Banks' Structured Bond Financing: Evidence from the European Market *

JOÃO PINTO [a], MÁRIO COUTINHO DOS SANTOS [b]

[a] Universidade Católica Portuguesa, Católica Porto Business School and CEGE, [b] CICEE – Research Center in Economics & Business Sciences, and Universidade Católica Portuguesa, Lisbon, Portugal.

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ABSTRACT

We examine the factors that influence European banks' choice of issuing structured finance bond deals, in the form of securitization or covered bonds, vis-à-vis straight bond deals. Using a data set of 10,457 deals closed between 2000 and 2017, we find that banks may have used structured finance arrangements to manage credit risk and regulatory capital. Our results support the asymmetric information hypothesis that banks suffering from adverse selection problems choose structured finance over straight bond deals to overcome liquidity constrains and obtain longer maturity funding. Finally, we show that the choice between structured finance and straight bond finance affects not only banks' capital ratios, but also their capital adequacy ratios.

Keywords: Banks; Capital structure; Debt choice; Securitization; Covered bonds; Straight bonds.
JEL Codes: E58; G21; G24; G32

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I. Introduction

Banks' financial structure is not confined to the choice between debt and equity financing; rather, it encompasses a more complex set of financing instruments and contractual design features. For example, within the class of debt securities, banks may choose between structured versus straight bonds. Within the structured finance class, they may also borrow on-balance-sheet through covered bonds, or off-balance-sheet issuing asset-backed claims. Furthermore, they also have the option to borrow from public or private debt markets (e.g., Fabozzi et al., 2012; Pinto & Santos, 2020; Schwarcz, 2010).

According to the European Covered Bond Council (ECBC), covered bond issuance in Europe has increased from €100 billion in the mid-1990s to €350 billion in 2006, approaching €600 billion in 2010. Regardless of its alleged role at the onset of the 2008 financial crisis, securitization issuance in European markets reached €2,527.1 billion between 2009 and 2017.[1] Yet, despite its increasing use as a source of funding for European banks, extant literature has made little headway in explaining the determinants of those structured finance choices. In this paper, we contribute to the literature by examining the determinants of European banks' choice between structured finance securities, in the form of securitization and covered bonds, and straight bonds. Specifically, we explore the following research questions: How do contractual- (spread, maturity, and tranching), bank- (liquidity, credit risk, profitability, regulatory capital, and size) and macro-level (ECB's asset purchase programs, volatility, and yield curve slope) factors, affect banks' choices of different financing instruments? Is the choice process different in pre- *versus* crisis times? Do banks use structured finance deals to adjust their capital ratios?

We focus on the European market because covered bonds have been an important long-term funding source for European mortgage or public-sector loans for over 250 years, contrastingly with the U.S. market, where there has been no meaningful covered bond issuance between 2000 and 2017 (BoE & ECB, 2004; Cross, 2008; Larsson, 2013).[2] In addition, banks, both in Europe and the U.S., have been funding their asset-based growth mostly with debt securities, such as bond securities (e.g., Choudhry, 2004; Gropp & Heider, 2010; Loutskina, 2011). The decrease in securitization issues during the 2008 financial crisis had been relatively mitigated by greater covered bond issuance activity, making it an important source of financing (or refinancing) for European banks (see Figure 1 and ECB, 2012).[3]

Despite being complementary instruments, securitization and covered bonds have structural differences (e.g., Boesel et al., 2018; Carbó-Valverde et al., 2017). For example,

[1] Covered bond and securitization European markets were considerably driven by the 2009, 2011, and 2014 ECB Covered Bond Purchase Programmes, and the first Asset-Backed Securities Purchase Programme in 2014 (sources: Securitisation Data Report, European Structured Finance, Q4: 2018; Securities Industry and Financial Markets Association (https://www.sifma.org/).

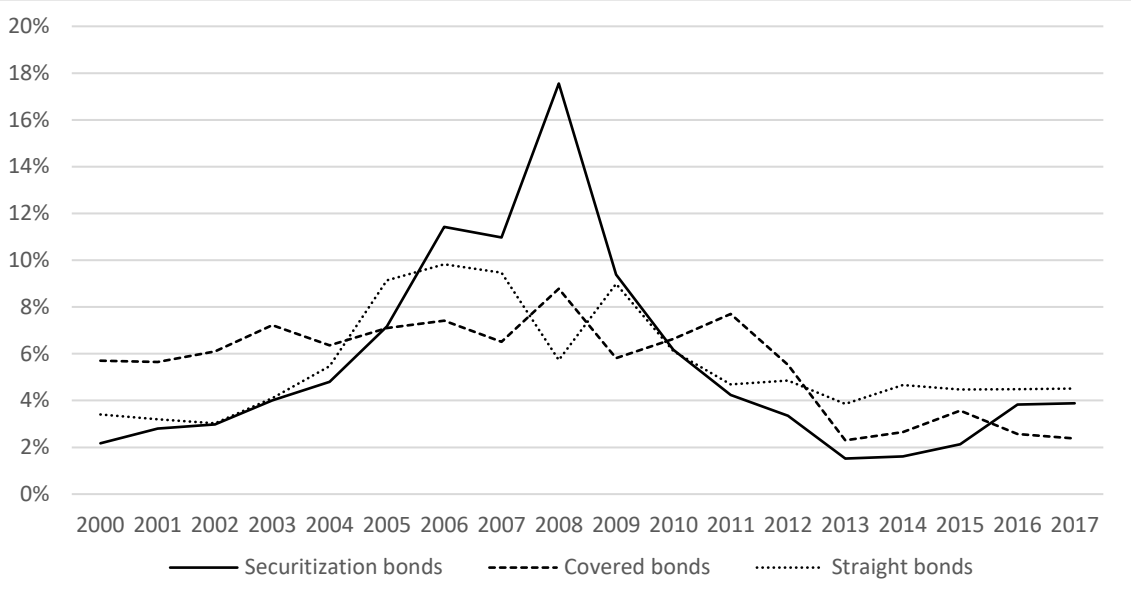
[2] This can be explained, in part, by regulation. The FDIC has not clarified how covered bondholders will be treated when an issuing bank becomes insolvent, including whether bondholders have priority over the FDIC.

[3] For further analysis see European Covered Bond fact book 2019 (http://www.ecbc.eu/). In this study, we define Europe as countries belonging to the European Economic Area plus Switzerland.

while in securitization arrangements, pooled assets are transferred to investors through true sales, in covered bond deals the assets remain on originators' balance sheets and investors acquire priority claims on them in default (Markmann, 2018; Prokopczuk et al., 2013).

Figure 1
Distribution of the percent of total value per year

Note: describes the distribution of the percent of total value per year, i.e., the percentage of the total deal value throughout that year to all the years, per deal type. Data are for deals reported in DCM Analytics with deal amount and weighted average spread available, closed by European banks during the 2000-2017 period.



This paper contributes to the banking debt financing literature. Extant research is more focused on studying why banks have been using securitization rather than conventional debt financing options (e.g., Affinito & Tagliaferri, 2010; Cardone-Riportella et al., 2010; Casu et al., 2013; Farruggio & Uhde, 2015). In contrast, examination of covered bonds in banking is relatively sparse (Boesel et al., 2018; Carbó-Valverde et al., 2017; Correia & Pinto, 2023). To the best of our knowledge, this paper is the first to examine the determinants of banks' debt choice considering three substitutive security types: straight, securitization, and covered bonds, and whether the cost of borrowing affects banks' choice between securitization (both ABS and MBS), covered bonds, and straight bonds. Unlike previous works, this paper investigates new borrowing choices, rather than the share of extant bond financing.

Using a large sample of 10,457 bond deals (worth €4,541.1 billion) issued in the 2000-2017 period, we find that European banks used structured finance, in the form of securitization and covered bond deals, as a risk management tool, i.e., to mitigate and transfer credit risk, and as a means to engage in regulatory capital arbitrage (e.g., Casu et al., 2013; Jones, 2000; Surti, 2010).

Our findings are consistent with the proposition that structured finance offers banks that are more prone to informational problems an effective signaling tool. In line with the pecking order theory, we find that banks suffering from adverse selection problems may choose structured finance over straight bond deals to overcome liquidity constrains. Our results also document that banks use structured finance deals to reduce borrowing

costs, and that less profitable banks and switchers - banks that use both structured finance and straight bond deals in the sampling period - are more likely to choose a structured finance deal over a straight bond deal for new debt issues.

Regarding the choice between securitization and straight bond arrangements, we found that larger and less profitable banks, as well as those with lower capital adequacy ratios, tend to prefer securitization vis-à-vis straight debt. In addition, higher non-performing loan ratios and Z-scores, increase the likelihood of banks choosing securitization over straight bond deals. We also found that banks use securitization deals when looking for long-term financing and benefiting from tranching.

In line with the trade-off theory of capital structure, banks choose covered bond versus straight bond deals when they have higher loans to deposits and short-term (ST) funding ratios. Our results document that banks that are less profitable, have higher non-performing loan ratios and Z-scores, and are better capitalized, prefer covered bond over straight bond deals.

Findings on the securitization-capital structure relationship document that the choice between structured finance and straight bond finance affects not only the banks' capital ratios, but also their regulatory capital levels. We show that banks' leverage, measured via the capital ratio, is influenced negatively by their size. In addition, banks with higher loans to deposits and ST funding, return on assets, and non-performing loan ratios have higher capital ratios. In line with Almazan et al. (2015), we show that banks' cost of borrowing affects their capital ratio for those that use structured finance deals only. When using the capital adequacy ratio, we find that banks with more liquidity restrictions have lower capital ratios, and banks use structured finance to benefit from regulatory capital arbitrage.

The remainder of this paper is organized as follows. Section 2 discusses the theoretical and empirical background. Section 3 describes data, sample, and variables. The following section examines the determinants of banks' choice between structured finance and straight bond deals. Section 5 delves into the determinants of banks' capital ratios. Section 6 concludes the paper.

II. Conceptual Framework and Related Literature

A. The financial economics of asset securitization and covered bonds

Structured finance contracting arrangements, such as asset securitization and covered bonds, are designed aiming at mitigating agency problems, curtailing monitoring costs, lessening costly informational problems, promoting risk sharing, and alleviating underinvestment (Albertazzi et al., 2015; Alves & Pinto, 2016; Caselli & Gatti, 2017; DeMarzo, 2005; Fabozzi et al., 2012). Asset securitization dynamically intertwines lending, funding, and nonbank financial intermediation, involving a fixed asset pool and a true sale, leading to banks' capital relief (Boesel et al., 2018; Carbó-Valverde et al., 2017; Cetorelli & Peristiani, 2012). It encompasses collateralized bonds issuance, prioritizing their cash flows, and various forms of credit enhancement mechanisms (e.g., Fabozzi et al., 2012; Jobst, 2007; Leland, 2007).[4]

[4] The 'bankruptcy remoteness' attribute of securitization, associated with the cash flow generating assets

Due to the nonrecourse nature of asset securitization arrangements, they can be used as a substitute for loan loss provisioning for income smoothing, earnings and capital management, risk management, and signaling purposes (e.g., Kobayashi & Osano, 2012; Zhao, 2019). Covered bonds are a class of hybrid financial assets, sharing features of both securitized instruments and senior unsecured bonds. Similarly to securitization, in case of a bank's default, bond investors have the first claim on the ring-fenced pool of assets and all proceeds from their servicing, which provides a line of first recourse (Larsson, 2013; Markmann, 2018). In addition, the collateralized asset pool may not be utilized to settle any general claims before all bond investors' claims are satisfied. Differently from securitization, in covered bonds if the cover pool is not sufficient, investors may claim a second, *pari passu* recourse from the banks' assets. Additionally, banks must preserve the grade of assets' cover pool, and 'overcollateralization' level.

B. Banks' debt choice

Prior literature suggests that motivations for the issuance of asset securitization or covered bonds over straight bond instruments include the following: (*i*) diversifying liquidity and funding sources; (*ii*) improving interest rate risk management; and (*iii*) reducing the cost of borrowing (e.g., Boesel et al., 2018; Carbó-Valverde et al., 2017; Fabozzi et al., 2012; Gorton & Metrick, 2013; Markmann, 2018).

Larsson (2013), Almazan et al. (2015), and Farruggio and Uhde (2015) argue that securitization and covered bonds allow banks to raise funds and improve their liquidity position with a low-level of risk for their investors. Both bond instruments played a key role in providing liquidity and funding during adverse shocks in financial markets, namely as effective mechanisms for accessing the lending schemes of central banks. Findings by Carbó-Valverde et al. (2017) document that banks issue mortgage covered bonds in tandem with mortgage-backed securities to address liquidity requirements.

As posited in Boesel et al. (2018), European banks have originated structured debt instruments for funding/liquidity motives when covered bonds issuance was not an option. Furthermore, banks can also use securitization and covered bonds for risk management purposes. For example, for asset/liability management. Under this framework, we should expect banks with higher liquidity risk to rely relatively more on structured finance bonds, namely covered bonds (Cardone-Riportella et al., 2010; Cross, 2008; Markmann, 2018). Additionally, banks endowed with high-quality asset portfolios may use securitization to minimize funding costs (Caselli & Gatti, 2017; Fabozzi et al., 2012; Pinto & Santos, 2020). SPVs get higher tranche ratings than originators' bond ratings because of asset pools' credit risk and enhancement mechanisms (e.g., Ayotte & Gaon, 2011; Gorton & Souleles, 2007). Thus, we should expect that banks that are more financially constrained are more likely to use securitization.

Almazan et al. (2015) find that securitization reduces asymmetric informational problems in the markets for small and medium banks. Thus, banks with costlier alternative sources of funding present a more intense use of securitization. Marques and Pinto (2020) find that ABS, MBS, and CDO transactions have lower weighted average

segregation from originators, is not present in either straight or covered bonds (e.g., Ayotte and Gaon, 2011).

spreads than comparable corporate bond deals. Additionally, covered bond issuances: (*i*) are a relatively conservative risk-return funding source, lower-cost compared to senior unsecured bonds (e.g., Boesel et al., 2018; Markmann, 2018); (*ii*) are associated with lower default and liquidity risk, due to the dual-recourse mechanism and 'overcolateralization' (Larsson, 2013); (*iii*) are typically collateralized by high quality loans, providing a potential smoothing outcushion in fluctuational market states; (*iv*) mitigate moral hazard problems created by the originate-to-distribute model behind securitization (Benmelech & Dlugosz, 2009; Michalak & Uhde, 2012); and (*v*) inhibit credit risk transfers, limiting the benefits of occasional market misvaluation opportunities, therefore preventing banks from engaging in regulatory capital arbitrage. Thus, we should expect that banks use structured finance bonds to reduce borrowing costs when compared with straight bonds and that, as a first option, banks prefer covered bonds to securitization.

Several authors (e.g., Casu et al., 2013; Jobst, 2005) argue that securitization consists of one of the main instruments available to banks to transfer credit risk and fund risky financial assets to minimize financial distress cost. DeMarzo (2005), Cardone-Riportella et al. (2010) and Affinito and Tagliaferri (2010) point out that banks use securitization to increase performace; i.e., to obtain new profit opportunities, by recognizing accounting gains when the market value of loans exceeds book value. Thus, banks exposed to higher credit risk would choose securitization rather than covered or straight bond issuance. From a different perspective, only banks with a high asset quality and a good reputation might be able to engage in securitization, without incurring a considerable discount on their face value (Ambrose et al., 2005; An et al., 2011). Additionally, banks usually retain the first loss tranche on their balance sheet (DeMarzo, 2005).[5] Under an asymmetric information framework, we could expect that banks with lower NPL ratios will engage more in securitization.

Prior research provides evidence suggesting that asset securitization allows originators to benefit from regulatory capital arbitrage (e.g., Acharya et al., 2014; Affinito & Tagliaferri, 2010; Minton et al., 2009); i.e., banks can adjust their capital ratios by engaging in securitization. Although Basel II and III regulatory frameworks addressed some of Basel I's drawbacks, its regulatory capital charge computation procedure still seems to provide some leeway for capital arbitrage (Curcio & Hasan, 2015; Karaoglu, 2005). According to Almazan et al. (2015), securitization offers banks the possibility of adjusting their capital structures. Under this framework, we expect that banks with higher leverage/lower capital ratios will prefer securitization over on-balance-sheet bond issuance. Finally, characteristics at the bank-level, such as type and size, are determinants of asset securitization decision-making (e.g., Uzun & Webb, 2007). The 'originate-to-distribute model' prompted a non-negligible originator-loan ultimate holder

[5] According to Farruggio and Uhde (2015), banks with a relatively high portion of risky assets should be more prone to securitize to decrease their risk exposure, while originating banks with higher portfolio quality are expected to realize a higher credit risk transfer as risk retention is comparatively low (see, also, Calomiris and Mason, 2004). Empirically, extant studies have found support for both positive (Affinito and Tagliaferri, 2010) and negative (Farruggio and Uhde, 2015) relationships between assets' credit risk and the likelihood of observing securitization.

incentive problem of the potential misalignment over credit screening (Brunnermeier, 2009; Demyanyk & Van Hemert, 2011; Purnanandam, 2011).

Despite the benefits of covered bonds compared to securitized instruments, there are concerns that with a high level of assets pledged to investors, this may contribute to banking markets becoming more unstable in tumultuous states of the world (Carbó-Valverde et al., 2017; Schwarcz, 2010).[6]

C. Banks' capital structure

Under an ideal economy of complete, perfect, and frictionless markets, the mix of external financial claims issued by a bank would be irrelevant, as both individuals and firms would be able to create their own homemade leverage (Modigliani & Miller, 1958). Therefore, banks' capital structure choices would be indifferent, and banks would exhibit random capital ratios (e.g., Greenbaum et al., 2019).[7]

Without the presence of regulatory jurisdiction, recent theoretical work has shown the optimality of banks' capital structure. In this framework, and under separation of residual claims and control rights, banks' capital structure choices are prone, among others, to costly principal-agent conflicts of interest and informational problems (e.g., Allen et al., 2015; Mehran & Thakor, 2011). However, in the presence of bank capital regulatory discipline, institutional distortions associated with unfairly priced deposit insurance, the too-big-to-fail regime, and the lender of last resort mechanism, create incentives for excessive risk-taking, when depositors have little, or no incentive to monitor the bank (e.g., Biswas & Koufopoulos, 2022; Mishkin, 1999).

Empirical literature has documented that debt- and non-debt tax shields, agency conflicts of interest, information signaling of capital structure choices, managerial incentives, and the strategic behavior on banking markets, are among the more significant internal determinants of banks' capital structure decision-making (e.g., Gropp & Heider, 2010; Hoque & Pour, 2018; Schepens, 2016).[8]

According to Crouhy and Galai (2018) and Greenbaum et al. (2016), banks' capital ratios seem to cluster around target leverage ratios which are, on average, above the ones of non-banking firms (e.g., Crouhy and Galai, 2018; Greenbaum et al., 2016). Since their exposure to capital adequacy supervisory and regulatory discipline in the early 1990s, banks have experienced a significant capital buildup. The evidence documents that since then, banks hold capital ratios in excess of the regulatory minima, suggesting that capital regulation may be a second-order determinant of banking capital structure choice (e.g., Berger et al., 2008; Brewer III et al., 2008; Flannery & Rangan, 2008; Gropp & Heider, 2010; Harding et al., 2013; Santos, 2022). More recently, the regulatory response to banks' funding stresses during the 2008 financial crisis led to toughener banking

[6] Covered bonds mitigate problems associated with moral hazard and informational asymmetry between the banks and investors because issuing banks must keep any underlying cover pool collateral on their balance sheet.

[7] The literature on the determinants of banks' capital structure is relatively scant. Among the exceptions, we include Brewer III et al. (2008), Flannery and Rangan (2008), Gropp and Heider (2010), Demirgüç-Kunt et al. (2013), Greenbaum et al. (2016), Birn et al. (2020), Anginer et al. (2020), Santos (2022).

[8] For further developments see Harker and Zenios (2000), Peura and Keppo (2006), and Demirgüç-Kunt et al. (2013).

regulatory and supervisory frameworks, including on binding leverage ratios and capital requirements, aiming at strengthening stability in banking markets (Acharya & Thakor, 2016; Biswas & Koufopoulos, 2022; DeYoung et al., 2018; Vazquez & Federico, 2015).

A branch of the literature relates debt financing choices to capital structure. Llorens and Lorens and Martin-Oliver (2017) suggest that structured finance innovations have made it possible to disentangle banks' lending and deposit-taking functions and have expanded the array of their financing options. Under capital adequacy regulation, the issuance level and the type of security to issue for capital structure management purposes should, concurrently, be congruent to the bank's private target capital ratio, and comply with its current target regulatory capital ratio.

Given their intrinsic design features, structured bond securities can, for example, be usefully used: (i) by financially constrained banks to lower funding costs (e.g., Almazan et al., 2015); (ii) by liquidity stressed banks, with a relatively higher cost of debt funding (or credit risk) to raise funding, and mitigate informational problems associated with the direct sale of loans or pools of loans (e.g., DeMarzo, 2005), and (iii) banks suffering severe adverse selection problems would choose both securitization and covered bonds over straight bonds to cover their liquidity constraints (Llorens & Martin-Oliver, 2017).

III. Methods

A. Sample selection

We extract bonds issued by European banks in the 2000-2017 period from DCM Analytics. Our sample starts in 2000 because it was only in the late 90s that regulations allowing securitization were implemented across the board in all European countries. We include only bonds with a deal-type code of "corporate bond investment-grade", "corporate bond high-yield", "asset-backed security", "mortgage-backed security" and "covered bond". We also require that securities are issued by European Economic Area plus Switzerland banks and that the tranche size (in € million) is available. As the unit of observation is a single tranche, multiple tranches from the same transaction, namely for asset securitization deals, appear as separate observations. Therefore, to perform a deal-level analysis, we aggregate tranche-level data for the following variables: credit spread, maturity and rating.

Since we want to control for the bank's cost of borrowing when examining both debt choices and capital ratio determinants, we select bonds with credit spread information and follow the methodology of Marques and Pinto (2020). To maximize the survival rate, we search in Datastream for yield to maturity information for those bonds with missing values. As DCM Analytics and Datastream do not have a common identification code, we hand-match borrowers' names. Finally, data for transaction size, maturity, and credit spread was winsorized at the 1% and the 99% levels.

These screens yield a full sample of 25,510 bond deals (31,959 tranches) worth €9,148.6 billion, of which 2,153 deals (8,165 tranches) worth €2,135.9 billion are classified as securitization bonds, 14,144 deals (14,251 tranches) worth €3,221.3 billion are classified as covered bonds, 9,213 deals (9,543 tranches) worth €3,791.3 billion as straight bonds. Panel A of Table 1 presents the geographic distribution of the full sample of deals, revealing striking

dissimilarities between banks' bond issuance. Panel A shows that securitization bond deals are concentrated in five countries (the U.K., Spain, the Netherlands, Italy, and Germany account for 87.9% of total value), with the U.K. accounting for more than one quarter of the entire market. Regarding covered bonds, Germany, Spain, and France represent 46.8%, 14.7%, and 13.0% of the total value, respectively. Straight bonds reveal a less concentrated country pattern, with the U.K. (18.5%), France (15.4%), Germany (15.0%), Italy (14.1%), Spain (13.9%), and the Netherlands (11.1%) receiving the highest shares of all issuance. Panel B provides information in relation to identifying the biggest players and their relative importance in the three bond markets. This panel shows that the top ten securitizing banks contributed to a weight of 39.2% in all securitization bonds issuance by volume, while the top ten banks issuing covered and straight bonds contributed to a weight of 52.9% and 31.1%, respectively. It is interesting to note that two banks (Lloyds Banking Group plc and BBVA, S.A.) are in the top ten for all securities, and that the Rheinische Hypothekenbank AG, a German mortgage bank, accounts for 18.5% of all covered bonds issuance by volume. Regarding covered bonds, 28.8% of the total volume issued concerns German banks, which is linked to the fact that covered bonds originate in this country (such as German Pfandbriefe). Finally, three banks are in the top ten for both securitization and covered bond deals (Lloyds Banking Group plc, BBVA, S.A. and La Caixa).

To examine the determinants of European banks' capital ratios, we link bond choice to firm attributes.

Table 1: Geographic distribution and top originating/issuing banks.

Note: Panel A details the deal allocation to originating/issuing banks in a particular country, whereas Panel B provides information on the biggest players and their relative importance in securitization, covered, and straight bond markets. Data are for deals reported in DCM Analytics with deal amount and weighted average spread available, closed by European banks during the 2000-2017 period.

Panel A: Geographic distribution

Geographic location of originator/ issuer	Securitization bonds			Covered bonds			Straight bonds		
	Number of deals	Total value [€ Million]	Percent of total value	Number of deals	Total value [€ Million]	Percent of total value	Number of deals	Total value [€ Million]	Percent of total value
Austria	13	3,109	0.15	234	35,770	1.11	922	112,426	2.97
Belgium	34	43,620	2.04	884	165,014	5.12	251	94,065	2.48
Denmark	-	-	-	7	7,000	0.22	13	4,125	0.11
Finland	6	10,249	0.48	39	20,175	0.63	66	25,797	0.68
France	132	66,736	3.12	927	420,040	13.04	1,064	583,475	15.39
Germany	271	154,656	7.24	10,280	1,507,331	46.79	2,117	569,222	15.01
Greece	33	40,337	1.89	4	3,250	0.10	119	51,319	1.35
Ireland	45	37,012	1.73	48	27,071	0.84	102	74,861	1.97
Italy	336	277,231	12.98	686	218,961	6.80	1,515	535,375	14.12
Netherlands	225	371,636	17.40	106	58,303	1.81	779	421,625	11.12
Portugal	68	56,275	2.63	32	25,280	0.78	271	64,478	1.70
Spain	439	476,666	22.32	469	471,826	14.65	890	526,787	13.89
Sweden	-	-	-	206	49,920	1.55	7	1,980	0.05
Switzerland	-	-	-	2	1,284	0.04	24	25,713	0.68
United Kingdom	551	598,419	28.02	220	210,052	6.52	1,073	700,096	18.47
Total	**2,153**	**2,135,947**	**100.00**	**14,144**	**3,221,277**	**100.00**	**9,213**	**3,791,344**	**100.00**

Panel B: Top originators/issuers

Securitization bonds			Covered bonds			Straight bonds		
	By value of deals	By number of deals		By value of deals	By number of deals		By value of deals	By number of deals
Lloyds Banking Group plc	11.87%	3.77%	Rheinische Hypothekenbank AG	18.46%	27.60%	Banco Santander, S.A.	7.01%	3.83%
Banco Santander, S.A.	11.58%	8.36%	Banco Español de Crédito, S.A.	6.61%	1.91%	Lloyds Banking Group plc	6.06%	3.36%
Royal Bank of Scotland plc	7.14%	4.31%	Compagnie de Financement Foncier	4.81%	3.53%	HSBC Holdings plc	4.75%	2.65%
BBVA, S.A.	6.13%	4.85%	BBVA, S.A.	4.40%	1.21%	ABN AMRO NV	4.21%	1.84%
La Caixa	5.11%	4.18%	Bremer Landesbank Kreditanstalt Oldenburg	4.13%	8.26%	Deutsche Bank AG	4.12%	2.85%
ABN AMRO NV	4.47%	1.48%	HypoVereinsbank AG	3.68%	3.93%	Rabobank	3.87%	3.88%
Barclays plc	4.28%	3.77%	Vseobecna Uverova Banka AS	2.84%	0.37%	Société Générale, S.A.	3.66%	2.04%
ING Groep NV	4.07%	1.35%	La Caixa	2.80%	0.78%	HypoVereinsbank AG	3.52%	5.01%
Banco de Sabadell, S.A.	3.60%	4.99%	Lloyds Banking Group plc	2.74%	0.82%	Intesa Sanpaolo SpA	3.50%	3.12%
UniCredit SpA	2.31%	2.16%	WestLB AG	2.61%	4.45%	BBVA, S.A.	3.37%	2.55%

Accounting and market data is drawn from Bankscope database. As DCM Analystics does not provide an identification code, we link Bankscope information to DCM Analytics bond information by hand-matching issuer names for covered and straight bonds, and issuer-parent names for securitization bonds.[9] Finally, macroeconomic data, such as sovereign bond yields, market volatility, and the Euro swap curve slope is obtained from Datastream.

B. Variables

Table 2 provides the definitions and sources for all the variables used.

Table 2: Definition of variables and sources.

Variable name	Variable definition	Source
Contractual characteristics		
Spread	Margin yielded by the security at issue above a corresponding currency treasury benchmark with a comparable maturity (OAS). Floating rate bonds were converted to fixed rates using fixed-for-floating rate swaps.	DCM Analytics and Datastream
WAS	Weighted average spread, calculated as the sum of the product of the weight of each tranche in the transaction size and the tranche's credit spread.	Authors
Rating	Bond rating based on the S&P and Moody's rating at the time of bond issuance. The rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=22.	DCM Analytics
WAR	Weighted average rating, calculated as the sum of the product of the weight of each tranche in the transaction size and the tranche's rating.	Authors
Maturity	Maturity of bonds, in years.	DCM Analytics

[9] Considering that in securitization the borrower is an SPV settled up to take on the initiative, we assigned securitization bond deals with originators ('Issuer Parent'). This approach ensures that the deals are matched with the ultimate party responsible for the financing decision.

WAM	Weighted average maturity, calculated as the sum of the product of the weight of each tranche in the transaction size and the tranche's maturity.	Authors
Deal size	Bond transaction size. Transaction size is converted into Euro millions when necessary.	DCM Analytics
Number of tranches	The number of tranches per transaction.	DCM Analytics
Number of banks	The number of financial institutions participating in bond issuance, as bookrunners, underwriters or servicers.	DCM Analytics
Macroeconomic factors		
Volatility	The Chicago Board Options Exchange Volatility Index (VIX). VIX reflects a market estimate of future volatility.	Datastream
EUSA5y-Libor3M	The slope of the Euro swap curve. Obtained as the difference between the five-year Euro swap rate and the 3-month Libor rate.	Datastream
Crisis	Dummy equal to 1 if the issue date belongs to the 2008 financial crisis and the subsequent sovereign debt crisis periods (from September 15, 2008 - Lehman Brothers' bankruptcy filing date - through to December 31, 2017), and 0 otherwise.	Authors
CBPP1	Dummy equal to 1 if the bond was issued during the first Covered Bond Purchase Program (from May 7, 2009, through to June 30, 2010), and 0 otherwise.	ECB
CBPP2	Dummy equal to 1 if the bond was issued during the second Covered Bond Purchase Program (from October 6, 2011, through to October 31, 2012), and 0 otherwise.	ECB
CBPP3/ABSPP	Dummy equal to 1 if the bond was issued during the third Covered Bond Purchase Program or the first ABS Purchase Program (from September 4, 2014, through to December 31, 2017), and 0 otherwise.	ECB
Sovereign risk	10-year sovereign bond yield of the country where the bank issuer (straight and covered bonds) or the bank originator (securitization bonds) is located.	Datastream
Risk free rate	The yield of the 10-year German bunds - a proxy for the general level of interest rates.	Datastream
Banks' characteristics		
Switcher	Banks that issue multiple bond types - securitization, covered and straight bonds - within the sampling period.	Authors
Total assets	Banks' total assets measured in Euro million.	Bankscope
Loan ratio	The ratio of net loans to total assets.	Bankscope
Loans to deposits & ST funding	The ratio of net loans to deposits and short-term funding.	Bankscope
Capital ratio	The ratio of total equity to total assets.	Bankscope
Capital adequacy ratio	Tier 1 + Tier 2 capital, which includes subordinated debt, hybrid capital, loan loss reserves and valuation reserves, as a percentage of risk-weighted assets and off-balance sheet risks.	Bankscope
Return on assets	The net income divided by total assets.	Bankscope
Return on equity	The net income divided by total equity.	Bankscope
Cost-to-income ratio	The ratio of the overheads or cost of running the bank (mostly salaries) to income generated before provisions.	Bankscope
Non-performing loans ratio	The ratio of total non-performing (or doubtful) loans to gross loans.	Bankscope
Z-score	Ratio of the sum of equity capital to total assets and the return on average assets before taxes (ROAA) to the standard deviation of ROAA per year. The standard deviation of ROAA is calculated employing a three-year rolling window.	Bankscope

C. Deal-level contractual variables

Following the line established in earlier studies on the choice between structured finance and straight debt financing for nonfinancial firms (Lemmon et al., 2014; Pinto & Santos, 2020),

securitization and bank performance (Casu et al., 2013), and the use of covered bonds (Carbó-Valverde et al., 2017), we consider the following deal-level contractual characteristics: (*i*) weighted average spread (WAS); (*ii*) weighted average maturity (WAM); (*iii*) weighted average rating (WAR); (*iv*) the logarithm of transaction size; (*v*) number of tranches; and (*vi*) number of banks.

We thus use the WAS as a measure of banks' cost of borrowing. The credit spread is the option adjusted spread (OAS), computed as the difference between the yield of a bond at issue and the yield of a corresponding currency treasury benchmark with a comparable maturity. Considering that covered bonds and straight bonds typically have fixed-rate coupons, while securitization bonds predominantly have floating-rate coupons (see section 4.1), it is essential to account for the fact that fixed-rate bonds carry interest rate risk, whereas floating-rate bonds do not. Following Marques and Pinto (2020), we converted floating-rate bonds to fixed rates using fixed-for-floating rate swaps to ensure comparability of credit spreads at issuance.[10] If structured finance transactions facilitate lower borrowing costs relative to traditional bonds, we expect the WAS to increase the likelihood of observing securitization and covered bonds over straight bonds (DeMarzo, 2005). Concerning the impact of the cost of borrowing on banks' capital structure, and following the insights of the trade-off theory, we expect that securitization will be used more intensively by banks for which access to other financing sources is particularly costly (Almazan et al., 2015).

Securitization and covered bonds are asset-backed claims, structured as extensive and detailed networks of contracts, enhancing the previsibility of expected cash flow streams and, consequently, allowing banks to raise funding with longer maturities. In addition, securitization and covered bonds' maturities match the maturity profile of the assets given as collateral. Therefore, we expect that a bank seeking longer-term funding will choose securitization and covered bonds over straight bonds.

Structured finance bonds enable originating/issuing banks to reduce their borrowing costs because most of the bonds issued by SPVs in securitization or directly by banks in covered bonds have a higher rating than traditional bonds (Roever & Fabozzi, 2003; Rosenthal & Ocampo, 1988). These types of instruments are usually designed - namely in terms of asset pool and credit enhancement mechanisms - to achieve segregation of the pool of assets or cash flows, from the bank originator/issuer. We thus expect to find a positive relationship between WAR and the likelihood of observing securitization and covered bonds over straight bonds.

Finally, Duffie and Rahi (1995) and DeMarzo (2005) argue that originators structure securitization transactions with various classes of securities to align with investors' risk-reward profiles. Their risk profiles vary based on the priority of cash flow claims and the presence of credit enhancement mechanisms. We, thus, expect that both the number of tranches and number of banks increase the likelihood of observing securitization over covered and straight bonds.

[10] This conversion was implemented for each tranche, using the appropriate swap quote that matched the bond's maturity on the issuance date. Daily swap curve data for maturities ranging from 3 months to 50 years, as well as the 12 interest rate market benchmarks (EUR Libor, USD Libor, and GBP Libor, with 1M, 3M, 6M, and 12M reference rates) were sourced from Datastream.

D. Originating/issuing banks' characteristics

Consistent with other studies on banks' funding choices (Boesel et al., 2018; Carbó-Valverde et al., 2017; Farruggio & Uhde, 2015), we include variables that measure banks' liquidity, credit risk, profitability, regulatory capital, size and type. We proxy for liquidity using *loans to deposits and short-term funding,* which reflects what portion of the loan portfolio is funded through potentially short-term liabilities. A higher ratio indicates greater liquidity risk. We expect less liquid banks to choose securitization and covered bonds over straight bonds (Cardone-Riportella et al., 2010; Casu et al., 2013).

The *non-performing loan* ratio indicates the portion of the loan portfolio that is non-performing. Lower ratios signify better asset quality. Since this ratio reflects a bank's risk profile, it can provide insights into whether European banks transfer credit risk through securitization. If this is the case, we would expect banks with lower asset quality to engage in more securitization (Affinito & Tagliaferri, 2010). We also use the z-score as a proxy for banks' credit risk and expect that banks with lower creditworthiness to engage more in structured finance (e.g., Chiaramonte et al., 2015). Concerning extant literature on banks' capital structure, Gropp and Heider (2010) find, in line with both corporate finance structure arguments and the regulatory view, a positive impact of risk on capital ratios.

The capital arbitrage hypothesis posits that banks engage in securitization to adjust their regulatory capital ratios. Accordingly, a firm with less capital has a greater incentive to securitize. To test this prediction, we employ two variables: the *capital ratio* that is defined as total book equity divided by total book assets, measuring the loss-absorbing capacity of a bank's equity buffer; and the *capital adequacy ratio* that is defined as Tier 1 plus Tier 2 capital divided by risk-weighted assets. This ratio stems from Basel II guidelines; it isolates the strongest sources of capital and adjusts the asset base for risk characteristics. We use two proxies for bank performance to determine whether economic performance affects a bank's propensity to engage in securitization and covered bonds over straight bonds. Despite a higher *return on assets* ratio indicates better economic performance, it also reflects bank risk-taking (Altunbas et al., 2022; Angeloni et al., 2015). The *cost-to-income* ratio is used as a surrogate of bank's operating efficiency. Previous empirical studies (Affinito & Tagliaferri, 2010; Cardone-Riportella et al., 2010) have shown that banks securitize to enhance economic performance. If this holds true, we would expect banks with lower economic performance to engage in more securitization. Profitability also influences a banking organization's target capital ratio. Gropp and Heider (2010) find that more profitable banking organizations tend to have more capital relative to assets, which is consistent with the prediction of the pecking-order-theory.

We also include the borrowing bank's general attributes. First, we proxy for a bank's size using the natural logarithm of its total assets (*log total assets*). We expect the probability of choosing structured finance securities over traditional bank bonds to increase with bank size (Almazan et al., 2015). However, under the pecking order framework, we expect that smaller banks, those facing higher asymmetric information problems, would use relatively more structured finance (Michalak & Uhde, 2012). We also expect that larger banks have lower capital ratios Gropp and Heider (2010). Larger

banking organizations typically have better-diversified asset portfolios and may also be viewed as more likely to be "too-big-to-fail" and thus require less private capital to remain in operation. Second, as a robustness check, we incorporate the loan ratio to evaluate whether asset composition influences the decision to securitize. Minton et al. (2004) contend that commercial banks are less inclined to securitize compared to investment banks. However, Casu et al. (2013) discover that the loan ratio does not impact banks' likelihood of engaging in securitization. Finally, we use the dummy *switchers* to identify banks that use the three types of bond instruments within our sample period. We anticipate that switchers are more likely to encounter lower transaction costs when accessing financial markets, making them more inclined to participate in structured finance deals. For instance, a bank with prior access to the bond market can leverage new financing channels without significant investment in market recognition and with reduced transaction costs. As in Farruggio and Uhde (2015) and Boesel et al. (2018), bank variables are lagged by one period to avoid potential problems of endogeneity.

E. Macroeconomic factors

Since securitization and covered bonds are backed by loans to public sector entities and mortgages, it is highly probable that investors' risk assessment depends on macroeconomic factors (Beirne et al., 2011; Gürtler & Neelmeier, 2018; Prokopczuk & Vonhoff, 2012). Cook and Tang (2010) demonstrate that macroeconomic states determine nonfinancial firms' adjustment speed to target leverage levels. Therefore, we include the yield curve slope and market volatility to control for these factors.

To analyze the impact of the supply-side conditions of the corporate debt market on debt choices, we introduce dummies for the ECB's asset purchase programmes and for the crises (the 2008 financial crisis and the subsequent sovereign debt crisis). The European market for covered bonds and securitization experienced significant growth due to the ECB's extraordinary actions, which included two CBPPs in 2009 and 2011 (CBPP1 and CBPP2), and more recently, CBPP3 and ABSPP in 2014. The CBPP1, announced on May 7, 2009, involved outright purchases of covered bonds by the Eurosystem totaling €60 billion from July 6, 2009, to the end of June 2010. On October 6, 2011, the ECB announced CBPP2 amounting to €40 billion in favor of euro-denominated covered bonds. CBPP3 and ABSPP were announced on September 4, 2014, with an initial unspecified amount, later defined as €10 billion per month. To assess the impact of these asset purchase programs on credit spreads, we employ three dummy variables: CBPP1, CBPP2, and CBPP3/ABSPP. We expect these programs to increase the likelihood of banks utilizing each bond instrument.

There is widespread agreement that securitization played a pivotal role in the development and propagation of the 2007-2008 financial crisis (e.g., Brunnermeier, 2009; Benmelech and Dlugosz, 2009; Michalak and Uhde, 2012). Additionally, we demonstrate a substitution effect between securitization and covered bonds in the aftermath of the financial crisis (see Figure 1). Thus, we anticipate that bank bonds issued during the crisis are more likely to be structured as covered and straight bonds. A key difference between securitization and covered bonds is that the latter is subjected to national legislation that defines the asset eligibility, national supervisors are required to monitor the collateral's

quality, and specify which banks are allowed to issue. In addition, Farruggio and Uhde (2015) show that the decision to securitize is a composite decision based on bank-specific as well as country-specific determinants. We thus control for country fixed effects.

IV. Banks' choice between structured finance and straight bond deals

A. Univariate analysis: bond deals and banks' characteristics

Table 3 describes the sample of bond deals. This section represents the most comprehensive comparison of its kind in the literature. Almost all the pair-wise comparisons indicate statistically significant differences between securitization vs covered bond deals, securitization vs straight bond deals, and covered vs straight bond deals.

Table 3: Descriptive statistics for bond deals.

Note: This table reports summary statistics for a sample of securitization, covered, and straight bond deals, closed by European banks during the 2000-2017 period. We test for similar distributions in contractual characteristics using the Wilcoxon rank-sum test for continuous variables and Fisher's exact test for discrete ones. [a] indicates significant difference at the 1% level between securitization and covered bond deals. [b] indicates significant difference at the 1% level between securitization and straight bond deals. [c] indicates significant difference at the 1% level between covered and straight bond deals. For a definition of the variables, see Table 2.

Variable of interest	Securitization bonds		Covered bonds		Straight bonds		Variable of interest	Securitization bonds		Covered bonds		Straight bonds	
Univariate analysis - continuous variables													
WAS (bps)							**Number of tranches**						
Number	742		5,642		4,073		Number	742		5,642		4,073	
Mean	71.4	b	59.8	c	155.8	b,c	Mean	4.1	a,b	1.5	a,c	1.0	b,c
Median	49.7		49.3		122.2		Median	4		1		1	
Deal size (€ Million)							**Number of banks**						
Number	742		5,642		4,073		Number	742		5,642		4,073	
Mean	1,481.7	a,b	268.0	a,c	473.7	b,c	Mean	2.1	a,b	2.1	a,c	3.2	b,c
Median	762.9		60.0		179.8		Median	2		1		2	
WAR [1-22 weak]							**Number of bookrunners**						
Number	742		5,642		4,073		Number	742		5,642		4,073	
Mean	2.0	a,b	1.4	a,c	4.9	b,c	Mean	1.5	a,b	1.7	a,c	1.8	b,c
Median	1.5		1		5		Median	1		1		1	
WAM (years)							**Sovereign risk (bps)**						
Number	742		5,642		4,073		Number	742		5,642		4,073	
Mean	29.8	a,b	5.7	a,c	5.2	b,c	Mean	388.4	a,b	346.5	a,c	322.9	b,c
Median	32.2		5.0		5.0		Median	410.9		352.3		337.8	
Univariate analysis - dummy variables													
Crisis period							**U.K. borrowers**						
Nr. of tranches	742		5,642		4,073		Nr. of tranches	742		5,642		4,073	
Nr. of tranches with d=1	333	a,b	3,192	a,c	3,116	b,c	Nr. of tranches with d=1	221	a,b	191	a,c	551	b,c
% of total	44.9%		56.6%		76.5%		% of total	29.8%		3.4%		13.5%	
Asset purchase programs							**Basel II & III**						
Nr. of tranches	742		5,642		4,073		Nr. of tranches	742		5,642		4,073	
Nr. of tranches with d=1	156	a,b	1,805	a,c	1,734	b,c	Nr. of tranches with d=1	515	b	4,145	c	3,666	b,c
% of total	21.0%		32.0%		42.6%		% of total	69.4%		73.5%		90.0%	
Market-based							**Mortgage**						
Nr. of tranches	742		5,642		4,073		Nr. of tranches	742		5,642		-	
Nr. of tranches with d=1	290	a,b	340	a,c	889	b,c	Nr. of tranches with d=1	436		3,190		-	
% of total	39.1%		6.0%		21.8%		% of total	58.8%		56.5%		-	

Regarding the cost of borrowing, Table 3 shows that the WAS is, on average, economically and statistically higher for straight bond deals (155.8 bps) than they are for covered bond deals (59.8 bps) and for securitization bond deals (71.4 bps). On the contrary, securitization and covered bond WAS do not differ significantly. This can reflect differences in WAR: mean of 1.4 (AAA) for covered bond deals, 20 (AA+) for securitization bond deals, and 4.9 (A+) for straight bond deals. A securitization deal of an average size typically matures over 29.8 years, a considerably longer period compared to the average 5.7 years for covered bonds. This can be explained by the fact that, unlike covered bonds, ABS and MBS have a pass-through nature, resulting in maturity virtually mirroring that of the underlying pool of assets. The observed level of participation from banks in the issuing syndicate offers indirect evidence that straight bond deals may be perceived as relatively riskier than securitization and covered bond deals.

As expected, namely due to higher economies of scale in relation to issuance costs, the average deal size exhibited by securitization bonds is higher than the average deal size exhibited by straight and covered transactions. The larger number of tranches per transaction in securitization *vis-à-vis* covered and straight bonds reflects the structuring and tranching nature of such deals. In a typical securitization deal, the average number of tranches per transaction is 4.1, which is larger than the average of 1.5 for covered bonds and 1.0 for straight bonds. The discrete variables specified in Table 3 provide clear evidence that securitization, covered, and straight bonds are fundamentally distinct financial instruments.

After applying the screens presented in section 3.1., hand-matching banks involved in the deals with Bankscope's accounting and market data, and winsorizing banks' characteristics at the 1st and 99th percentiles, we identified 10,457 banks for which we have all the necessary data for the analysis. Of these firms, 742 were originators in securitization deals, 5,642 issuers in covered bond deals, and 4,073 issuers in straight bond deals. Table 4 reports the deal's WAS and the banks' characteristics into seven categories according to their borrowing record in our sample period. Of these banks, 40 were originators of securitization bonds only, 8 were issuers of covered bonds only, 80 were issuers of straight bonds only, and 9,447 were classified as switchers, the latter representing 90.1% of all banks.

We find that the average WAS for switchers is lower than that for banks that close securitization or straight bond deals only. This is consistent with the hypothesis that banks use structured finance deals to manage their cost of borrowing. Results presented in Table 4 also show that banks that use securitization have, on average, a higher proportion of loans to total assets than covered bond issuers have. Also, the mean percentage of liquid assets to deposits and short-term funding for banks that use securitization is significantly higher than for covered bond users, which seems to indicate that banks that engage in covered bonds *vis-à-vis* securitization present lower liquidity. Banks using securitization have on average, higher capital ratios and profitability than those using covered bonds. Finally, the non-performing loan ratio is lower for all banks that utilize securitization compared to those using covered bonds.

Table 4: Financial firms categorized according to choice of bond issuance.

Note: Our sample includes 10,457 deals, of which 742 are securitization deals, 5,642 are covered bond deals, and 4,073 are straight bond deals. 40 deals were closed by banks that originated securitization bonds only; 8 deals were closed by banks that issued covered bonds only; 80 deals were closed by banks that issued straight bonds only; and the switchers originated/issued 9,447 deals. [a] indicates significant difference at the 1% level between banks that originated securitization bond deals versus covered bond deals. [b] indicates significant difference at the 1% level between banks that originated securitization bond deals versus straight bond deals. [c] indicates significant difference at the 1% level between banks that issued covered bond deals versus straight bond deals. For a definition of the variables, see Table 2.

Variable of interest		All originators/issuers			Originators/issuers of			Switchers
		Securitization bonds	Covered bonds	Straight bonds	Securitization bonds only	Covered bonds only	Straight bonds only	All bond types
WAS_t (bps)	Mean	71.4 [b]	59.8 [c]	155.8 [b,c]	124.9	73.9	210.5	97.2
	Median	49.7	49.3	122.2	79.0	70.1	177.5	66.4
	Number	742	5,642	4,073	40	8	80	9,447
Total $assets_{t-1}$ (€ billion)	Mean	742,000.0 [b]	559,000.0 [c]	683,000.0 [b,c]	597,000.0	214,000.0	320,000.0	660,000.0
	Median	542,000.0	445,000.0	340,000.0	736,000.0	182,000.0	330,000.0	482,000.0
	Number	742	5,642	4,073	40	8	80	9,447
Loan $ratio_{t-1}$	Mean	54.5% [a,b]	42.7% [a,c]	50.7% [b,c]	40.1%	49.9%	57.4%	46.9%
	Median	58.9%	42.9%	52.0%	34.4%	40.5%	46.6%	47.2%
	Number	742	5,642	4,073	40	8	80	9,447
Loans to deposits & ST $funding_{t-1}$	Mean	93.9% [a]	89.1% [a,c]	98.8% [c]	61.4%	68.9%	110.6%	93.5%
	Median	92.2%	80.8%	92.7%	51.5%	72.1%	68.2%	89.3%
	Number	742	5,642	4,073	40	8	80	9,447
Capital $ratio_{t-1}$	Mean	6.0% [a,b]	3.4% [a,c]	5.1% [b,c]	8.2%	7.6%	8.7%	4.1%
	Median	5.6%	2.8%	4.9%	8.3%	7.7%	7.3%	3.4%
	Number	742	5,642	4,073	40	8	80	9,447
Capital adequacy $ratio_{t-1}$	Mean	12.8% [a,b]	12.6% [a,c]	14.1% [b,c]	12.9%	13.0%	15.2%	13.1%
	Median	12.1%	12.3%	13.5%	12.2%	12.5%	15.9%	12.5%
	Number	686	5,377	3,864	37	6	76	9,040
Return on $assets_{t-1}$	Mean	0.7% [a,b]	0.2% [a,c]	0.5% [b,c]	0.7%	0.3%	0.3%	0.3%
	Median	0.8%	0.2%	0.3%	0.7%	0.2%	0.8%	0.2%
	Number	742	5,642	4,073	40	8	80	9,447
Cost-to-income $ratio_{t-1}$	Mean	59.1% [a,b]	72.6% [a,c]	63.8% [b,c]	63.4%	54.4%	64.6%	67.8%
	Median	55.1%	70.0%	63.0%	65.2%	53.6%	56.7%	65.4%
	Number	742	5,642	4,073	40	8	80	9,447
Non-performing loan $ratio_{t-1}$	Mean	3.0% [a,b]	4.0% [a,c]	3.9% [b,c]	3.1%	7.7%	5.9%	3.9%
	Median	1.7%	3.6%	3.2%	0.9%	7.5%	2.3%	3.4%
	Number	742	5,642	4,073	40	8	80	9,447
Z-$score_{t-1}$	Mean	0.3 [b]	0.3 [c]	0.2 [b,c]	0.5	0.5	0.2	0.2
	Median	0.2	0.2	0.1	0.3	0.2	0.1	0.2
	Number	348	1,294	1,885	29	4	51	3,063

Comparing banks that used securitization versus straight bond deals, we show that banks that use securitization are larger and have on average, a higher proportion of loans to total assets than banks that choose straight bonds. While the capital ratio is higher for securitization bond originators, they have lower capital adequacy rations vis-à-vis straight bond issuers. Also, banks using securitization have on average, higher profitability and z-scores than those using straight bonds. On the contrary, both non-performing loans and cost-to-income ratios are lower for all banks that use securitization *vis-à-vis* straight bonds. These results remain consistent when comparing banks that exclusively originate securitization bonds with those that solely issue covered bonds.

Finally, banks' characteristics differ significantly for all variables used between banks that use covered versus straight bonds. Banks that use covered bonds are smaller and have on average, lower loans to total assets, loans to deposits and short-term funding, capital and capital adequacy, and return on assets ratios when compared with banks that use straight bonds. In addition, cost-to-income and non-performing loan ratios, as well as z-scores are higher for all banks that use covered bonds *vis-à-vis* straight bonds.

B. Binomial specifications

The main objective of our analysis is to research how European banks choose between structured finance (securitization and covered bonds) *vis-à-vis* straight bond deals, namely, how the banks' characteristics, contractual features, and the macroeconomic environment affect the choice between securitization and straight bond deals as well as between covered bond and straight bond deals. In this analysis, we estimate a logistic regression model. The dependent variable, choice of debt, is a binary variable equal to 1 if the originator/issuer chooses a structured finance deal and 0 if they, instead, choose a straight bond deal:

$$Choice\ of\ debt_{i,t} = \alpha_0 + \beta\ Bank\ characteristics_{i,t-1} + \gamma\ Contractual\ characteristics_{i,t} + \varphi\ Macroeconomic\ factors_t + \varepsilon_{i,t} \quad [1]$$

where the subscripts denote the deal *i* at time *t*. Models [1], [1a], and [1b] of Table 5 report the results of the logistic regression (1). Estimations were developed following a stepwise approach, focusing firstly, on the variables for which we have information for all the deals (1) and then substituting the proxies for the leverage level (model [1a]) and for credit risk (model [1b]).

Findings presented in Table 5 suggest that banks with lower capital ratios or capital adequacy ratios prefer structured finance bond deals over straight bond deals, which is in line with the idea that banks use structured finance to adjust capital ratios. As we expected, banks use structured finance to manage credit risk: both non-performing loan ratio and Z-score increase the likelihood of observing a structured finance bond deal *vis-à-vis* a straight bond deal. Banks choose structured finance deals when they are less profitable. This finding supports the idea that banks engage in securitization to enhance their economic performance. Additionally, banks that originate/issue the three bond deals in our sampling period, the switchers, prefer straight over structured finance bond deals.

Regarding contractual factors, we show, in line with extant literature, that banks use structured finance to reduce borrowing costs, as we show a significant and negative relationship between the WAS and the probability of observing a structured finance bond deal versus a straight one. Our findings also document that WAM increases the probability of a bank choosing a structured finance bond deal and are consistent with the prediction that by reducing the level of asymmetric information between lenders and borrowers, structured finance enables borrowers to raise funding with longer maturities (Flannery, 1986). Contracting structure and separate incorporation of securitization and the dual-recourse feature of covered bonds enhance lender's verifiability of cash flow realizations (Caselli & Gatti, 2017). Our results are in line with security design literature: originating banks design structured finance transactions with different classes of securities – tranching – to reduce market imperfections and to match investors' risk-reward profiles (DeMarzo, 2005).

Table 5: Determinants of banks' choice.

Note: This table presents results of logistic regressions, which predict banks' choice between structured finance bond deals and straight bond deals in models [1], [1a], and [1b]. The dependent variable equals 1 when a bank issues a securitization or a covered bond deal and 0 when it issues a straight bond deal. In models [2], [2a], and [2b] we use a multinomial specification, in which the discrete dependent variable takes the value 1 if the bank originates a securitization bond deal, 2 if the bank issues a covered bond deal, and 3 if the bank issues a straight bond deal. For each independent variable, the first row reports the estimated coefficient, and the second row reports the p-value. Coefficients were estimated based on heteroskedasticity-consistent standard errors clustered by year and bank. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. For a definition of the variables, see Table 2.

Dependent variable:	**Structured finance bond deal = 1, straight bond deal = 0**			**Securitization bond deal = 1, covered bond deal = 2, straight bond deal = 3**					
				Model [2]		**Model [2a]**		**Model [2b]**	
Choice of debt	**Model [1]**	**Model [1a]**	**Model [1b]**	Securitization bond deals	Covered bond deals	Securitization bond deals	Covered bond deals	Securitization bond deals	Covered bond deals
Independent variables:									
Intercept	-1.273	-0.110	-0.452	-10.632 ***	0.866	-6.941 **	1.803	-10.601 **	1.758
	(0.444)	(0.960)	(0.810)	(0.000)	(0.616)	(0.028)	(0.436)	(0.035)	(0.341)
Log total assets	0.027	0.007	-0.012	0.263 **	0.015	0.209 **	-0.008	0.120 **	0.008
	(0.712)	(0.936)	(0.875)	(0.031)	(0.846)	(0.015)	(0.932)	(0.057)	(0.923)
Loans to deposits & ST funding	-0.139	0.017	1.221 ***	-0.197	0.115 *	-0.006	0.013 *	-0.818	1.379 ***
	(0.427)	(0.950)	(0.000)	(0.579)	(0.053)	(0.989)	(0.096)	(0.327)	(0.000)
Capital ratio	-0.067 **		-0.122 **	0.260 ***	-0.111			0.337 **	-0.146 **
	(0.023)		(0.041)	(0.001)	(0.146)			(0.013)	(0.034)
Capital adequacy ratio		-0.078 **				-0.072 **	-0.074 **		
		(0.024)				(0.016)	(0.040)		
Return on assets	-0.518 **	-0.430 **	-0.656 **	-0.494 **	-0.560 **	-0.124 *	-0.516 **	-0.475 **	-0.746 **
	(0.017)	(0.036)	(0.037)	(0.030)	(0.017)	(0.060)	(0.019)	(0.022)	(0.029)
Non-performing loan ratio	0.127 ***	0.136 ***		0.034	0.135 ***	0.084 *	0.141 ***		
	(0.000)	(0.000)		(0.410)	(0.000)	(0.063)	(0.001)		
Z-score			0.862 ***					1.288 ***	0.853 ***
			(0.002)					(0.008)	(0.003)
Switcher	-0.724 ***	-0.843 ***	-1.237 ***	-2.085 ***	-0.568 **	-2.640 ***	-0.702 **	-1.774 **	-1.178 ***
	(0.003)	(0.005)	(0.003)	(0.000)	(0.032)	(0.000)	(0.031)	(0.028)	(0.009)
WAS	-0.009 ***	-0.008 ***	-0.011 ***	-0.002	-0.010 ***	-0.002	-0.010 ***	-0.011 ***	-0.012 ***
	(0.000)	(0.000)	(0.000)	(0.296)	(0.000)	(0.232)	(0.000)	(0.000)	(0.000)
WAM	0.103 ***	0.099 ***	0.106 ***	0.236 ***	0.085 ***	0.228 ***	0.082 ***	0.309 ***	0.087 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of tranches	0.911 ***	0.891 ***	1.014 ***	2.654 ***	-0.883 ***	2.649 ***	-0.806 ***	4.405 ***	-1.614 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.009)	(0.000)	(0.000)
Number of banks	-0.066 ***	-0.061 **	0.002	-0.618 ***	-0.046 *	-0.636 ***	-0.042 *	-0.802 ***	0.024
	(0.007)	(0.012)	(0.955)	(0.000)	(0.065)	(0.000)	(0.099)	(0.000)	(0.403)
Crisis	-1.004 ***	-0.786 **	-0.627 **	-2.586 ***	-0.887 ***	-2.292 ***	-0.716 *	-4.218 ***	-0.346
	(0.001)	(0.034)	(0.031)	(0.000)	(0.005)	(0.001)	(0.059)	(0.000)	(0.410)
Volatility	0.050 ***	0.040 ***	0.031 **	0.060 ***	0.049 ***	0.051 ***	0.041 ***	0.075 ***	0.029 *
	(0.000)	(0.000)	(0.048)	(0.000)	(0.000)	(0.005)	(0.000)	(0.002)	(0.066)
EUSA5y-Libor3M	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.013 **	0.001
	(0.507)	(0.655)	(0.683)	(0.717)	(0.609)	(0.729)	(0.735)	(0.043)	(0.930)
CBPP1	0.196	0.123	0.119	-0.028	0.172	0.005	0.115	-1.452 *	0.172
	(0.496)	(0.651)	(0.658)	(0.957)	(0.555)	(0.993)	(0.677)	(0.095)	(0.522)
CBPP2	0.089	0.099	0.373	-1.143	0.139	-0.835	0.165	-1.352	0.373
	(0.836)	(0.814)	(0.365)	(0.146)	(0.757)	(0.357)	(0.705)	(0.320)	(0.383)
CBPP3/ABSPP	-0.072	0.126	-0.146	-0.745	-0.050	-0.431	0.111	-0.030	-0.205
	(0.843)	(0.701)	(0.663)	(0.213)	(0.886)	(0.466)	(0.740)	(0.963)	(0.548)
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	10,457	9,927	3,527	10,457		9,927		3,527	
Correct predictions	78.11%	78.34%	77.13%	88.70%		88.81%		90.12%	
Pseudo-R^2	0.320	0.325	0.328	0.467		0.467		0.501	

As expected, we find a negative relationship between the dummy crisis and the probability of observing a structured finance deal. During the 2008 financial crisis the use of structured finance reduced significantly, particularly securitization, given the very important role these

transactions played in the emergence and spread of the crisis. We will analyze this impact in more detail in the next section, in which we analyze this effect by segmenting securitization from covered bond deals. Finally, there is a significant and positive relation between market volatility and the banks' choice of structured finance bond deals over straight bond deals.

C. Multinomial specification

The previous section examines the banks' choice between structured finance bond deals and straight bond deals. However, banks can choose among the three deal types. In addition, Figure 1 shows that there is a substitution effect between securitization and covered bonds and even between traditional bonds and covered bonds after 2008. In other words, the issuance of covered bonds increased significantly compared to the fall in the other two types of bonds. More recently, with the implementation of the ABSPP by the ECB in 2014, there has been a reduction in covered bonds against an increase in securitization. To scrutinize the data further, we use a multinomial specification in which the dependent variable choice of debt is equal to 1 if the bank originates a securitization deal, equal to 2 if the bank issues a covered bond deal, and equal to 3 if the bank issues a straight bond deal. Results presented in models [2], [2a], and [2b] of Table 5 are consistent with the findings reported for binominal logistic regressions, but now with richer information on the determinants of the choice between securitization and straight bond deals and between covered bond and straight bond deals.

Findings suggest that banks choose securitization *vis-à-vis* straight bond deals when they are larger and less profitable. Banks with lower leverage level, measured via their capital ratio prefer securitization over straight bonds; on the contrary, banks with lower capital adequacy prefer securitization *vis-à-vis* straight debt, which is, again, in line with the hypothesis of banks using off-balance-sheet funding to reduce their risk weighted assets. Models [2a] and [2b] show that higher non-performing loan ratios and Z-scores increase the likelihood of banks choosing securitization over straight bonds. Finally, we find that banks do not use securitization to manage liquidity risk, and switchers prefer straight over securitization bond deals when raising debt in capital markets. In addition, we show, as expected, that banks use securitization deals when looking for long-term financing and want to benefit from tranching. Securitization tends to have a lower number of banks involved and we only find that banks use securitization *vis-à-vis* straight bond deals to manage their borrowing costs in model [2b]. Again, while the 2008 financial crisis reduced the probability of observing a securitization bond deal over a straight bond deal, the higher the market volatility, the higher the likelihood of banks choosing securitization.

Regarding the choice between covered bond and straight bond deals, results show that: (*i*) banks with higher loans to deposits and ST funding ratios prefer covered bond over straight bond deals, which supports the trade-off theory of capital structure; (*ii*) the higher the capital ratio or the capital adequacy ratio, the lower the probability of a bank choosing to issue covered bonds versus straight bonds; (*iii*) banks choose covered bond deals vis-à-vis straight bond deals when they are less profitable; and (*iv*) banks with higher non-performing loan ratios and Z-scores prefer covered bond over straight bond deals. In addition, we show that banks use covered bond deals when looking for long-term financing and when they want

to reduce borrowing costs; and the higher the number of tranches as well as the number of banks involved, the lower the probability of observing a covered bond deal.

Our conclusion that the preference for covered bonds over straight bonds is stronger for less profitable banks with greater NPLs can be explained by agency problems between managers and debtholders. The choice of covered bonds in those cases could be a way to reduce wealth for regular debtholders, as risk can typically be increased for unsecured regular debt holders when covered bonds are issued. As pointed out by Arif (2020), a large-scale issuance of covered bonds leaves fewer assets for the unsecured creditors while, similarly, the ring-fencing of high-quality assets also increases the risk for taxpayers as they ultimately provide a guarantee to deposits. However, all of this could well be in the interest of bank managers or shareholders as it could be a solution for liquidity and profitability problems, given the ability to raise covered bonds with lower costs than other unsecured sources of debt.

D. Switchers' debt choices and the role of the 2008 financial crisis

In this section, we re-estimate models in Table 6 with two main objectives. The first objective is to examine the choice determinants for switchers. Banks that switch between the three bond instruments may provide interesting insights into the choice process. Additionally, a switcher-focused analysis will solve endogeneity concerns that may arise in the choice between structured finance bond and straight bond deals in the previous sections. As pointed out by Boesel et al. (2018), 'securitization can still be a viable source of liquidity for banks with no access to the covered bond market.' Appendix A provides information on the top 10 switchers. The second objective is to examine whether the 2008 financial crisis significantly affected banks' choice determinants. Results presented in Table 6 show a significant and negative impact of the dummy crisis on the probability of observing a structured finance deal, whether securitization or covered bond deals, *vis-à-vis* a straight bond deal. This analysis is important not only because the 2008 financial crisis eroded investors' confidence in securitization, but also because the implementation of the Basel II capital requirements started in the countries considered on 1 January, 2007 (Farruggio & Uhde, 2015).

Results, reported in model [3] of Table 6, indicate, again, that banks with lower adequacy ratios prefer structured finance bond deals over straight bond deals, and banks use structured finance to manage credit risk and when they are less profitable. Additionally, banks use structured finance to reduce borrowing costs to raise debt funding with longer maturities. When using a multinomial specification, in model [5], we find that for switchers their size does not affect their choice. They choose securitization *vis-à-vis* straight bond deals when they are less profitable and seek long-term funding. Results also show, in line with previous results, that banks do not use securitization as a liquidity risk management mechanism, but rather to manage solvency and credit risks. Regarding the choice between covered bond and straight bond deals, results show that for switchers, the loans to deposits and ST funding ratio do not affect their choice. Additionally, as presented in Table 6, the higher the capital adequacy ratio, the lower the probability of a bank choosing to issue covered bonds versus straight bonds; and banks choose covered bond deals *vis-à-vis* straight bond deals when they are less profitable, face higher credit risk, seek long-term funding, and want to reduce borrowing costs.

Models [4a] and [4b] show that in terms of bank characteristics, there is only one significant change between the pre- and crisis period. Surprisingly, the capital adequacy ratio only affects choice in the crisis period. On the contrary, models [6a] and [6b] show significant changes between the two periods.

Table 6: Determinants of banks' choice: switchers and the 2008 financial crisis.

Note: This table presents results of logistic regressions, which predict banks' choice between structured finance bond deals and straight bond deals in models [3], [4a], and [4b]. The dependent variable equals 1 when a bank issues a securitization or a covered bond deal and 0 when it issues a straight bond deal. In models [5], [6a], and [6b] we use a multinomial specification, in which the discrete dependent variable takes the value 1 if the bank originates a securitization bond deal, 2 if the bank issues a covered bond deal, and 3 if the bank issues a straight bond deal. For each independent variable, the first row reports the estimated coefficient, and the second row reports the p-value. Coefficients were estimated based on heteroskedasticity-consistent standard errors clustered by year and bank. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. For a definition of the variables, see Table 2.

Dependent variable:	**Structured finance bond deal = 1, straight bond deal = 0**			**Securitization bond deal = 1, covered bond deal = 2, straight bond deal = 3**					
				Model [2]		**Model [2a]**		**Model [2b]**	
Choice of debt	**Model [1]**	**Model [1a]**	**Model [1b]**	Securitization bond deals	Covered bond deals	Securitization bond deals	Covered bond deals	Securitization bond deals	Covered bond deals
Independent variables:									
Intercept	2.099	1.219	-2.869	3.897	-26.917 ***	1.096	-0.734	3.825	1.219
	(0.416)	(0.601)	(0.441)	(0.148)	(0.001)	(0.789)	(0.858)	(0.136)	(0.601)
Log total assets	-0.104	-0.070	-0.061	-0.101	1.261 ***	-0.047	-0.094	-0.067	-0.070
	(0.317)	(0.477)	(0.691)	(0.354)	(0.001)	(0.834)	(0.619)	(0.510)	(0.477)
Loans to deposits & ST funding	-0.151	0.042	-1.149 *	-0.117	-1.512 *	-0.276 **	-0.300	0.064	0.042
	(0.617)	(0.914)	(0.071)	(0.709)	(0.091)	(0.030)	(0.641)	(0.873)	(0.914)
Capital adequacy ratio	-0.551 **	-0.067 *	-0.053 **	-0.105 **	-0.193	-0.080	-0.116 **	-0.064 *	-0.067 *
	(0.013)	(0.073)	(0.033)	(0.013)	(0.465)	(0.210)	(0.042)	(0.097)	(0.073)
Return on assets	-0.551 **	-0.276 **	-0.376 **	-0.575 ***	0.473	-1.467 ***	-0.206 **	-0.315 **	-0.276 **
	(0.013)	(0.029)	(0.021)	(0.007)	(0.684)	(0.000)	(0.050)	(0.026)	(0.029)
Non-performing loan ratio	0.170 ***	0.062 *	0.126 *	0.177 ***	-0.209	0.158	0.001	0.064 *	0.062 *
	(0.000)	(0.095)	(0.078)	(0.000)	(0.501)	(0.199)	(0.995)	(0.100)	(0.095)
Switcher		-0.752 **			-3.695 **	-0.384	-2.736 ***	-0.647 *	-0.752 **
		(0.021)			(0.014)	(0.517)	(0.000)	(0.058)	(0.021)
WAS	-0.009 ***	-0.011 ***	-0.002	-0.009 ***	0.002	-0.007 ***	-0.004	-0.012 ***	-0.011 ***
	(0.000)	(0.000)	(0.307)	(0.000)	(0.284)	(0.000)	(0.147)	(0.000)	(0.000)
WAM	0.093 ***	0.117 ***	0.225 ***	0.076 ***	0.173 ***	0.061 **	0.294 ***	0.098 ***	0.117 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.020)	(0.000)	(0.000)	(0.000)
Number of tranches	0.737 ***	0.618 ***	2.679 ***	-1.056 ***	5.171 ***	0.956 ***	2.241 ***	-1.936 ***	0.618 ***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.001)
Number of banks	-0.059 **	-0.031	-0.772 ***	-0.043 *	-0.677 ***	-0.088 *	-1.019 ***	-0.016	-0.031
	(0.018)	(0.203)	(0.000)	(0.090)	(0.000)	(0.100)	(0.000)	(0.500)	(0.203)
Crisis	-0.855 **		-2.425 ***	-0.785 *					
	(0.029)		(0.005)	(0.052)					
Volatility	0.041 ***	0.037 **	0.046 **	0.041 ***	-0.008	0.047 **	0.035	0.037 **	0.037 **
	(0.000)	(0.033)	(0.039)	(0.001)	(0.845)	(0.025)	(0.110)	(0.038)	(0.033)
EUSA5y-Libor3M	0.001	0.003	-0.004	0.001	0.002	-0.005 **	-0.003	0.003	0.003
	(0.630)	(0.457)	(0.341)	(0.653)	(0.701)	(0.014)	(0.387)	(0.497)	(0.457)
CBPP1	0.128	-0.057	0.267	0.109			0.257	-0.066	-0.057
	(0.654)	(0.772)	(0.621)	(0.705)			(0.682)	(0.744)	(0.772)
CBPP2	0.099	0.337	-1.287	0.152			-0.626	0.391	0.337
	(0.821)	(0.370)	(0.191)	(0.734)			(0.383)	(0.318)	(0.370)
CBPP3/ABSPP	0.160	0.082	-0.857	0.180			-0.876	0.071	0.082
	(0.618)	(0.832)	(0.233)	(0.577)			(0.106)	(0.857)	(0.832)
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	9,040	3,660	6,267	9,040		3,660		6,267	
Correct predictions	77.38%	88.64%	75.48%	81.90%		90,33%		80,20%	
Pseudo-R^2	0.312	0.464	0.267	0.442		0.638		0.401	

Concerning the choice between securitization bond deals and straight bond deals, we find that: (*i*) while bank size positively and significantly affected the probability of a bank choosing to securitize its assets in the pre-crisis period, during the crisis this variable became insignificant; (*ii*) while banks used securitization as a liquidity management tool in the pre-crisis period, during the crisis period securitization was used as a means to increase key economic ratios; and (*iii*) the cost of borrowing ceased to be important as a determinant of the choice between these two forms of bond financing. Finally, while in the pre-crisis period banks primarily employed covered bond deals as a liquidity management tool compared to straight bond deals, during the crisis period, covered bonds were utilized not only to manage regulatory capital ratios but also as a risk management tool to mitigate and transfer credit risk.

E. Robustness checks

We conduct several additional robustness checks to further validate our findings in Tables 5 and 6. First, we re-estimate our models by replacing the banks' log total assets by the log deal size. Second, we include additional bank characteristics like cost-to-income and loan ratio. Finally, we replaced country fixed effects as a measure of sovereign risk, using the yield of 10-year government bonds of the country where the originating/issuing bank is located. Overall, our estimates are qualitatively the same.

V. The choice of bond markets and banks' capital ratios

Results in Table 3 show that securitization, covered bond, and straight bond deals have significantly different characteristics. Additionally, banks' capital ratios differ significantly between those that used each of the three bond deal instruments (see Table 4). Therefore, selection is important in this context. As the choice between structured finance bond and straight bond deals may be endogenous to capital ratios, we follow the methodology of Lokshin and Sajaia (2004) and use an endogenous switching regression model to study banks' capital structure determinants, taking into consideration the potential self-selection by banks between issuing structured bond deals versus straight ones. The empirical model consists of the following three equations:

$$Capital\ ratio\ structured\ finance\ bond\ deals_{i,t} = \alpha_0 + \beta\ Bank\ characteristics_{i,t-1} + \gamma\ Contractual\ characteristics_{i,t} + \varphi\ Macroeconomic\ factors_t + \varepsilon_{i,t} \quad [2]$$

$$Capital\ ratio\ straight\ bond\ deals_{i,t} = \alpha_0 + \beta\ Bank\ characteristics_{i,t-1} + \gamma\ Contractual\ characteristics_{i,t} + \varphi\ Macroeconomic\ factors_t + \varepsilon_{i,t} \quad [3]$$

$$I^*_{i,t} = \delta_0(Capital\ ratio\ structured\ finance\ bond\ deals_{i,t} - Capital\ ratio\ straight\ bond\ deals_{i,t}) + \beta\ Bank\ characteristics_{i,t-1} + \gamma\ Contractual\ characteristics_{i,t} + \varphi\ Macroeconomic\ factors_t + u_{i,t} \quad [4]$$

where the third equation models bond deal selection: if $I_i^* > 0$, when bank *i* issues a structured bond deal (securitization or covered bonds); otherwise, it issues a straight bond deal. We adjust for heteroscedasticity and estimate standard errors clustered by year and bank. The Wald test statistics of independent equations lead us to reject the hypothesis of equations being independent for models [7] and [8] in Table 7. Therefore, the major conclusion is that the choice between structured finance and straight bond finance affects banks' capital ratios and capital adequacy ratios.

Table 7: Banks' capital ratios and the choice of bond markets.

Dependent variable: Capital ratio / Capital adequacy ratio	**Model [7]** Structured finance bonds	**Model [7]** Straight bonds	**Model [8]** Structured finance bonds	**Model [8]** Straight bonds
Dependent variables:				
Intercept	4.489 *** (0.000)	8.074 ** (0.016)	17.442 *** (0.000)	22.356 *** (0.000)
Log total assets	-0.162 *** (0.004)	-0.299 *** (0.000)	-0.162 *** (0.001)	-0.526 *** (0.000)
Loans to deposits & ST funding	0.380 *** (0.002)	0.630 *** (0.006)	0.927 *** (0.000)	-0.953 ** (0.024)
Return on assets	2.374 *** (0.000)	1.820 ** (0.028)	0.457 *** (0.000)	1.144 ** (0.011)
Non-performing loan ratio	0.214 *** (0.000)	0.263 *** (0.000)	-0.153 *** (0.000)	-0.251 *** (0.000)
Switcher	0.03 (0.729)	-1.210 (0.337)	-1.198 *** (0.000)	1.391 ** (0.037)
WAS	0.004 *** (0.000)	0.002 (0.367)	-0.003 *** (0.000)	0.003 (0.189)
WAM	0.022 *** (0.000)	-0.062 (0.338)	0.009 ** (0.032)	-0.053 (0.541)
Number of tranches	0.127 *** (0.000)	-0.371 (0.664)	0.005 (0.840)	-1.417 ** (0.022)
Number of banks	0.058 *** (0.000)	0.106 (0.155)	0.013 (0.274)	0.153 ** (0.045)
Crisis	0.919 *** (0.000)	1.615 (0.296)	3.394 *** (0.000)	6.562 *** (0.000)
Volatility	-0.022 *** (0.000)	-0.034 (0.265)	-0.101 *** (0.000)	-0.171 *** (0.000)
EUSA5y-Libor3M	0.001 *** (0.005)	-0.007 * (0.064)	-0.001 ** (0.018)	-0.013 *** (0.000)
CBPP1	-0.519 *** (0.000)	-0.002 (0.990)	-2.216 *** (0.000)	-1.155 *** (0.000)
CBPP2	-0.103 (0.516)	-0.331 *** (0.008)	0.483 ** (0.020)	-0.271 (0.288)
CBPP3/ABSPP	0.638 *** (0.000)	0.541 * (0.075)	1.918 *** (0.000)	1.191 *** (0.000)
Dependent variable: Choice of debt	Structured finance bond deal = 1 straight bond deal = 0		Structured finance bond deal = 1, straight bond deal = 0	
Independent variables:				
Intercept	-1.678 (0.137)		-3.175 ** (0.029)	
Log total assets	0.106 ** (0.015)		0.181 *** (0.002)	
Loans to deposits & ST funding	-0.159 *** (0.000)		0.100 (0.494)	
Return on assets	-0.504 *** (0.008)		-0.521 *** (0.000)	
Non-performing loan ratio	-0.011		-0.004	

	(0.752)	(0.838)
Switcher	-0.239	-0.487 ***
	(0.503)	(0.000)
WAS	-0.003	-0.003
	(0.283)	(0.121)
WAM	0.046 ***	0.035 ***
	(0.000)	(0.000)
Number of tranches	0.384 ***	0.405 ***
	(0.000)	(0.000)
Number of banks	-0.064 ***	-0.057 ***
	(0.000)	(0.000)
Crisis	-0.753 ***	-0.946 ***
	(0.000)	(0.000)
Volatility	0.023 ***	0.025 ***
	(0.000)	(0.000)
EUSA5y-Libor3M	0.002 ***	0.003 ***
	(0.005)	(0.001)
CBPP1	0.080	0.053
	(0.141)	(0.346)
CBPP2	0.003	0.194
	(0.962)	(0.282)
CBPP3/ABSPP	0.098	0.076
	(0.460)	(0.492)
Number of observations	10,457	9,927
Wald chi2	3,761.89 ***	2,113.62 ***
Log pseudolikelihood	-24,822.06	-27,393.92
Wald test of independent equations	4.32 **	10.64 ***

Although a thorough analysis of the determinants of banks' capital structure is beyond the scope of this paper, Table 7 presents some interesting results. Model [7] documents the impact of banks' characteristics on capital ratios, controlling for contractual and macro factors. Findings suggest that banks' leverage is influenced negatively by their size, while banks with higher loans to deposits and ST funding ratio, return on assets, and non-performing loan ratios, have higher capital ratios. In line with Almazan et al. (2015) we show that banks' cost of borrowing affects their capital ratio for those that use structured finance. Additionally, while in periods with a higher market volatility, banks typically reduce their capital ratio, between 2008 and 2017, banks that used structured finance bond deals strengthened their capital ratio. Interestingly, banks that used structured finance in the sample period strengthened their capital ratio during the ECB's ABSPP.

In model [8], we replaced an accounting measure of banks' capital structure by a regulatory measure. Results in columns 3 and 4 show similar results for banks that used structured finance bond deals in model [7]. However, for those that used straight bond deals, results show that the capital adequacy ratio is now negatively influenced by the loans to deposits and ST funding ratio, indicating that banks with more liquidity restrictions have lower capital ratios. Finally, banks use structured finance to benefit from regulatory capital arbitrage: switchers that issued straight bond deals have higher capital adequacy ratios, while those that issued structured finance bond deals have lower capital adequacy ratios.

V. Summary and conclusions

This paper provides empirical evidence on banks' borrowing decisions. Results document that sampled banks' characteristics, like capital and capital adequacy ratios, return on assets, non-performing loan ratio, and Z-score influence the choice between structured finance, in the form of securitization and covered bond deals, and straight bond deals. Findings are consistent with the hypothesis that structured finance promotes the reduction of the deadweight costs associated with information asymmetries and provides support for the argument that banks with lower liquidity ratios resort more to structured finance deals, namely covered bonds. Findings are also consistent with the prediction that banks exposed to higher credit risk and those with lower capital adequacy ratios would choose both securitization or covered bond deals over straight bond deals, and transaction cost considerations lead switchers to choose structured finance for new debt.

The paper also reports evidence on reduced borrowing costs for structured finance deals vis-à-vis straight bond deals. We interpret this result as evidence that rational borrowers choose between those two categories of borrowing sources, based on the efficiency of the cost of borrowing for the available financing alternatives. Therefore, we argue that further research could be particularly useful and valuable that explores if structured finance transactions reduce sponsors' or originators' overall cost of capital, as well as on banks' relative use of these funding sources.

Finally, considering that the choice between structured finance and straight bond finance affects banks' capital ratios, we consider that further analysis on how banks' choice between structured finance bond deals and straight bond deals affects their leverage level is an important avenue for future research, in particular addressing the following questions: is their capital structure affected by this choice in pre- versus crisis times? Do banks adjust more quickly to their target leverage level by using structure finance deals?

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APPENDIX A

Table A1: Top 10 switchers in the 2000-2017 period.

Note: This table provides information on the top 10 switchers, banks that employ securitization, covered, and straight bonds in the sampling period. Data are for deals with WAS and tranche amount available, closed by European banks during the 2000-2017 period.

Issuer/issuer parent	Number of switches	Number of securitization bond deals	Securitization bond deal amount [€ Million]	Number of covered bond deals	Covered bond deal amount [€ Million]	Number of straight bond deals	Straight bond deal amount [€ Million]
Commerzbank AG	206	27	22,322.45	1,557	279,078.17	99	53,318.33
UniCredit, SpA	169	16	25,428.85	222	55,586.85	204	67,835.67
Banco Santander, SA	157	62	127,310.66	108	100,013.45	156	135,276.82
Banco Bilbao Vizcaya Argentaria, SA	90	36	67,378.45	68	66,564.91	104	65,115.39
BPCE, SA	88	4	4,212.63	199	72,781.17	75	55,310.14
Lloyds Banking Group Plc	81	28	130,459.26	46	41,401.32	137	117,024.58
Deutsche Bank AG	55	20	11,322.55	40	14,933.00	116	79,467.09
BNP Paribas	52	4	5,498.50	35	29,152.18	116	75,111.58
Dexia, SA	52	1	750.00	144	30,987.95	37	33,569.14
Rabobank	42	21	20,902.10	2	1,500.00	158	74,653.41