP
Banque Internationale à Luxembourg	Luxembourg	Part of Precision Capital S.A. (Size of TA EUR 30–50 bil.)

Source: Authors' calculations.