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David Marques-Ibanez, Gianluca Santilli, Giulia Scardozzi

Bail-in in action

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Abstract

In the aftermath of the European sovereign debt crisis, the question of who should bear the burden of banking crises has been a cornerstone of the new supervisory framework in Europe. We evaluate the bail-in regulation (BRRD) for bank bond holdings using a proprietary database covering holdings of all euro-denominated securities. We focus on hard-to-value bailinable bank bonds and show that banks increased their holdings of bailinable bank bonds while households and non-financial corporations reduced their holdings of bailinable bonds issued by riskier banks.

JEL classification: G21, G28

Keywords: Bail-in, Bond holdings, Bond allocation

Non-technical summary

Following the European sovereign debt crisis, the European Union decided to move from a decentralized (i.e. national) to a centralized bank resolution framework to prevent taxpayers from bearing the lion share of the cost of resolution of banking crises. The new regime included the use of the bail-in tool, which is contained in the Bank Recovery and Resolution Directive (BRRD), which was agreed in April 2014 and entered into force in January 2016. According to BRRD, investors would have to bear the costs of bank resolution in proportion to the seniority of their investments.

This leads us to a simple but crucial question: has the new bail-in regime affected holdings by type of investor? We answer this question by looking at securities issued by euro-area banks, using a proprietary dataset on all holdings of euro-denominated securities. We focus on bank bond holdings by type of investor after the approval of the bail-in regulation. An important consideration is that the bail-in regulation aims to improve market discipline, as the removal of the implicit government guarantee for investors in bank bonds usually increases the risk of the securities issued by banks and makes their pricing more complex. However, some investors may not be able to recognise the additional risk and complexity. For example, households are usually not able to assess the stability of banks and the risks associated with bailinable bank debt while professional and institutional investors (i.e. banks, insurance companies, mutual and pension funds) are better equipped to invest in such complex financial products because usually they have the capacity, skills and data availability to assess the risk-return combination of these financial instruments (de Dreu, 2012). Banking supervisors may also be concerned about an increase in cross-holdings of securities by banks, as this could augment contagion risks and thus threaten financial stability.

We show that the bail-in regime was effective in reducing households and non-financial corporations' holdings of the riskier bank bonds (relative to safer ones). The regulation appears to have protected unsophisticated investors from investing in newly issued risky bank bonds. Conversely, banks increased their relative holdings of bailinable bonds. The increase in bank holdings of riskier securities could endanger financial stability were to fail the issuers of these securities.

1 Introduction

In the aftermath of the European sovereign debt crisis, the European Union decided to move from a decentralized (i.e. national) bank resolution policy to a centralized bail-in regime. The idea was to prevent taxpayers from bearing once again the lion's share of the costs of resolving banking crises. The new regime is contained in the Bank Recovery and Resolution Directive (BRRD), which was agreed in April 2014 and entered into force in January 2016. Under the BRRD, investors will bear the costs of resolution according to the seniority of their investments.

This leads us to a simple but crucial question: has the new bail-in regime affected holdings by type of investor? Our paper answers this question by focusing on investments issued by euro-area banks using a proprietary dataset on all holdings of euro-denominated securities. We focus on the bank bond holdings by type of investor following the approval of the bail-in directive.

An important consideration is that the BRRD bail-in regulation aims to improve market discipline, as the removal of the implicit government guarantee to bank bond holders usually increases the risk of the securities issued by banks and makes their valuation more difficult. At the same time, most households are not able to evaluate bank risks (Lusardi, Mitchell, and Curto, 2014), while professional and institutional investors (e.g. banks, insurance companies, mutual and pension funds) are usually better equipped to invest in such complex financial products, as they tend to have the experience, skills and data availability to assess the risk-return combination of these financial instruments (de Dreu, 2012). Banking supervisors may also be concerned about an increase in banks' (cross) holdings of securities issued by other banks, as this could amplify contagion risks and threaten financial stability.

We show that the bail-in regime was effective in reducing households' and non-financial corporations' holdings of the riskier bank bonds relative to safer ones, while banks increased their relative holdings of bailinable bonds. The regulation appears to have protected unso-

phisticated investors from exposures in risky bank bonds. At the same time, the increase in banks' holdings of riskier securities could threaten financial stability if the issuers of these securities were to fail.

This study belongs to the literature that analyzes the impact of regulation on investor behavior. Flannery and Sorescu (1996) showed that when governments stopped providing implicit guarantees to large financial institutions, investors in subordinated debt became more diligent in pricing the risk of bank default. There is also evidence analysing investor reactions to conventional monetary policy actions (Bernanke and Kuttner, 2005; Kurov, 2012), unconventional monetary policy (Kiley, 2014; Lutz, 2015), and informal central bank communications (Caiazza, Fiordelisi, Galloppo, and Ricci, 2022). A more reduced set of studies focuses on the reaction to the announcement of new bank resolution mechanisms on bond yields (Cutura, 2018; Giuliana, 2022; Crespi and Mascia, 2018), equity returns (Fiordelisi, Minnucci, Previati, and Ricci, 2020; Scardozzi, 2021), and CDS (Pancotto, Gwilyim, and Williams, 2019; Lamers, Present, and Soenen, 2023). Fiordelisi and Scardozzi (2022) analyse changes in bank funding after the introduction of the bail-in BRRD regulation.

2 Data and methodology

We collect data on bank bond holdings from the Securities Securities Holdings Statistics by Sector (SHSS) database which is a proprietary database managed by the European Central Bank that records the amount of each security held by each major investment sector (i.e. banks, households, insurance corporations, non-financial corporations, and others). We complement our dataset by constructing an indicator of bank risk via the weighted average of each bank's yield to maturity for each period, using data taken from the Centralised Securities Database (CSDB), another confidential ECB database. Our dataset consists of a panel where each observation indicates the holding of a given security (i), for a given category of holder sector (j) located in a country (c), at a given time (t). Such a granular dataset

allows us to investigate whether the bail-in regulation caused a change in the allocation of euro-area bank bonds.

The identification strategy relies on the differences in maturity of bonds using the implementation date of the regulation as a key wedge separating the treated and control groups. We exploit the fact that some bonds are subject to the bail-in regime due to their maturity, while other (very similar) bonds with slightly different maturities are not. We implement this by focusing only on bank bonds that mature around the bail-in enactment date (January 1, 2016). The treatment includes bonds that are subject to the bail-in regulation because they mature two months after the bail-in regulation is enacted (i.e., bonds with a maturity date that ranges between January 8, 2016 and March 8, 2016).[1] The control group includes bonds that are not bailinable because they mature just before (but not much before) the bail-in regulation is enacted. We observe changes in the holdings of such bonds before and after the approval of the bail-in directive.

For each of the four holder categories we run the following DID model:

$$\begin{aligned} y_{i,t} =& \alpha + \beta_1 w_i \times t_t + \beta_2 w_i \times Risk_{i,t} + \beta_3 t_t \times Risk_{i,t} + \\ & \beta_4 w_i \times t_t \times Risk_{i,t} + \beta_8 Pricegrowth_{i,t} + \beta_9 HomeBias_{i,t} + \theta_i + \lambda_t + \epsilon_{i,t} \end{aligned} \tag{1}$$

where i is the bond identifier and t is the time (e.g. quarter). The dependent variable ($Y_{i,t}$) is the natural logarithm of the nominal value of bonds held by investors, that we cluster into four categories[2] (i.e., banks, households, non-financial corporations, and other financial intermediaries, which we call as "Specialised Financial Intermediaries -SFIs-[3]), for the security i at quarter t. The variable $w \times t$ is the interaction of time and treatment, w, which takes the value of 1 for bonds with maturities ending around just after the enactment

[1] To increase the homogeneity between treatment and control groups, we did not include non-bailinable securities in terms of other characteristics except for their maturity.

[2] We exclude from our analysis the bonds bought governments and central banks.

[3] This category contains the following types of investors: money market funds, insurance corporations, pension funds, other insurance corporations and pension funds, and Non-Money Market Funds Investment funds.

(the first two months of 2016), and 0 for those maturing just before (the last two months of 2015). The dummy t indicates the quarter of the treatment, so $w \times t$, takes the value of 1 for bailinable bonds (i.e. those maturing in the first two months of 2016) after the approval date (i.e. the second quarter of 2014). We then interact the treatment variables w and t with issuer risk ($Risk$). $w \times t \times Risk$ captures the interaction of the treatment with issuer risk. Other explanatory variables are: *Price growth* which is the growth rate of the *i-th* security price; *home bias* dummy equals to 1 if the holder's country is the same as the issuer's country; θ_i accounts for fixed effect at the security level, λ_t accounts for time fixed effects[4]. To account for time-invariant differences between securities and quarters, we run our model with security- and quarter-fixed effects.

3 Results

We first run a t-test comparing the bond holdings in the treatment and control groups. Table 1 shows that the treatment and control units are statistically indistinguishable prior to the BRRD approval date (second quarter of 2014).

Table 2 presents the results by category of holder: the coefficient of interest ($w \times t$) shows that banks increased their relative holdings of bailinable bank securities. After the approval of the new resolution tool, the banking sector increased by 34% its relative holdings of bailinable bank bonds (column 1). Although the banking sector is a potential investor in bailinable bank bonds due to its financial sophistication, policymakers may seek to reduce banks' excessive exposure to bailinable bonds as this could threaten financial stability. For households, $w \times t$ is not statistically significant, suggesting that households did not change their relative net holdings of bailinable bonds during this period after the regulation was approved. In contrast, the interaction term ($w \times t \times Risk$, columns 2 and 3) is negative and statistically significant for households and non-financial corporations suggesting that they sold securities issued by the riskier banks after the approval of the regulation. Interestingly,

[4]We also run our model with "country of the holder × time" fixed effects and the results do not change.

the table shows that the other financial intermediaries (SFIs) did not statistically react to the event. We also show evidence consistent with home bias (Pigrum, Reininger, and Stern, 2016) (*Home bias* is highly statistically significant in all columns of Table 2).

Of course, as the objective is to get as close as possible to causality, the analysis above is limited to a sub-sample of all bailinable bank bonds. In order to have a wider perspective, we complement it by showing graphically the evolution of holdings of all bailinable bonds (i.e. those issued by euro area banks with maturities after January 8, 2016): Figure 1 shows that financial intermediaries (banks and SFIs) increased their holdings from 727 billion euro in 2,011, to 1,791 in 2019; while households reduced their holdings from 140 billion euro in 2011, to 115 in 2019. The total amount held by the four categories of investors was 927 billion euro in 2011 and 2,020 billion euro in 2019. This suggests that banks and SFIs were the main net buyers. As a percentage of total bailinable bonds, the treated bonds used in our identification are: 10% for households, 7% for banks, 3.5% for SFIs, and 4.5% for non-financial corporations.

4 Conclusion

We assess the impact of a new bail-in regulation in Europe on bank bond holdings by type of investor. We find that households and non-financial corporations reduced their relative holdings of bailinable bank bonds issued by the riskier banks, while the banking sector increased their relative holdings of bailinable bonds. The latter may be of concern to supervisors.

Table 1. T-test for parallel trend assumption

The table reports the t-student test, testing the parallel trend assumption, for each category of holder: banks (panel A), households (panel B), non-financial corporation (Panel C), and Specialised Financial Intermediaries (Panel D). The panels report the means of the growth rate of the nominal amount of non-bailinable (controls) and bailinable bonds (treated units). The growth rate is calculated as the nominal amount held in t over the nominal amount in t-1 minus 1. Statistical differences are expressed by *,**,***. The quarters reported are those before the formal approval of the BRRD (2014q2).

Panel A: Banks t-test

Quarter	MeanControl	MeanTreated	Diff.
2011Q3	1.173	1.909	-0.737**
2011Q4	1.159	1.294	-0.136
2012Q1	1.070	1.064	0.007
2012Q2	1.375	2.622	-0.247
2012q3	1.009	1.095	-0.086
2012q4	1.165	1.151	0.015
2013q1	1.125	2.051	-0.926
2013q2	1.135	1.298	-0.163
2013q3	1.367	1.205	0.162
2013q4	1.730	1.476	0.254
2014q1	2.501	2.476	0.025

Panel B: Household t-test

Quarter	MeanControl	MeanTreated	Diff.
2011Q3	-0.001	0.018	-0.018
2011Q4	0.001	-0.007	0.008
2012Q1	0.028	-0.007	0.035
2012Q2	-0.006	0.023	-0.029
2012Q3	0.024	-0.010	0.034
2012Q4	-0.015	0.022	-0.037
2013Q1	-0.011	-0.017	0.016
2013Q2	-0.011	-0.032	0.020
2013Q3	0.017	0.027	-0.010
2013Q4	0.002	0.001	0.001
2014Q1	1,793	1,682	0.111

Panel C: non-financial corporation t-test

Quarter	MeanControl	MeanTreated	Diff.
2011Q3	0.141	-0.013	0.154
2011Q4	-0.011	1,111	-1,123
2012Q1	0.144	0.007	0.136
2012Q2	-0.017	0.008	-0.026
2012Q3	-0.017	-0.014	-0.004
2012Q4	-0.025	-0.019	-0.006
2013Q1	0.032	0.149	-0.118
2013Q2	0.032	-0.003	0.035
2013Q3	0.020	0.018	0.002
2013Q4	0.011	-0.044	0.056
2014Q1	0.202	0.028	0.230

Panel D: SFIs t-test

Quarter	MeanControl	MeanTreated	Diff.
2011Q3	-0.003	1,667	-1,671
2011Q4	-0.012	0.038	-0.050
2012Q1	-0.002	0.014	-0.016
2012Q2	0.329	0.418	-0.089
2012Q3	0.046	-0.042	0.088
2012Q4	0.022	0.001	0.022
2013Q1	1,991	-0.005	0.996
2013Q2	-0.290	0.171	-0.201
2013Q3	-0.003	1,667	-1,671
2013Q4	0.134	0.058	0.076
2014Q1	0.123	0.484	-0.361

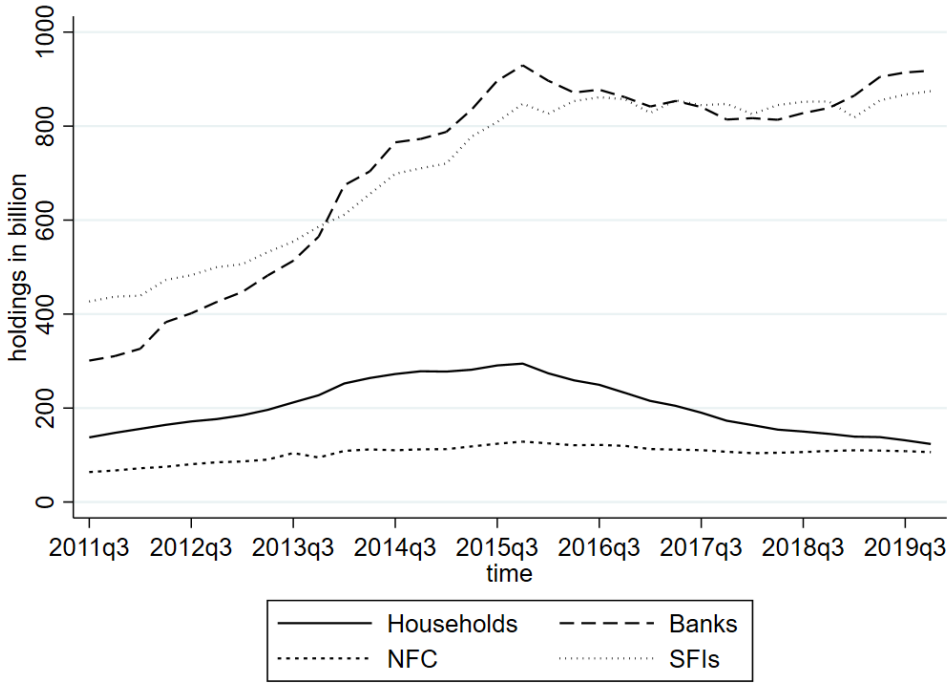
Table 2. Holdings by sectors: DiD

The table reports the results of the model 1. The dependent variable is the nominal amount held by each type of holder category: banks (column 1), households (column 2), non-financial corporations (column 3), and specialised financial intermediaries (column 4). The sample includes observations from the third quarter of 2011 to the third quarter of 2015. The treatment time dummy t takes values equal to 1 from the second quarter of 2014 (e.g. bail-in approval) and 0 before. The treatment group (w=1) consists of bailinable bank bonds (they inlucde bonds that expired from January 8, 2016 to March 8, 2016, i.e. after the BRRD came into force); while the control group (w=0) consists of non bailinable bank bonds (i.e. they expired before the BRRD came into force, i.e. from November 1, 2015 to December 31, 2015). NFC indicates non-financial corporations and SFI non-bank financial institutions. The table shows the effect caused by the approval of the bail-in regulation on bond holdings by sector. *,**,*** represents the level of significance, 10%, 5% and 1% respectively.

VARIABLES	Banks	Households	NFC	SFIs
$w \times t$	0.340***	-0.011	-0.125***	0.002
	(0.055)	(0.051)	(0.035)	(0.082)
$w \times Risk$	-0.190**	0.123**	-0.041	-0.057
	(0.080)	(0.053)	(0.049)	(0.103
$t \times Risk$	-0.012	0.02	0.011	0.004
	(0.063)	(0.050)	(0.033)	(0.111)
$w \times t \times Risk$	0.166	-0.170**	-0.114*	-0.074
	(0.110)	(0.069)	(0.059)	(0.159)
Home bias	1.607***	3.912***	2.231***	1.284***
	(0.143)	(0.081)	(0.138)	(0.086)
PriceGrowth	-0.072	0.107	-0.174	-0.240
	(0.326)	(0.215)	(0.200)	(0.668)
Constant	14.47***	11.68***	10.93***	14.12***
	(0.131)	(0.068)	(0.134)	(0.049)
Observations	6,305	7,474	4,521	2,699
R-squared	0.858	0.854	0.926	0.846
Time FE	YES	YES	YES	YES
Security FE	YES	YES	YES	YES

Figure 1. Amount of bailinable bonds held by investors

The figure shows the amount of all bailinable bank bonds (with a maturity after the 8th January 2016) held by type of investors over time. NFC indicates non-financial corporations and SFI non-bank financial institutions.



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David Marques-Ibanez
European Central Bank, Frankfurt am Main, Germany; email: david.marques@ecb.int

Gianluca Santilli
Università degli Studi di Roma Tor Vergata, Rome, Italy; email: gianluca.santilli@uniroma2.it

Giulia Scardozzi
Università degli Studi Internazionali di Roma, Rome, Italy; email: giulia.scardozzi@unint.eu

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