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Non-significant in life but significant in death: Spillover effects to euro area banks from the SVB fallout*

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Abstract

Did Silicon Valley Bank (SVB) fallout spillover to the euro area banking sector? We find that euro area banks' cumulative abnormal returns declined by about 10% on average after the collapse of SVB. Surprisingly, we also find that investors did not react to euro area banks sharing similar vulnerabilities as SVB, such as lower liquidity and less stable funding sources. Instead, they were more concerned about the possible negative repercussions on banks' balance sheets coming from the pace of the current monetary policy tightening.

Keywords: Event study; Silicon Valley bank; Spillover; Euro area banks
JEL classification: G01, G14, G21

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1 Introduction

The sudden fallout of Silicon Valley Bank (SVB), the second largest in U.S. history and the largest since the global financial crisis, has raised concerns among policymakers about potential spillover effects for U.S. banks and banks worldwide.

In principle, the SVB failure should be considered an idiosyncratic shock. SVB's business model was primarily exposed to the tech industry, which grew considerably during the Covid-19 pandemic. Therefore, SVB attracted large uninsured deposits from tech firms that invested in long-term U.S. treasuries and mortgage-backed securities. In a "low-for-long" interest rate environment, this strategy was reasonable as it allowed exploiting a cheap and generally stable source of funding (deposits) while benefiting from higher returns from longer-term investments. However, the pace of the tightening cycle by the Federal Reserve against rising inflation coupled with weaker growth in the tech industry led to a sharp decline in the value of SVB's securities portfolio and lower deposit inflows from tech firms. This, in turn, induced a surge in withdrawals by the bank's uninsured depositors, impairing SVB's liquidity position (exacerbated by the lack of liquidity requirements) and forcing SVB to sell off assets at significant losses.

In reality, however, the SVB fallout spillovered to euro-area banks and the global stock market leading to disruptions to the financial system and affecting investors' confidence. Indeed, when SVB was closed by regulators on March 10, 2023, the U.S. banks Dow Jones and the bank EURO STOXX indexes lost about 12% and 6%, respectively (Figure 1). Therefore, from a regulatory and policy perspective, it is important to appreciate which banks are more likely to suffer from investors' adverse reactions to the SVB fallout. In addition, it is also important to gauge whether investors reacted more to banks sharing similar vulnerabilities as SVB, such as lower liquidity and/or less stable sources of funding or whether they were more concerned about the possible negative repercussions on banks' balance sheets coming from the pace of the monetary policy tightening.

[Place Figures 1 and 2 about here]

This paper first investigates contagion effects from SVB to euro area banks. Specifically, we apply an event study methodology with bootstrapped p-values to evaluate euro area banks' cumulative abnormal returns (CARs) from one day prior to one day after the event. Second, we provide insights into the possible bank-specific factors driving the market's reaction to euro area banks from the SVB failure. Thanks to the granularity of the dataset, we can look at detailed euro area banks' liquidity, funding and security holdings generally unavailable in commercial databases.

To preview our main findings, we first find that euro area bank CARs declined by 10.1% on average after the SVB fallout, but the effect is heterogeneous across countries. Second, investors were not concerned about euro area banks' liquidity and funding conditions as euro area banks had large liquidity buffers and relied on stable deposits (Figure 2).[1] Indeed, the several measures of liquidity and funding employed to test the relationship with CARs are not statistically significant. On the contrary, a statistically significant reaction is visible on standard measures of solvency and profitability and on the share of securities, especially those held to maturity.

While several papers (Fiordelisi and Ricci, 2016; Hori, 2005; Yamori and Mur, 1999) indicate that bank failures can have a significantly negative impact on the stock markets both domestically and internationally, with the effect varying across banks, this is the first study to test whether the market's reaction was directed on euro area banks sharing similar vulnerabilities as SVB or whether the market was more concerned about the negative implications on bank's balance sheet coming from the speed of the monetary policy tightening.

[1]The liquidity coverage ratio defines the minimum stock of high-quality liquid assets (HQLA) credit institutions need to hold as liquidity reserves in order to cover their net cash outflows under a severe 30-day stress scenario. The minimum liquidity coverage ratio required for internationally active banks is 100%.

2 Data and Methodology

This Section describes our data, sample selection, and econometric strategy.

3 Data and sample selection

We study the period from January 1, 2022, to March 20 2023. The dataset combines market data and balance sheet information from various sources. Bank stock prices and relative market capitalisation are from Datastream (EU-18). Data on bank-specific information are from the ECB supervisory data that collect both bank-level controls commonly employed in the banking literature (i.e., size, asset quality, profitability, capitalisation, asset composition) and granular liquidity and funding measures (liquidity coverage ratio, net stable funding ratio, high-quality liquid assets and uninsured deposits). The sample selection process proceeds as follows. First, we start with the universe of publicity-listed banks in the euro area available in Datastream.[2] Second, we merge the stock price data with ECB supervisory data, which leads to a final sample of 81 banks from 18 Eurozone countries.

3.1 Methodology

3.1.1 Abnormal returns and Cumulative abnormal returns

In line with previous research in the economic literature (Correa et al., 2014; Fiordelisi and Ricci, 2016), in this study, we employ a market model (Brown and Warner, 1980) to estimate the abnormal returns of banks surrounding the collapse of SVB. We estimated the abnormal return using the following market model:

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) \tag{1}$$

[2]The total number of banks with available stock prices is 96, of which: 8 in Austria, 3 in Belgium, 2 in Cyprus, 10 in Germany, 2 in Estonia, 8 in Spain, 6 in Finland, 16 in France, 6 in Greece, 4 in Ireland, 16 in Italy, 1 in Lithuania, 1 in Luxembourg, 4 in Malta, 3 in Netherlands, 1 in Portugal, 2 in Slovenia, 3 in Slovakia.

where $AR_{i,t}$ represents the abnormal return of bank i at time t. $R_{i,t}$ and $R_{m,t}$ denote the stock returns and market portfolio returns at time t, respectively. MSCI Europe is the benchmark for the market portfolio.[3]

Following Ahern (2017) approach, the estimation window for the market model is set at 120 trading days (-122,-2). An alternative estimation window of 90 trading days allows for potential parameter instability. We determine the cumulative abnormal returns (CARs) for the 3-day event window (-1,1) using the formula:

$$CAR_{i,t} = \sum_{t=t_1}^{t_2} AR_{i,t} \tag{2}$$

3.1.2 Aggregate market reaction

To evaluate the aggregate price reaction to the SVB's collapse, we estimate an equally-weighted and a market-weighted portfolio of stocks of euro area banks. Next, we compute the overall reaction to the collapse of SVB by estimating the average CARs over the event.

Following previous studies (Armstrong et al., 2010; Byun and Rozeff, 2003), we adopt bootstrapped p-values to evaluate the significance of CARs. We initially remove the announcement event days from our sample using a three-day window (-1, +1). Next, we use a pseudo-random number generator to select placebo events from the remaining trading days, and we estimate placebo CARs based on these events. This process is repeated 1,000 times to create a simulated distribution of placebo CARs. Using two-tailed statistical tests, these critical values determine the significance level at which the estimated CARs deviate from zero.

[3] As a robustness check, we perform the analysis using the Eurostoxx as the market portfolio. The findings are virtually the same and are available upon request.

3.1.3 Bank heterogeneity

After estimating the CARs for the bank stock, we examine their drivers by regressing them on a set of variables that might affect the price reaction:

$$CAR_{i,t} = a + bX_{i,t-1} + \epsilon_{i,t} \tag{3}$$

where $X_{i,t-1}$ includes lagged (2022-Q4) bank-specific variables used to capture which banks suffer a stronger market reaction from the SVB fallout. To test for euro area banks' liquidity conditions, we introduce sequentially the liquidity coverage ratio (*LCR*), the cash-to-total assets ratio (*Cash_TA*), the high-quality liquid assets-to-total deposit ratio (*HQLA_DEP*), and the Net Stable Funding Ratio (*NSFR*). We also assess the impact on banks' funding conditions using the wholesale funding-to-total assets ratio (*Wholesale_TA*) and the ratio of uninsured deposits to total deposits (*Uninsured Deposits_DEP*). We also use the ratio of total securities-to-total assets ratio (*Total Securities_TA*) to test whether investors were concerned about the negative effect of the monetary policy tightening on banks' security portfolios. To gain further insight into this effect, we decompose *Total Securities_TA* into: the ratio of total securities classified at amortised cost-to-total assets (*Total Securities ARM*) and the ratio of total securities classified at fair value through other comprehensive income-to-total assets (*Total Securities FVOCI*). Lastly, we control for the logarithm of bank total assets (*Size*), the non-performing loan ratio (*NPL ratio*), the return on assets (*ROA*), and the distance to the combined buffer requirement (*Distance to CBR*).[4]

[4]The distance to CBR is a measure of solvency capturing bank capital headroom on top of capital requirements.

4 Results

4.1 Aggregate effect of SVB fallout

Table 1 reports our main results using equally-weighted and market-weighted portfolios. In this analysis, we employ MSCI Europe as a proxy for the market portfolio. In particular, in Columns (1) and (2), we use an estimation window of 120 trading days, while in Columns (3) and (4), we use an estimation window of 90 trading days. We also report the bootstrapped p-values for the CAR based on 1,000 simulations for the period starting from January 1, 2022, to March 20, 2023. We find that the investors react negatively to the SVB bankruptcy (Figure 3).

[Place Figure 3 about here]

The price reaction is statistically significant at the 5% level for both market-weighted and equally-weighted portfolios. The results hold regardless of the length of the estimation window (120 or 90 days). We also observe that the reaction for the market-weighted portfolios is stronger than the equally-weighted portfolios, suggesting a stronger market reaction to larger banks. The magnitude of the effect is also economically meaningful. The average market capitalisation for our sample of banks is 908 billion euros, and the total CAR for the SVB fallout is -7.6% (-8.3%), implying a drop in market capitalisation of 69.00 (75.36) billion euros. We also provide an analysis of the impact of the SVB crash on different portfolios: a) peripheral versus core euro area countries and; b) the largest euro area countries (Germany, France, Italy and Spain). Unsurprisingly, we observe a stronger market reaction to peripheral banks following the collapse of SVB. Finally, we find a similar reaction for banks in Italy and Spain while a negligible reaction to German and France banks.

[Place Table 1 about here]

4.2 Bank characteristics and SVB fallout

Table 2 presents the results from the cross-sectional variation of CARs, examining how bank-specific variables are correlated with stock price reactions. We use MSCI Europe as a benchmark and an estimation window of 120 trading days. Our findings show that the coefficient on bank *Size* is negative and statistically significant at the 1% level in all specifications. This result is consistent with the aggregate market reaction in the previous Section, indicating that CARs declined more for larger banks following the collapse of SVB. We find also a positive and statistically significant (at the 1% level across the econometric specifications) relationship between the *Distance to CBR* and *ROA* and bank CARs, suggesting that banks with solid profitability and solvency were less affected by the SVB failure.

[Place Table 2 about here]

Interestingly, the coefficients on banks' liquidity and funding structure variables such as *LCR*, *Cash_TA*, *HQLA_DEP*, *Wholesale_TA*, *NSFR*, and *Uninsured deposits_DEP* are not statistically significant indicating that investors were not concerned about euro-area banks' liquidity and funding conditions. On the contrary, the coefficient on *Total Securities_TA* is negative and statistically significant at the 1% level, confirming investors' concerns about the negative repercussions on banks' balance sheets coming from the speed of the monetary policy tightening. Indeed, Figure 4 (left) shows that the estimated CARs for banks with a ratio of total securities-to-total assets ratio of about 39% (corresponding to the 95th percentile of the Total Securities_TA distribution) declined by about 4.5 pp more than banks with a ratio total securities-to-total assets ratio of about 1% (corresponding to the 5th percentile of the Total Securities_TA distribution).

When distinguishing between *Total Securities ARM* and *Total Securities FVOCI*, the coefficients on both variables enter the regressions with a negative sign, but only the coefficient on *Total Securities ARM* is statistically significant (at the 1% level). The marginal effects of *Total Securities ARM* (Figure 4 (right)) shows that the previous results for *Total*

Securities_TA are largely driven by the held-to-maturity portfolio. In this respect, we reckon that while losses on the security portfolios at fair value through other comprehensive income are visible as they are booked directly into the bank's equity, investors were worried about euro area banks' unrealised losses on the held-to-maturity portfolio, which can materialise if a bank looks to sell its securities portfolio because it does not have adequate contingent sources of liquidity or has wider asset/liability mismatches.[5]

[Place Figure 4 about here]

5 Conclusion

The fallout of Silicon Valley Bank had significant spillover effects on the euro-area banking system, highlighting the interconnectedness of the global financial system and the need for continued monitoring of systemic risks.

Our analysis suggests that investors were not concerned about euro area banks' liquidity and funding conditions, thanks to the large liquidity buffers and stable funding sources maintained by euro area banks. However, investors' concerns were primarily focused on euro banks' solvency and profitability and on the share of securities in their portfolios, especially those held to maturity.

These findings highlight the need for supervisors and policy-makers to continuously monitor the effects of the current interest rate hike on banks' balance sheets.

[5]We replace the CARs estimated with an estimation window of 90 trading days, and the results are virtually the same as those reported in Table 2.

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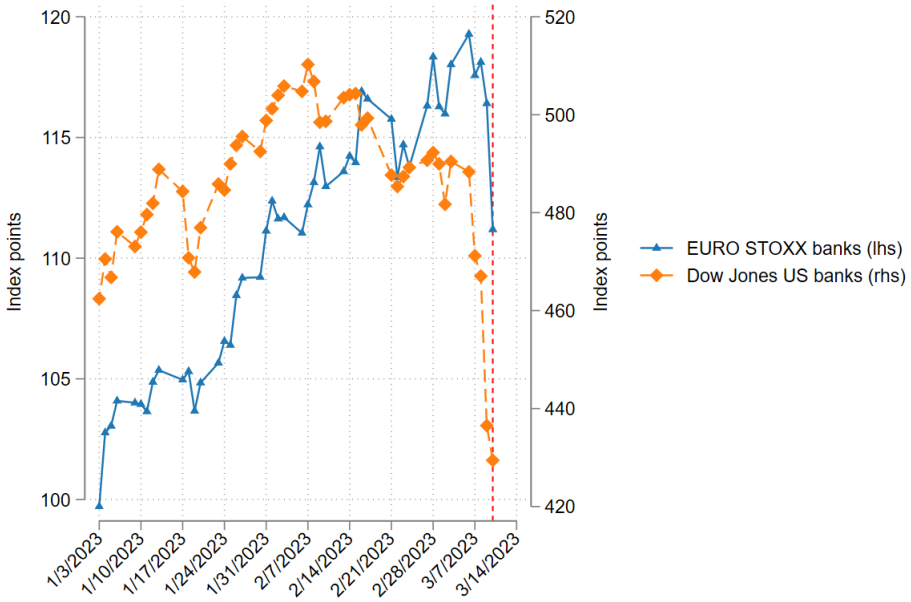
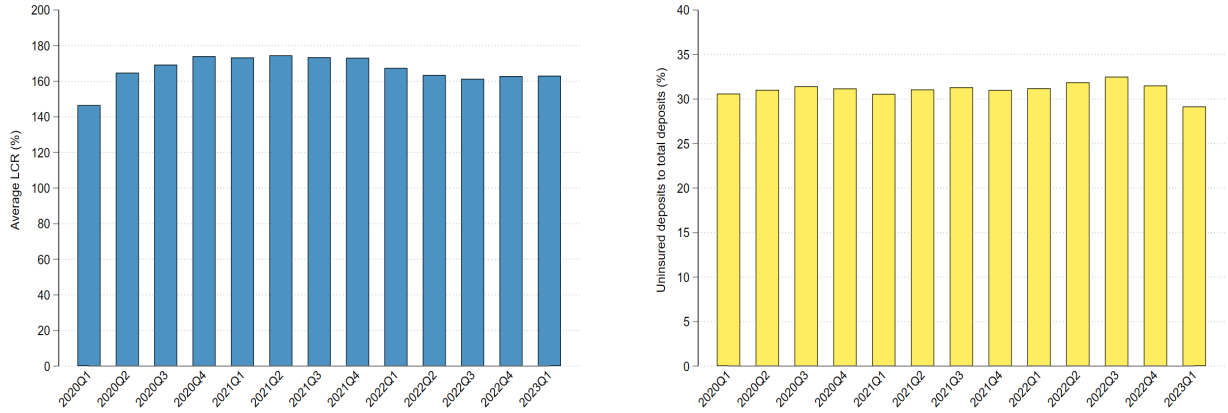
Figure 1: **US and EA banks indexes**



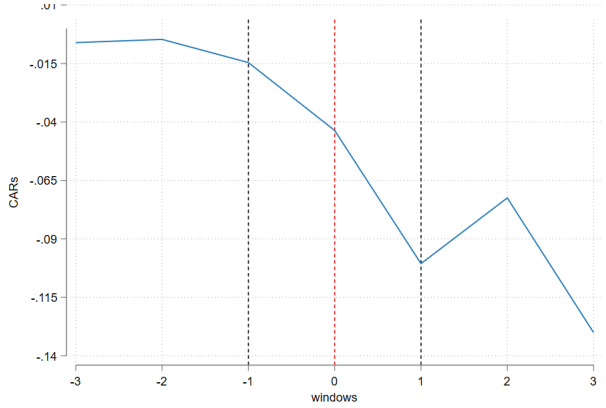
Note: This figure shows the Dow Jones and EURO STOXX bank indexes from 1 Jan. 2023 to 13 Apr. 2023. The red dashed vertical line indicates 10 March, day of the SVB collapse.

Figure 2: **EA banks LCR and uninsured deposits to total deposits over 2020Q1-2023Q1**



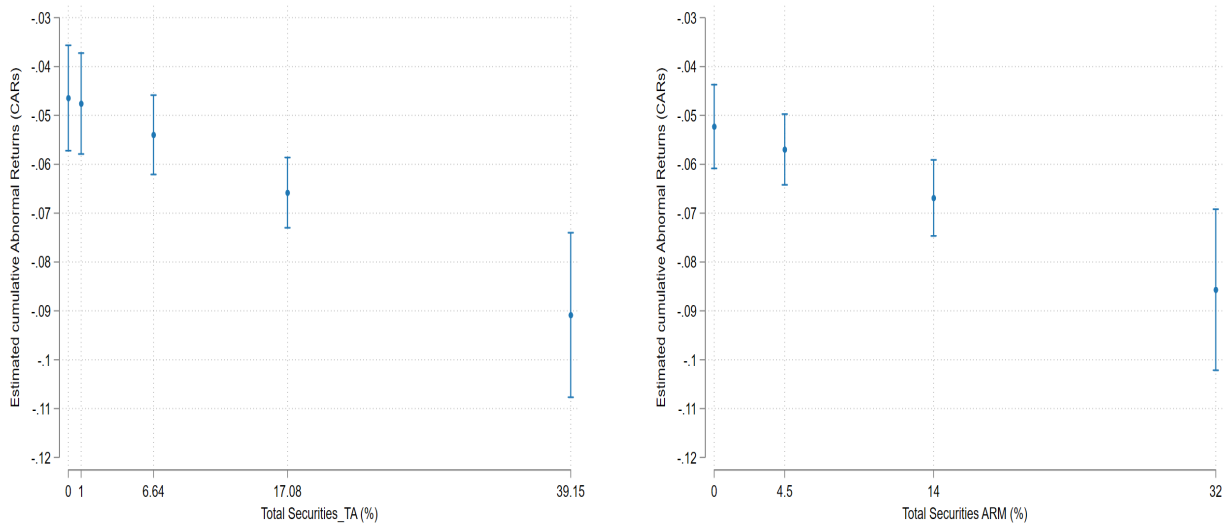
Note: This figure shows the average liquidity coverage ratio (*LCR*, left) and the ratio of uninsured deposits to total deposits (right) over 2020Q1-2023Q4 for a sample of 81 banks.

Figure 3: **Cumulative Abnormal Returns (CARs) around SVB fallout**



Note: This figure shows the CARs for a sample of 96 EA banks from 3 days prior to 3 days after the event. The main analyses are based on CARs for the 3-day event window (-1,1).

Figure 4: **Estimated CARs at different levels of total bank securities and total securities classified as held-to-maturity**



Note: This figure shows the relationship between the CARs and total securities-to-total assets ratio (left) and total securities ARM-to-total assets ratio (right) at different percentiles (5^{th}, 25^{th}, 50^{th}, 75^{th}, 95^{th}). For the chart on the right, the 5^{th} and 25^{th} overlaps.

Table 1: **Aggregate market reaction to Silicon Valley Bank collapse.**

This table presents the event-study results for the Silicon Valley Bank collapse. To estimate the cumulative abnormal returns (CARs), we used both equal-weighted (EW) and market-weighted (MW) portfolio for all the Eurozone banks, the GIIPS banks, and the Core Eurozone (Belgium, France, Germany, Luxembourg, and the Netherlands) banks, as well as for Italy, Germany, Spain, and France. MSCI Europe represented the market portfolio. The estimation window was set to 120 trading days for Columns (1)-(2) and 90 trading days for Columns (3)-(4). We calculated the CARs using equations (1) and (2). To determine the *BS p-values*, which indicate the statistical significance of the average CAR from January 1, 2022, to March 20, 2023, we performed 1,000 bootstrap simulations. For each simulation, we selected one random trading day and calculated the average CAR based on equations (1) and (2). The p-values were determined by the number of cases where the CAR was either greater or less than the estimated value, using 2-tailed tests. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	MSCI Europe - Estimation window 120		MSCI Europe - Estimation window 90	
	CAR (-1,1) EW	CAR (-1,1) MW	CAR (-1,1) EW	CAR (-1,1) MW
	(1)	(2)	(3)	(4)
Total	-0,056***	-0,097***	-0,059**	-0,101***
BS p-values	0,006	0,000	0,012	0,000
Total GIIPS	-0,029***	-0,032***	-0,030***	-0,034***
BS p-values	0,000	0,000	0,000	0,000
Total Core Eurozone	-0,015***	-0,026***	-0,017**	-0,027***
BS p-values	0,006	0,000	0,012	0,000
Total Italy	-0,014***	-0,013***	-0,014***	-0,013***
BS p-values	0,000	0,000	0,000	0,000
Total Germany	-0,005*	-0,005***	-0,005	-0,005***
BS p-values	0,094	0,000	0,110	0,000
Total France	-0,006**	-0,012***	-0,007**	-0,013***
BS p-values	0,026	0,000	0,022	0,000
Total Spain	-0,008***	-0,016***	-0,008***	-0,017***
BS p-values	0,000	0,000	0,000	0,000

Table 2: **Determinants of CARs.**

This table shows the results of cross-sectional regressions on the bank-level CARs. The dependent variable is *CAR (-1,1)*, which is estimated according to Equation (1)-(2) using an estimation window of 120-trading days. This set of regressions uses as a proxy for the market portfolio MSCI Europe. *Size* is the logarithm of bank total assets. *NPL ratio* is the ratio of non-performing loans divided by total loans. *Distance to CBR* is the distance to the combined buffer requirement. *ROA* is the bank net income divided by total assets. *Total Securities_TA* is the ratio of total securities-to-total assets. *Total Securities ARM* is total securities classified at the amortised cost scaled by total assets. *Total Securities FVOCI* is total securities classified at fair value through other comprehensive income scaled by total assets. *Cash_TA* is the ratio of cash-to-total assets. *HQLA_DEP* is the ratio of high quality liquidity assets over total deposits. *Wholesale_TA* is the ratio between wholesale funding over total assets. *Uninsured Deposits_DEP* is the ratio of retail unsecured deposit over total deposits. In our estimates, we rely on OLS regression with robust standard errors clustered at the bank level. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1) CARs	(2) CARs	(3) CARs	(4) CARs	(5) CARs	(6) CARs	(7) CARs	(8) CARs	(9) CARs
Size	-0.016***	-0.016***	-0.016***	-0.016***	-0.016***	-0.016***	-0.016***	-0.015***	-0.015***
	(-7.784)	(-7.750)	(-7.834)	(-7.697)	(-7.447)	(-5.100)	(-7.746)	(-7.723)	(-7.214)
NPL ratio	0.002	0.002	0.002	0.002	0.002	-0.003	0.002	0.002	0.001
	(1.211)	(1.357)	(1.265)	(1.197)	(1.098)	(-1.006)	(1.283)	(1.039)	(0.835)
Distance to CBR	0.002***	0.002***	0.002**	0.002***	0.003***	0.003***	0.002***	0.002***	0.002***
	(2.874)	(3.031)	(2.601)	(2.765)	(2.816)	(2.729)	(2.860)	(3.292)	(3.336)
ROA	0.012***	0.012***	0.012***	0.012***	0.011***	0.016*	0.012***	0.011***	0.010***
	(3.997)	(4.030)	(3.865)	(3.948)	(3.397)	(1.700)	(4.057)	(3.693)	(2.893)
Total Securities_TA	-0.001***	-0.001**	-0.001***	-0.001***	-0.001***	0.001	-0.001***		
	(-3.150)	(-2.113)	(-3.157)	(-2.963)	(-2.956)	(0.659)	(-3.218)		
LCR		-0.004							
		(-0.724)							
Cash_TA			-0.000						
			(-0.532)						
HQLA_DEP				0.000					
				(0.115)					
Wholesale_TA					0.000				
					(0.952)				
NSFR						0.001			
						(0.651)			
Uninsured Deposits_DEP							0.000		
							(0.605)		
Total Securities ARM								-0.001***	
								(-2.786)	
Total Securities FVOCI									-0.001
									(-0.672)
N. of banks	81	81	81	81	81	52	81	81	81
Intercept	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.520	0.523	0.521	0.520	0.526	0.598	0.523	0.513	0.464