# Are covered bonds different from securitization bonds? A comparative analysis of credit spreads

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**Abstract**

This study compares credit spreads and the pricing of securitization and covered bonds. Using a sample of 18,309 bonds issued by European banks in the 2000-2016 period, we find that asset-backed securities (ABS), mortgage-backed securities (MBS), public covered bonds (PCB), and mortgage covered bonds (MCB) are priced differently. Although ratings are the most important pricing determinant for ABS and MBS, investors place relatively more importance on contractual, macroeconomic, and banks' characteristics rather than ratings in pricing covered bonds. ABS and MBS have higher credit spreads than similarly rated PCB and MCB, and security prices reflect information beyond credit ratings across asset classes. We find evidence of borrowing costs affecting the banks' choice between ABS and PCB. We also find that banks are more likely to issue MCB *versus* MBS for liquidity reasons, while banks that aim to meet regulatory capital requirements would prefer securitization.

Key words: credit spreads; securitization; covered bonds; mispricing; cost of borrowing.
JEL classification: F34; G01; G12; G24

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## Abstract

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## 1. Introduction

Securitization and covered bond markets have become important sources of (re)financing for a wide variety of assets in recent decades. The reduction in securitization issuance after the beginning of the 2008 financial crisis was accompanied by a growing demand for covered bonds (see section 3 of the Online Appendix), a funding instrument that has been used by European banks for over a century. Covered bond issuance in Europe increased significantly from less than €100 billion in the mid-1990s to €350 billion in 2006 (Packer *et al.*, 2007). In 2010, for the first time ever covered bond issuance exceeded the volume of senior unsecured bonds in European markets, with a total issuance of €599.2 billion, decreasing to €436.1 billion in 2016.[1] According to Marques and Pinto (2020), the volume of securitized assets in Europe increased 946.9% in the 2000-2008 period, from €78.2 billion to €818.7 billion. Between 2009 and 2016, €2,290.6 billion of securitized bonds were issued.[2]

According to ECB (2008), covered bonds have proven to be relatively resilient during the 2008 financial crisis, which has led to several authors proposing such securities as a promising alternative to securitization (Bernanke, 2009; Surti, 2010; Campbell, 2013). More recently, Carbó-Valverde *et al.* (2017), Boesel *et al.* (2018), and Markmann (2018) point out that securitization and covered bonds are complementary instruments in enhancing the effectiveness of monetary policy and the integration of capital markets.[3] In this paper we compare credit spreads and pricing determinants of securitization bonds – asset-backed securities (ABS) and mortgage-backed securities (MBS) – with those of covered bonds – public covered bonds (PCB) and mortgage covered bonds (MCB) –, in a large sample of bond

[1] In this study, we define Europe as countries belonging to the European Economic Area plus Switzerland. For further analysis, see European Covered Bond fact book 2019 (http://www.ecbc.eu/).
[2] In the U.S., after a sharp decrease of 61.2% between 2007 (€2,404.9 billion) and 2008 (€933.6 billion), the volume of securitization products grew to €1,792.9 billion in 2016, an increase of 92.1%. Securitisation Data Report, European Structured Finance, Q4: 2016; Securities Industry and Financial Markets Association (https://www.sifma.org/).
[3] The three covered bond purchase programmes (CBPP) announced by the European Central Bank (ECB) in 2009, 2011 and 2014, along with the asset-backed securities purchase programme (ABSPP) announced in 2014, played a key role in the development of the European covered bond market and the revival of European banks' securitization issuance during both 2008 and the European sovereign debt financial crises.

tranches (18,309 tranches worth €4,922.3 billion) issued by European banks in the 2000-2016 period. We also examine, in a deal-level analysis, whether covered bond transactions allow originating banks to reduce borrowing costs *vis-à-vis* securitization deals.

The European market is a sound laboratory to implement these analyses. First, covered bonds are a European product par excellence. With more than 250 years old, they play a fundamental role in long-term funding for mortgage or public-sector loans.[4] In contrast, there has essentially been no covered bond issuance in the U.S. between 2000 and 2016, with €4 billion in 2006 and €8.86 billion in 2007 (Larsson, 2013). Second, a recent joint paper prepared by the Bank of England and the ECB (BoE and ECB, 2014) points to the need for a better functioning securitization market in the European Union due to its key role as a funding and risk transfer instrument. Finally, since 2009 the ECB has relied on both instruments, through direct purchases in primary and secondary markets, as a way to restore bank funding and enhance the transmission of monetary policy (Bluwstein and Canova, 2016).

This paper contributes to bond pricing literature by studying the determinants of securitization and covered bond credit spreads. Despite the significant attention devoted by extant literature to the analysis of corporate bond credit spreads, limited research has been carried out in structured finance markets.[5] Vink and Thibeault (2008), Buscaino *et al.* (2012), and Fabozzi and Vink (2012) find credit rating as the most important determinant of securitization bond credit spreads. An *et al.* (2011) and Marques and Pinto (2020) show that contractual characteristics other than credit ratings, as well as originating banks' credit risk proxies and macroeconomics factors, are also important in pricing such securities. Breger and Stovel (2004), Koziol and Sauerbier (2007), Kempf *et al.* (2012), and

[4] According to Grossmann and Stöcker (2016), the oldest covered bond issuance dates back to 1770, with only Denmark, Germany, Switzerland and Spain introducing covered bond legislation pre-1990. Central European countries, including France, followed in the mid-1990s, with another wave, including countries such as the U.K., Austria, Italy, Greece, and Portugal, arriving in the 2000s. For further details see Cross (2008) and Larsson (2013).

[5] Schwarcz (2011) emphasizes that covered bonds should be viewed as a financing tool that belongs, as does securitization, to structured finance. See also Leland (2007) and Fabozzi *et al.* (2006).

Prokopczuk *et al.* (2013) study the determinants of covered bond credit spreads issued by German banks. Research focused on international markets is scant. A few exceptions are Prokopczuk and Vonhoff (2012) and Gürtler and Neelmeier (2018), who find that country-specific differences, liquidity, and macroeconomic factors, like the interest rate level and market volatility are important determinants of covered bond credit spreads. However, none of these works control by issuing banks' accounting and market characteristics. We believe our study is the first to examine how credit spreads and pricing compare between securitization and covered bonds and whether covered bond prices reflect additional information other than credit ratings. To the best of our knowledge, we are the first to analyze the pricing of subcategories of securitization and covered bonds, taking into consideration the potential self-selection by banks between issuing ABS *versus* PCB and MBS *versus* MCB.[6]

Our findings document that securitization and covered bond tranches are priced differently. While credit ratings are a major pricing determinant for ABS and MBS, we show that variables other than credit rating are relatively more important for investors in determining PCB and MCB credit spreads. We find that factors important for ABS and MBS pricing, such as time to maturity, transaction size, country risk, creditor rights and legal enforcement, and yield curve slope, are also important for determining credit spreads on covered bonds. Remarkably, we find non-linear (convex) relationships between credit spreads and maturity for both PCB and MCB. The number of banks involved and their reputation, financial and sovereign debt crises, and market volatility are also relevant drivers for covered bond credit spreads.

We contribute to the literature that examines a mispricing phenomenon in bond markets. As ABS and MBS are closest substitutes for PCB and MCB, respectively, relying on these securities may

[6] Our analysis uses a dataset of securitization and covered bonds, developed based on a hand-matching procedure between bonds extracted from DCM Analytics and banks' characteristics drawn from Bankscope. As in Marques and Pinto (2020), we use endogenous switching regression models to mitigate potential self-selection problems.

become a robust way of analyzing such phenomenon. Brennan *et al.* (2009), Coval *et al.* (2009a,b) and Wojtowicz (2014) point out that as credit ratings are constructed to reflect only physical default probabilities (S&P) or expected losses (Moody's), they disregard whether a security is likely to default in extreme economic conditions. This implied information loss may be a source of mispricing and securitization bond tranches, which carry large systematic risks, should offer higher spreads than securities with the same credit rating whose payoffs have a lower correlation with the market (e.g., covered bonds). Security design literature also presents the segmentation of financial markets as a source of mispricing (Duffie and Rahi, 1995; Riddiough, 1997). Empirically, Cornaggia *et al.* (2017) show that, in the U.S., asset-backed bonds exhibit higher yields than similarly rated corporate bonds. Marques and Pinto (2020) find that security prices reflect information beyond credit ratings, and that while collateralized debt obligations (CDOs) tranches exhibit, on average, higher credit spreads, investment-grade ABS and MBS typically offer similar or lower compensation than rating-matched corporate bonds. We extend Cornaggia *et al.'*s (2017) and Marques and Pinto's (2020) work by comparing subcategories of securitization and covered bond credit spreads across credit ratings, controlling for macroeconomic factors, contractual and banks' characteristics.

We find evidence of a mispricing effect in structured finance markets. Our findings document that ABS and MBS tranches have, on average, higher credit spreads than rating-matched PCB and MCB alternatives, in line with the hypothesis that investors should demand larger spreads for holding securities with larger systematic risks. On the other hand, the dual protection nature of covered bonds leads investors to perceive that PCB and MCB have an associated lower risk *vis-à-vis* comparable securitization bond tranches. Our results also show that ratings are not perfect measures of credit quality, and that security prices reflect information beyond credit ratings across asset classes for

specific rating categories. We check the robustness of our results for subsamples of bonds issued in the pre- *versus* crisis periods and results are qualitatively similar.

We also extend a growing body of literature that studies banks' debt choices. Extant literature is mostly focused on why banks use securitization *vis-à-vis* traditional funding alternatives (e.g., Greenbaum and Thakor, 1987; Affinito and Tagliaferri, 2010; Cardone-Riportella *et al.*, 2010; Casu *et al.*, 2013; Farruggio and Uhde, 2015). Limited empirical research has been carried out in this area to examine why banks use covered bonds. The two exceptions are: Carbó-Valverde *et al.* (2017), who examine the use of covered *versus* securitization bonds in the 2003-2007 period, and find that while banks are more likely to use MCB when they have liquidity needs, the use of MBS is associated with risk management. Boesel *et al.* (2018) show that banks with a covered bond programme are less willing to use securitization to improve their liquidity/funding position. To the best of our knowledge, this paper is the first to examine whether the cost of borrowing affects banks' choice between securitization and covered bonds. One strand of the literature presents the reduction in originators' borrowing costs as a commonly referred economic benefit of securitization. By minimizing the costs related to financial distress and bankruptcy, securitization allows banks to lower borrowing costs (Goldberg and Rogers, 1988; Rosenthal and Ocampo, 1988; Gorton and Souleles, 2007; Ayotte and Gaon, 2011). On the other hand, Larsson (2013), Carbó-Valverde *et al.* (2017) and Boesel *et al.* (2018) argue that due to the dual-recourse feature of covered bonds, along with the originating banks' requirement of maintaining the cover pool's quality and the 'overcollateralization' level, they have an associated lower default and liquidity risk. Moreover, covered bonds mitigate moral hazard problems created by the originate-to-distribute model of securitization (Benmelech and Dlugosz, 2009; Michalak and Uhde, 2012).

We find that banks choose ABS *vis-à-vis* PCB when they have higher loan ratios and want to adjust capital ratios; and larger and more profitable banks prefer MBS over MCB. Additionally, banks

choose MCB rather than MBS when they have higher liquidity and capital adequacy ratios as well as a higher proportion of net loans in total assets. When aggregating tranches at the deal level, we find that the cost of borrowing seems to affect the banks' choice between ABS and PCB deals. The European banks choice between MBS and MCB depends instead on exogenous factors – e.g., financial crises and ECB asset purchase programmes (APP) – and the objectives to be achieved by banks – increasing liquidity *versus* credit risk management and regulatory capital arbitrage. Results are robust when considering a sub-sample of switchers – banks that use both securitization and covered bond deals during our sampling period – and when using endogenous switching regression models.

Finally, we contribute to a recent body of literature, mostly focused on covered bonds, which explores the impact of ECB's APP on euro area bank funding conditions. So far, the literature has focused on the CBPPs' effects on the secondary market (e.g., Szczerbowicz, 2015; Gibson *et al.*, 2016; Markmann and Zietz, 2017; Gürtler and Neelmeier, 2018). We extend this literature by focusing on *ex ante* or primary market spreads, examining the impact of both the third CBPP and the ABSPP on credit spreads, controlling for banks' characteristics, and using endogenous switching regression models to take into consideration banks' choice between subcategories of securitization and covered bonds.

In line with Beirne *et al.* (2011), Szczerbowicz (2015), and Gibson *et al.* (2016), we find that the first CBPP led to a narrowing of PCB and MCB spreads. Concerning the second CBPP, contrary to Szczerbowicz (2015) but in parallel with Gürtler and Neelmeier (2018), we find a widening effect on spreads. Our results show a significant negative impact of the third CBPP on both PCB and MCB credit spreads, while the ABSPP reached the ECB goal of reducing spreads for MBS only.

This paper is organized as follows. Section 2 reviews the literature and presents the research hypotheses. Section 3 describes the methodology and variables we use. Section 4 examines the determinants of credit spreads for securitization and covered bonds. It also analyzes if the market prices

bonds differently across asset classes, when controlling for credit ratings. Section 5 examines if covered bonds reduce banks' cost of funding and section 6 concludes the paper.

## 2. Literature review and hypotheses

### *2.1. The financial economics of securitization and covered bonds*

Covered bonds are hybrid financial debt instruments with characteristics of both senior unsecured corporate bonds and securitization securities, issued specifically by banks. According to Schwarcz (2011), securitization and covered bonds are processes whereby financial assets are pooled together, with their cash flows, and converted into negotiable securities to be placed in financial markets. Both allow banks to access low-cost capital market funding with a low-level of risk for their investors and can be used to regenerate lending markets. Although in a traditional securitization transaction the assets are transferred to another entity – a Special Purpose Vehicle (SPV) created for the sole purpose of holding those financial claims – through a true sale, in covered bonds the cover-pool assets typically remain on the bank's balance sheet and investors have a priority claim against the collateral assets in case of default (Gorton and Metrick, 2013; Prokopczuk *et al.*, 2013). Even in a structured covered bond, which is very similar to securitization technique as it involves the use of an SPV that buys the cover-pool assets, bondholders have a residual claim on the bank issuer. Covered bonds are thus dual-recourse bonds, with a claim on both the bank issuer and a cover-pool of assets, which are 'ring-fenced' to give investors greater protection (Larsson, 2013; Markmann, 2018).[7]

Extant literature suggests that securitization and covered bonds can be used by banks, namely, to: (*i*) increase liquidity and diversify funding sources; (*ii*) reduce funding costs *vis-à-vis* traditional corporate bonds; and (*iii*) improve banks' ability to manage funding and interest rate risk. However,

[7] Ring-fencing here means that in a standard (legislative) covered bond transaction the cover-pool assets are segregated to protect them from claims of the issuer's bankruptcy. In structured covered bond transactions, ring-fencing means, as it does for securitization, that the cover-pool assets are sold to a bankruptcy-remote SPV. See Packer *et al.* (2007), Cross (2008) and Schwarcz (2011) for a distinction between structured and legislative covered bond regimes.

and contrary to securitization, covered bonds do not allow banks to transfer credit risk; obtain new profit opportunities, by recognizing accounting gains when the market value of the loans exceeds book value; and to benefit from regulatory capital arbitrage by reducing risk-weighted assets (e.g., Greenbaum and Thakor, 1987; Pennacchi, 1988; Rosenthal and Ocampo, 1988; Jones, 2000; Ambrose *et al.*, 2005; Cross, 2008; Surti, 2010; Affinito and Tagliaferri, 2010; Casu *et al.*, 2013; Farruggio and Uhde, 2015). Regarding banks' choice between covered bonds and securitization, Carbó-Valverde *et al.* (2017) find that banks issue MCB *vis-à-vis* MBS to meet their liquidity needs. Boesel *et al.* (2018) complement their results by showing that European banks originate asset-backed products for funding/liquidity reasons when they cannot resort to covered bonds.

Despite the above-mentioned advantages, securitization also has shortcomings. The transition from the traditional 'originate-to-hold model' to the 'originate-to-distribute model', as well as its reliance on credit markets as a continuing source of credit, has been blamed by academics and practitioners for the 2008 financial crisis. If the originator does not hold the credit it originates, but distributes the loan and its risks to other entities through securitization, the originator has a reduced incentive to monitor the credit granting process. Thus, this model brings with it a major principal-agent problem in the credit screening process, because the credit incentives of the originator are not aligned with those of the entity that ultimately holds the loan (Brunnermeier, 2009; Demyanyk and Van Hemert, 2011; Purnanandam, 2011). Prior research also documents that the use of securitization was associated with increased problems in renegotiating distressed assets and failures in valuing complex securitization instruments (Benmelech and Dlugosz, 2009; Michalak and Uhde, 2012).

Regarding covered bonds, notwithstanding their benefits when compared to securitization,[8] there are concerns that a high number of bank assets, which are pledged to special creditors, and

[8] The fact that covered bond issuing banks must keep any underlying cover pool collateral on their balance sheet mitigates problems associated with moral hazard and informational asymmetry between the banks and investors.

therefore would not be available in case of bank insolvency, would make banks more vulnerable in case of market turmoil and lead to further destabilization of the system (Schwarcz, 2011). While in securitization the segregated pool of assets is typically fixed, allocating risk to all stakeholders, in covered bonds the asset pool is dynamic, requiring the issuer to continue to segregate assets as needed to repay bonds, in order of priority, *vis-à-vis* unsecured creditors. Recently, Arif (2020) find that the systemic risk of smaller banks increases after the issuance of covered bonds.

### *2.3. Hypotheses*

#### *2.3.1. The pricing of securitization and covered bonds*

Despite the similarities between securitization and covered bond transactions, there are important differences to consider (Larsson, 2013; Carbó-Valverde *et al.*, 2017; Boesel *et al.*, 2018; Markmann, 2018). First, the 'bankruptcy remoteness' feature provided by the instrumental SPV in securitization, isolating cash flow generating assets from the originator's balance sheet, is not available in on-balance-sheet funding such as covered bonds (Ayotte and Gaon, 2011). Second, securitization deals are structured in different tranches with different risk-return profiles; i.e., tranches are issued as subordinated, varying seniority and maturity claims, created to generate differential interests in the pool, such that the senior investors have priority rights over subordinated investors (Marques and Pinto, 2020). Third, credit enhancement mechanisms other than overcollateralization, such as excess spread, cash reserve accounts, or a third-party guarantee may be assigned to the SPV, to improve the credit rating of ABS and MBS (Fabozzi *et al.*, 2006). Fourth, while in ABS and MBS the pool of assets is fixed or static, the cover pools are usually dynamic. Finally, covered bonds are not pass-through structures, as it is not mandatory to have an exact match between the cash inflows from the underlying cover-pool assets and the cash outflows to repay the investors.

The off-balance sheet feature of securitization causes the spread of issued securities to depend mostly on the assets pledged as collateral and on the credit enhancement mechanisms used (Liu *et al.*, 2018). Due to the dual-recourse feature of covered bonds, their spread depends not only on the cover-pool of cash flow generating assets and the level of overcollateralization but also on banks' accounting and financial characteristics (Larsson, 2013). This leads us to hypothesize:

*Hypothesis 1 (H1): securitization and covered bonds are priced differently by common pricing factors.*

*2.3.2. Mispricing*

Extant empirical literature shows evidence of a mispricing effect in bond markets. Wojtowicz (2014) documents that CDO tranches have higher spreads compared to similarly rated corporate bonds. Cornaggia *et al.* (2017), using data of ratings for U.S. bonds show that bond prices reflect additional information other than credit ratings across asset classes, and that securitization tranches offer higher yields than similarly rated corporate bonds. Marques and Pinto (2020) document that while European CDO tranches have, on average, higher credit spreads than rating-matched alternatives, investment-grade ABS and MBS typically offer similar or lower compensation than corporate bonds with comparable credit risk.

These results can be explained based on two different strands of the literature. Brennan *et al.* (2009), Coval *et al.* (2009a,b), and Wojtowicz (2014) argue that securitization bonds carry large systematic risks *vis-à-vis* comparable securities, which are relatively neglected by credit ratings. As credit ratings are constructed to reflect only physical default probabilities (S&P) or expected losses (Moody's), they ignore whether a security is likely to default in extreme economic conditions. Under this framework, Coval *et al.* (2009b) argue that this implied information loss may be a source of mispricing and securities correlated with the market should offer higher spreads than securities with the same credit rating whose payoffs have a lower correlation. Brennan *et al.* (2009) corroborate this

argument and show that this mispricing effect increases with the subordination level. The segmentation of financial markets might also contribute to bond mispricing. As pointed out by Duffie and Rahi (1995) and Riddiough (1997), market imperfections may lead to the segmentation of financial markets and the appearance of arbitrage opportunities, which may be exploited by originators when designing securitization bonds. Limits imposed by preferences and investment mandates and/or regulation are mentioned as the common types of arbitrage opportunities that usually arise when market segmentation exists (Allen and Gale, 1989, 1991). We thus propose:

*Hypothesis 2 (H2): Structured finance bonds are mispriced and bond prices reflect information beyond credit ratings.*

*2.3.3. Banks' cost of borrowing*

If there is a mispricing effect we would expect that one bond type has a lower/higher credit spread than the comparable alternative. Security design literature provides robust theoretical arguments that structured finance transactions do matter because they reduce market imperfections and frictions. Diamond (1993), Winton (1995), and Glaeser and Kallal (1997) argue that structuring activities based on the design and issuance of securities with different degrees of seniority reduces monitoring costs and adverse selection problems. Riddiough (1997), DeMarzo and Duffie (1999), Fulghieri and Lukin (2001), and DeMarzo (2005) point out that pooling assets and issuing different securities against the pool of cash flows allows banks to reduce asymmetric information costs. According to Duffie and Rahi (1995) and DeMarzo (2005), originators may be required to design securitization transactions with different classes of securities to match investors' risk-reward profiles, and the market will place a premium on them *vis-à-vis* comparable bond alternatives.

Extant theoretical literature on securitization suggests that originators with high-quality assets may be able to reduce their borrowing costs through securitization, by minimizing the costs related to

financial distress and bankruptcy (Greenbaum and Thakor, 1987; Goldberg and Rogers, 1988; Fabozzi *et al.*, 2006). Empirically, Lemmon *et al.* (2014) find evidence consistent with ABS reducing financing costs. Marques and Pinto (2020) find that ABS and MBS transactions have lower spreads than comparable corporate bonds. This supports a third hypothesis:

*Hypothesis 3 (H3): Securitization bonds have lower credit spreads than comparable covered bonds.*

However, compared to securitization and traditional corporate bonds, covered bonds have a dual protection nature: in the event of a bank becoming insolvent, the investor would receive a preferential claim over the assets in the respective cover pool, which is there solely to protect them (Cross, 2008). In addition, banks are required to maintain the quality of the cover pool and the level of 'overcollateralization', which reduces default and liquidity risk for bondholders (Carbó-Valverde *et al.*, 2017; Boesel *et al.*, 2018). Therefore, covered bonds mitigate principal-agent problems raised by asset securitization, when the bank, who originates the assets to be ultimately sold and securitized, retains little or no interest in the pool of securitized assets (Brunnermeier, 2009; Purnanandam, 2011).

In addition, the loan-to-value of the cover loans is relatively conservative, typically ranging from 60% (for commercial loans) to 80% (for residential loans), which provides a safety cushion against the potential cyclical fluctuations in the market value for the cover pool assets. Moreover, covered bonds are subject to tight regulatory control, are subject to preferential treatment under Basel III and Solvency II, and do not foster overreliance on complex mathematical models. According to Boesel *et al.* (2018) and Markmann (2018), the sum of these properties makes covered bonds an important vehicle for long-term funding with a conservative risk-return profile, providing banks cheap access to funding (Schwarcz, 2011; Szczerbowicz, 2015). These arguments would have an expected opposite effect to what H3 predicts.

## 3. Data and variable definition

### *3.1. Sample selection*

We use DCM Analytics to select individual bonds issued by European banks in the 2000-2016 period. Although information is available on several types of bonds, we include only those with a deal-type code of "asset-backed security", "mortgage-backed security", and "covered bond". We also require that securities are issued by banks located in countries from the European Economic Area plus Switzerland and that the tranche size (in € million) be available. As the unit of observation is a single tranche, multiple securitization tranches from the same transaction appear as separate observations. Hence, to perform a transaction-level analysis in section 5 we aggregate tranche-level data (e.g., credit spread, maturity and rating).

In covered bonds, collateral is most typically composed of mortgages and public sector loans, both considered as high quality loans (Gürtler and Neelmeier, 2018). Thus, we classified as PCB those with 'Public Loans' as collateral description. Similarly, covered bonds collateralized by mortgages were classified as MCB. To compare securitization with covered bonds, we exclude CDO and retained ABS backed by public sector loans only. This allows us to compare what is comparable, namely ABS with PCB and MBS with MCB. Additionally, we exclude synthetic securitization bonds, whole-business securitizations, perpetual bonds, bonds with additional features such as step-up, caps, or floors, and bonds classified as "fixed rate convertible to floating rate note", "fixed rate adjustable", "fixed rate extendible", "floating rate note extendible", and "floating rate note convertible".

Whereas we intend to examine how credit spreads and pricing of ABS and MBS compare with those of similarly rated PCB and MCB, we select from our full sample those issues that have the necessary information to compute the credit spread. We include only bond tranches classified as either fixed rate bonds or variable rate bonds with yield to maturity information. For variable rate bonds, only

those quoted on the following indices are included: Euribor, Euro Libor, USD Libor, and GBP Libor. 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, in order to take possible outliers into account, we winsorize the data for transaction size, maturity, and credit spread at the 1% and the 99% levels.

These screens yield a sample of 18,309 bonds (14,584 transactions) worth €4,922.3 billion, of which 668 tranches (200 transactions worth €171.3 billion) are classified as ABS bonds, 4,295 tranches (1,139 transactions worth €1,645.6 billion) as MBS, 7,005 tranches (6,953 transactions worth €1,434.6 billion) as PCB, and 6,341 tranches (6,292 transactions worth €1,670.8 billion) as MCB. Panel A of Table 1 presents the tranche allocation to originating (for securitization) or issuing (for covered bonds) banks in a particular country, while Panel B provides information in relation to identifying the biggest players and their relative importance in securitization and covered bond markets. Panel A shows that ABS collateralized by public loans are concentrated in five countries (Spain, Italy, Greece, Germany and the U.K. account for 92.7% of total value), with Spain accounting for more than half of the entire market. Regarding PCB, Germany, Spain, and Belgium represent 66.5%, 12.2%, and 7.3% of the total value, respectively. MCB reveal a less concentrated country pattern *vis-à-vis* MBS, with Germany (24.4%), France (23.3%), Spain (22.9%), Italy (9.0%), and the U.K. (7.3%) receiving the highest shares of all issuance. MBS are significantly concentrated in the U.K. and the Netherlands, which account for 57% of all issuance by volume. Panel B shows that the top ten ABS and MBS originators contributed to a weight of 58.6% and 49.7% in all issuance by volume, respectively. It is interesting to note that 4 banks (Banco Santander, S.A., BBVA, S.A., Lloyds Banking Group plc, and UniCredit, SpA) are in the top 10 for both securities, and that the U.K. Asset Resolution Ltd, a U.K. holding company established in October 2010 as a bad bank to hold the two run-off elements of the two nationalized

banks Bradford & Bingley plc and Northern Rock plc, accounts for 6.9% of all MBS issuance by volume. Regarding covered bonds, the top 10 PCB issuers were involved in around 64.1% of all deals, a higher fraction when compared with 46.2% for MCB deals. Finally, only two banks (Commerzbank AG and SFIL-Société de Financement Local) are in the top 10 for both PCB and MCB.

****** Insert Table 1 about here ******

### *3.2. Variables*

Table 2 provides the detailed definitions and sources for all the variables used, as well as the expected impact of explanatory variables on credit spreads. A discussion of extant empirical literature on the determinants of bond credit spreads and summary descriptive statistics are presented in sections 1 and 3 of the Online Appendix, respectively.

****** Insert Table 2 about here ******

#### *3.2.1. Credit Spread*

*Credit spread* corresponds to the option adjusted spread (OAS), defined as the margin yielded by the security at issue above a corresponding currency treasury benchmark with a comparable maturity.[9] Considering that covered bonds typically have fixed-rate coupons, whereas ABS and MBS have, predominantly, floating-rate coupons (see section 3.3), it is necessary to account, in credit spread computation, for the fact that the fixed rate bond carries interest rate risk, whereas a floater does not. In addition, within a securitization transaction, there can be both fixed-rate and floating-rate tranches. Following Marques and Pinto (2020), to ensure comparability of credit spreads at issuance we converted floating rate bonds to fixed rates using fixed-for-floating rate swaps. This conversion was

[9] Fabozzi and Vink (2012) stress that the OAS is the most common measure used by financial intermediaries to correct the normal yield spread for embedded options (e.g., the prepayment option), usually included in structured bonds.

implemented per tranche, using the appropriate quote for the swap matching the maturity of the bond and taken at the issuance date.[10]

*3.2.2. Credit rating*

In our sample, all bonds have at least one credit rating assigned by S&P or Moody's, which is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=21 (Cornaggia *et al.*, 2017). If a tranche has two credit ratings, we computed the average. We use rating dummies in regression analyses. As first-loss tranches in securitization are typically not rated, we include the dummy variable *rated*, equal to 1 if the bond has a credit rating, and 0 otherwise. To examine whether a different rating assigned by S&P and Moody's has any statistically significant impact on credit spreads, we use, as in Gabbi and Sironi (2005), a dummy variable – *rating discordance* – equal to one if the two ratings have a different numeric equivalent value, and zero otherwise. We expect rating agencies' discordance to lead to a higher credit spread.

*3.2.3. Contractual characteristics and macroeconomic factors*

Following the line established in earlier studies (Gabbi and Sironi, 2005; Chen *et al.*, 2007; Vink and Thibeault, 2008; Fabozzi and Vink, 2012; Marques and Pinto, 2020), this study considers the following contractual characteristics: (*i*) maturity and the logarithm of maturity; (*ii*) transaction size; (*iii*) tranche rank; (*iv*) fixed rate; (*v*) number of banks; and (*vi*) bank reputation.

Since securitization and covered bonds are backed by loans to public sector entities and mortgages, it is highly likely that the investors' risk assessment depends on macroeconomic factors (Beirne *et al.*, 2011; Prokopczuk and Vonhoff, 2012; Gürtler and Neelmeier, 2018). We thus use the yield curve slope and market volatility to control for these factors. In addition, to account for country

[10] The data on daily swap curves for maturities between 3 months and 50 years as well as the 12 interest rate market benchmarks used (EUR Libor, USD Libor and GBP Libor, with 1M, 3M, 6M, and 12M reference rates), were drawn from Datastream.

differences we include country risk, creditor rights and enforcement variables in our baseline regression model (Fabozzi and Vink, 2012; Boubakri and Ghouma, 2010; Markmann, 2018). Finally, to examine the impact of the supply side conditions of the corporate debt market on credit spreads, we include dummies for *financial crisis* and *sovereign crisis* and use year dummy variable.

The development of the European market for covered bonds and securitization was significantly increased by the ECB's extraordinary action implementing two CBPPs in 2009 and 2011 (CBPP1 and CBPP2), and more recently (2014) CBPP3 and ABSPP. The CBPP1 was announced on May 7, 2009, under which the Eurosystem made outright purchases of covered bonds to the nominal value of €60 billion from July 6, 2009 to the end of June 2010. On October 6, 2011, the ECB announced CBPP2 of €40 billion in favor of euro-denominated covered bonds. CBPP3 and ABSPP were announced on September 4, 2014. Despite initially not being specified, the ECB later defined an amount of €10 billion per month. To examine the impact of the announcement of these asset purchase programmes on credit spreads, we use three dummy variables: CBPP1, CBPP2 and CBPP3/ABSPP.

*3.2.4. Originating/issuing banks' characteristics*

Although securitization employs bankruptcy remote SPVs, Gorton and Souleles (2007), Longstaff and Rajan (2008), and Marques and Pinto (2020) show that the originator's accounting and market characteristics matter in pricing the securities issued by the SPV. Consistent with other studies on the reasons for financial firms using securitization (Affinito and Tagliaferri, 2010; Cardone-Riportella *et al.*, 2010; Farruggio and Uhde, 2015) and securitization *versus* covered bonds (Carbó-Valverde *et al.*, 2017; Boesel *et al.*, 2018), we include variables measuring banks' type (*loan ratio*), size (log *total assets*), liquidity (*liquid assets to deposits & ST funding*), credit risk (*non-performing loans ratio*), profitability (*return on assets*), and regulatory capital (*capital adequacy ratio*). We collect bank specific accounting and market data in the fiscal year ending just prior to bond issuance from

Bankscope. As DCM Analytics does not provide an identification code, we hand-matched ABS and MBS originators with Bankscope by using the issuer-parent's name. For covered bonds, data from Bankscope is merged with bond information from DCM Analytics by hand-matching issuers' names.

### *3.3. Univariate analysis*

Table 3 describes the sample by asset class. This section constitutes the most exhaustive such comparison in the literature. Table 3 also presents Wilcoxon z-tests and Fisher's exact tests comparing the values of each variable in the securitization bond sample with the corresponding values in the covered bond sample. Almost all of the pair-wise comparisons indicate statistically significant differences between the common pricing variables.

****** Insert Table 3 about here ******

Regarding the relative pricing of securitization *versus* covered bonds, Table 3 shows that the average credit spreads are economically and statistically higher for securitization bonds (96.1 bps) than they are for covered bonds (48.0 bps). Similar results are obtained for subsamples: ABS (127.5 bps) and MBS (91.2 bps) have higher average credit spreads than PCB (35.4 bps) and MCB (62.0 bps), respectively. This can reflect differences in credit rating: average credit ratings for PCB (1.4 | AAA) and MCB (1.8 | AA+) are significantly better than for ABS (5.6 | A) and MBS (4.2 | AA-). Coupling these results with the fact that the average country risk does not differ significantly between MBS and MCB, we can conclude that banks have an incentive to maintain high quality mortgages on their balance sheets in covered bonds, giving a positive signal to the markets.[11]

A securitization tranche of an average size matures in 35.0 years, which is a long period if we compare it with the average 5.8 years for covered bonds. Similarly, ABS (26.5) and MBS (36.4) have

[11] We also compare the evolution of credit spreads in section 3 of the Online Appendix, by considering a pre-crisis period from January 1, 2000 through to September 14, 2008, and a crisis period from September 15, 2008 (the first trading day after Lehman Brothers' bankruptcy filing the day before) through to December 31, 2016.

higher average maturities than PCB (5.6) and MCB (6.1). This can be explained by the fact that contrary to covered bonds, ABS and MBS have a pass-through nature that leads to maturity being virtually the same as that of the underlying pool of assets. The observed level of the number of banks participating in the issuing syndicate provides indirect evidence that MBS lending may be considered relatively riskier than MCB lending. However, opposite findings are presented for ABS *versus* PCB.

While MBS (€383.1 million) exhibit a higher average tranche size than MCB (€263.5 million), the average tranche size does not differ significantly between ABS and PCB. As expected, namely due to higher economies of scale in relation to issuance costs, the average transaction size exhibited by covered bond issuances is lower than the average transaction size exhibited by ABS and MBS transactions. The structuring and tranching nature of securitization is also reflected in a larger number of tranches per transaction *vis-à-vis* covered bonds. In typical PCB and MCB transactions, the average number of tranches per transaction is 1.0, which is smaller than the average of 4.9 for ABS and 7.0 for MBS. Similarly, while the tranche rank is 1.0 for covered bonds, ABS and MBS exhibit average tranche ranks of 2.9 and 3.8 respectively.

As for continuous variables, most of the discrete variables detailed in Table 3 clearly suggest that securitization and covered bonds are fundamentally different financial instruments. Therefore, we would expect the impact on pricing to be bond-specific.

## 4. The pricing of securitization *versus* covered bonds

### *4.1. Determinants of ABS, MBS, PCB, and MCB credit spreads*

To examine the common pricing determinants of individual bonds, and how ABS and MBS compare with similarly rated PCB and MCB, we use the model described in equation (1).[12] The dependent variable is the *credit spread*, in basis points. We employ OLS regression techniques and

[12] We use a reduced-form model along the lines of existing pricing models for corporate and securitization bonds (Campbell and Taksler, 2003; Chen *et al.*, 2007; Fabozzi and Vink, 2012; Marques and Pinto, 2020).

adjust for heteroskedasticity. Due to time varying risk premia and cross-country differences, we estimate standard errors clustered by year and country.[13]

$$Credit\ spread_{i,t} = \alpha_0 + \beta_1 Rated_{i,t} + \sum_{n=2}^{21} \beta_n\ Rating\ dummy_{n,i,t} + \beta_{22}\ rating\ discordance_{i,t} + \gamma\ Contractual\ characteristics_{i,t} + \varphi\ Macroeconomic\ factors_t + \varepsilon_{i,t} \quad (1)$$

We use the Chow test to examine whether the credit spreads associated with securitization and covered bonds are influenced similarly by common pricing characteristics; i.e., we are testing if the pricing characteristics in equation (1) are significant across bond types and, if so, whether they have the same coefficient values. Cornaggia *et al.* (2017) show that ratings present significant differences across asset classes. Marques and Pinto (2020) document that securitization and corporate bonds are differently priced. We perform the same methodology to examine if subcategories of securitization and covered bonds are priced in segmented markets. We conclude that securitization and covered bonds are distinct financial instruments and that ABS and MBS, as well as MBS and MCB, are financial instruments influenced differently by common pricing characteristics: the Chow test statistics of 114.2 for securitization *versus* covered bonds, 20.3 for ABS *versus* MBS, 31.3 for PCB *versus* MCB, 57.4 for ABS *versus* PCB, and 83.6 for MBS *versus* MCB, are all higher than the critical levels. So, we corroborate H1 and examine the determinants of credit spreads for each bond type separately.

Table 4 presents the results of estimating equation (1) using each of the six samples discussed in section 3.3.[14] We start by comparing credit spreads among securities in the same category. To do that we use equation (1) and create one dummy variable set equal to 1 if the tranche is an MBS or an MCB, and 0 otherwise – models [1] and [2]. Furthermore, so as to directly compare securitization and

[13] We test whether our results are robust to differences in clustering choices for standard errors (e.g., at deal and year and country and bank levels). Results do not change qualitatively.

[14] We do not experience any collinearity problems when estimating our models since, with the exception of maturity and log maturity, the largest variance inflation factor is 4.8 for enforcement in model [1a]; 2.7 for volatility in model [1b]; 1.7 for country risk in model [2a]; and 2.3 for enforcement in model [2b].

covered bonds with the same collateral, we also include two dummy variables set equal to 1 if the tranche is an ABS or an MBS, and 0 otherwise – models [3] and [4]. Results presented in column 1 of Table 4 suggest that MBS issued by European banks are, on average, associated with 21.1 bps lower credit spreads than ABS. Regarding covered bonds, we find that credit spreads between PCB and MCB do not differ significantly (model [2]). Regression results for models [3] and [4] show that ABS and MBS dummy variables are associated with statistically significant 30.0 bps and 28.3 bps increases in credit spreads, respectively, meaning that both ABS and MBS have higher spreads than comparable covered bonds. So far, we corroborate H2 and reject H3: (*i*) there is a mispricing effect explained by an information loss associated with credit ratings and/or the segmentation of securitization and covered bond markets; and (*ii*) as covered bonds mitigate principal-agent problems underlying the originate-to-distribute business model, coupled with the fact that covered bonds have a dual protection nature and banks are required to maintain the quality of the cover pool and the level of 'overcollateralization', investors require lower yields when investing in PCB and MCB. In section 4.3., we investigate these hypotheses further by comparing credit spreads per rating classes.

****** Insert Table 4 about here ******

Next, we compare the determinants of credit spreads per bond type. Models [1a], [1b], [2a], and [2b] present pricing regression results for subsamples of 668 ABS, 4,295 MBS, 7,005 PCB, and 6,341 MCB. Regarding the impact of credit risk on credit spread, Table 4 shows that while for securitization bonds, rated bonds have lower credit spreads, in models [2a] and [2b] the impact of rated dummy on credit spread is insignificant for PCB or significant and positive for MCB. The insignificance of rated variable for covered bonds can be explained by the fact that almost all are issued

with a rating and 90% of PCB and 83% of MCB have a rating classification of A+ or higher (see section 2 of the Online Appendix).[15]

As expected, the higher the credit risk, the higher the credit spread. However, it should be noted that the relationship between spread and rating is not linear. Additionally, securitization and covered bonds have different rating distributions: while for ABS and MBS there are observations for the entire rating spectrum, non-investment grade PCB and MCB are practically nonexistent. We also estimate these models considering only rated and credit rating dummies as independent variables and find that models yield adjusted $R^2$ values of 0.20, 0.37, 0.01, and 0.05, respectively. This confirms credit ratings as the most important determinant of credit spreads in ABS and MBS, but not for covered bonds. Furthermore, the adjusted $R^2$ value increases, on average, 0.14 for securitization bonds and 0.40 for covered bonds with the inclusion of additional contractual and macroeconomic variables, which shows that variables other than credit rating are relatively more crucial in determining covered bond credit spreads. This result corroborates extant empirical literature, mostly focused on German covered bonds, which find that as the probability of default is marginal, credit ratings do not have a significant impact on credit spreads (e.g., Koziol and Sauerbier, 2007; Kempf *et al.*, 2012). Thus, investors do rely on information beyond the assigned credit rating for both security instruments, which corroborates H2. In addition, we do not find evidence of credit rating discordance between S&P and Moody's substantially affecting credit spreads. This result may be explained by the fact that: (*i*) in securitization, tranches are created to achieve a particular credit rating; and (*ii*) the proportion of bonds with rating discordance is relatively small: 8.5% for securitization bonds and 4.3% for covered bonds (see Table 3).

We find, in line with Vink and Thibeault (2008), a negative relationship between maturity and credit spreads for ABS. Interestingly, a convex relationship between credit spread and maturity appears

[15] It is also important to notice that under CBPP1, CBPP2, and CBPP3, only covered bonds with a rating classification of BBB- or higher are eligible for ECB purchase.

strongly significant for covered bonds. This "smile" effect can be explained by liquidity risk associated with short-term bonds and by covered bond market effects, namely higher market competition by banks and investors for standard, medium-term maturities (e.g., the ECB defined a time to maturity interval of 3-7 years as one of the eligibility criteria in CBPP1). The influence of *transaction size* on credit spread is negative and significant for MBS, but insignificant for ABS and PCB. This suggests that increasing the transaction size of an MBS by €100 million will reduce the required credit spread by 10.1 bps, which indicates a positive price liquidity effect related to the size of the MBS deal. On the contrary, MCB have higher spreads, which can be explained by the fact that larger issues means higher asset pools on the balance sheet, since banks are responsible for maintaining sufficient assets on its balance sheet and the level of overcollateralization to meet investor's needs.

The tranche rank behaves differently for MBS than for MCB. As expected, spread and tranche rank are significantly positively related for the former. That is, the greater the subordination level, the higher the credit spread. In securitization, the structure is layered so that each senior class (or tranche) is larger and has absolute priority in the cash flow over the more junior classes. On the contrary, credit spread and tranche rank have a significant negative relationship for MCB, suggesting that investors associate an increase in the number of tranches with a decrease of credit risk. This can be explained by the fact that in MCB tranches are usually designed for different maturities rather than for credit quality.

The influence of currency risk on credit spread is insignificant for ABS and MBS, but positive and significant for PCB and MCB. Such a mismatch in the currency of the deal's nationality and the currency of the covered bond issuance significantly increases the yield charged by 21.3 bps and 23.3 bps for PCB and MCB, respectively. Contrary to what is expected, but in line with the results presented by Marques and Pinto (2020), issuers raise funds via ABS and MBS at a lower credit spread through fixed priced issues than through floating rate issues. As expected, the greater the *number of banks* and

the better the reputation of the banks involved, the lower the credit spread for covered bonds. However, these factors do not affect credit spreads in ABS and MBS.

As expected, *country risk* is significantly positively related to spread for MBS, PCB, and MCB, indicating that lending to a bank located in a country with a rating of BB+ (BB+=11) *versus* one with a rating of AAA (AAA=1) will increase the credit spread by 36.6 bps, 147.1 bps, and 27.5 bps for MBS, PCB, and MCB, respectively. The impact of the creditor rights index is positive and significant for ABS and MCB, but significant and negative, as expected, for PCB. As we expected, covered bonds issued in countries with a strong legal enforcement system pay lower yields. On the contrary, there is a significant positive impact of enforcement on MBS credit spreads. Despite being insignificant for ABS, the relationship between credit spread and the slope of the Euro swap curve, *EUSA5y-Libor3M*, is significant and negative for MBS, PCB, and MCB, meaning a steeper Euro swap curve is associated with lower credit spreads. Credit spread and market volatility are significantly positively related for covered bonds. These results are in line with those of Beirne *et al.* (2011) and Prokopczuk and Vonhoff (2012), who found a significant and positive relationship for MCB, but different from those of Gürtler and Neelmeier (2018), who present an insignificant relationship for PCB.

As we use year fixed effects, *financial crisis* and *sovereign crisis* dummies, as well as dummies capturing ECB's asset purchase programmes, capture the impact of tranches issued between the starting date of that exogenous event and the end of that year. With the exception of ABS, *financial crisis* dummy is associated with significant increases in credit spreads, while the start of the European sovereign debt crisis has imposed a significant increase in credit spreads for PCB and MCB of 24.9 bps and 45.8 bps, respectively. Results also show that while the first and the third CBPP (*CBPP1* and *CBPP3/ABSPP* dummies) had a reducing effect on European covered bond credit spreads, the second CBPP (*CBPP2* dummy) is associated with significant 50.3 bps and 48.4 bps increases in PCB and

MCB credit spreads, respectively. Regarding securitization bonds, we find that CBPP1 and CBPP2 do not contribute to a credit spread reduction for both ABS and MBS. In fact, we find that the ECB asset purchases of covered bonds during the CBPP1 fed through into MBS asset prices, thus leading to an increase in credit spreads. Concerning ABSPP, we find that despite the insignificant impact on ABS credit spreads, this programme led, on average, to a 33.5 bps reduction in MBS credit spreads, which is in line with the ECB objective of easing funding conditions for credit institutions.

Our findings are similar to those presented by Beirne *et al.* (2011), Szczerbowicz (2015), Markmann and Zietz (2017), and Gürtler and Neelmeier (2018), for the impact of CBPP1 on credit spread: the first CBPP led to a narrowing of both PCB and MCB credit spreads. For CBPP2, contrary to Szczerbowicz (2015) and Gibson *et al.* (2016), but in line with Markmann and Zietz (2017) and Gürtler and Neelmeier (2018), we find a significant positive relationship between CBPP2 dummy and credit spreads for PCB. In addition, we find that the second CBPP has a significantly positively influence on MCB credit spread. Thus, our results regarding the second CBPP are not consistent with the ECB objective of promoting the easing of funding conditions for credit institutions and enterprises. These findings can be explained by the fact that in the second programme the demand was significantly lower than the announced amount; whereas the planned amount was completely exhausted during the first programme, during the second programme the total amount of purchased covered bonds only reached €16.4 billion of €40 billion. Additionally, in December 2011, the ECB announced the three year jumbo Longer-Term Refinancing Operations (LTROs) and settled its first tranche, with the second tranche being settled in March 2012, which had a longer impact on the euro-denominated covered bond market with a significant decrease of public issuance in 2011 and 2012.

### *4.2. Bond pricing and banks' choice*

In our sample, banks can choose between ABS and PCB, and between MBS and MCB. For example, Banco Santander, S.A. issued €317,375.5 billion of bonds over the 2000-2016 period, using both securitization – ABS (€26.9 billion) and MBS (€174.6 billion) – and covered bonds – PCB (€11.1 billion) and MCB (€104.8 billion), switching 73 times between both deal types (see Table 8). As the choice between securitization and covered bonds may be endogenous to credit spreads, to test the robustness of our results we use an endogenous switching regression model (Lokshin and Sajaia, 2004) to study pricing, taking into consideration the potential self-selection by firms between issuing the two bond types. We perform a full information maximum likelihood (FIML) method on the credit spread samples of our model specifications – models [5] and [6] of Table 5 – simultaneously with a probit selection equation, where the choice between securitization and covered bonds is a function of contractual and bank characteristics, and macroeconomic factors.[16] The empirical model consists of the following three equations:

$$Credit\ spread\ Securitization_{i,t} = \alpha_0 + \beta_1 Rated_{i,t} + \beta_2 Rated * Rating_{i,t} + \beta_3\ Rating\ discordance_{i,t} + \gamma\ Contractual\ characteristics_{i,t} + \varphi\ Macroeconomic\ factors_t + \omega\ Bank\ characteristics_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

$$Credit\ spread\ Covered\ Bonds_{i,t} = \alpha_0 + \beta_1 Rated_{i,t} + \beta_2 Rated * Rating_{i,t} + \beta_3\ Rating\ discordance_{i,t} + \gamma\ Contractual\ characteristics_{i,t} + \varphi\ Macroeconomic\ factors_t + \omega\ Bank\ characteristics_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

$$I^*_{i,t} = \delta_0(Credit\ spread\ Securitization_{i,t} - Credit\ spread\ Covered\ Bonds_{i,t}) + \beta_1 Rated_{i,t} + \beta_2 Rated * Rating_{i,t} + \beta_3\ Rating\ discordance_{i,t} + \gamma\ Contractual\ characteristics_{i,t} + \varphi\ Macroeconomic\ factors_t + \omega\ Bank\ characteristics_{i,t-1} + u_{i,t} \quad (4)$$

where the third equation models bond selection: if $I_i^* > 0$, then firm *i* issues an ABS or an MBS; otherwise it issues PCB or MCB. We adjust for heteroscedasticity and due to time varying risk premia and cross-country differences, we estimate standard errors clustered by year and country. The Wald

[16] We implement a FIML method to simultaneously estimate binary and continuous parts of the model in order to yield consistent standard errors. For further analysis, see Lokshin and Sajaia (2004).

test statistics of independent equations lead us to reject the hypothesis of equations being independent for model [6], but not for model [5].

****** Insert Table 5 about here ******

Results in Table 5 show that the impact of banks' characteristics is different for securitization *vis-à-vis* covered bond securities. Regarding ABS, detailed in model [5], banks' size and capital adequacy ratio have a significant negative impact on credit spreads. In addition, loan ratio has a significant impact on credit spreads, but with a sign contrary to expectations. This can be explained by the fact that banks with a higher loan ratio are relatively larger and have a wider credit portfolio at their disposal, as they can choose the loans that best adapt to the ABS deal to be structured and the predetermined credit rating to be attained. Similar results are obtained for MBS, in Model [6]. We also find, as expected, that the higher the bank's liquidity and the capital adequacy ratio, the lower the MBS credit spread. Contrary to what we expected, non-performing loans ratio negatively impacts credit spreads. This might mean that banks with a higher proportion of non-performing loans have to resort to higher credit enhancement mechanisms to be able to issue bonds with relatively lower yields.

Results reported for PCB in model 5 indicate, as expected, that loan ratio and credit spread have a significant positive relationship, while banks with more regulatory capital pay lower credit spreads. As for MBS, we find a significantly negative relationship between non-performing loans ratio and PCB credit spreads. Finally, model [6] shows, as expected, that larger banks and those with higher profitability and more regulatory capital pay lower credit spreads. We also find that the higher the loan ratio, the higher MCB credit spreads. Finally, it is important to note that investors do consider factors other than credit ratings, some of them already considered by rating agencies in assessing ratings, in pricing both securitization and covered bonds, which corroborates H2.

Finally, results in Table 5 for contractual and macroeconomic factors show that the significance and sign of the coefficients are in line with those included in Table 4, with the following differences to consider: (*i*) contrary to expected, rating discordance variable becomes significantly negatively related to credit spread for ABS; (*ii*) the coefficients on maturity and log maturity become insignificant for ABS, and there is a convex relationship between credit spread and maturity for MBS; (*iii*) the impact of tranche rank on credit spread becomes insignificant for MBS; (*iv*) as expected, the relationship between fixed rate and credit spread become significant and positive for covered bonds; and *(v*) CBPP2 affects MBS credit spreads positively. Overall, our results corroborate H1, that securitization and covered bonds are priced differently by common pricing factors, and H2, as investors rely on factors other than ratings when pricing ABS, MBS, PCB, and MCB.

Although a thorough analysis of the determinants of debt financing choice between securitization and covered bonds is beyond the scope of this paper, Table 5 presents some interesting results. Findings suggest that banks choose ABS *vis-à-vis* PCB when they have higher loan ratios. Model [5] also shows that banks with lower capital adequacy prefer ABS over PCB, which is in line with the idea that banks use securitization to adjust capital ratios. Banks choose MBS *versus* MCB – model [6] – when they are relatively larger and more profitable. Additionally, banks with a higher proportion of net loans in total assets, as well as with higher liquidity and capital adequacy ratios prefer MCB rather than MBS. These results corroborate those of Carbó-Valverde *et al.* (2017) and Boesel *et al.* (2018): banks are more likely to issue MCB *versus* MBS for liquidity reasons, while banks that aim to meet regulatory capital requirements would prefer securitization. We consider that a further analysis of banks' choice between securitization and covered bonds is an important avenue for future research.

### *4.3. Do securitization bonds have higher yields than similarly rated covered bonds?*

Models [3] and [4] of Table 4 show that, when controlling for credit rating and other contractual and macroeconomic factors, securitization bonds have higher yields than comparable covered bonds, which corroborates H2 that there is a mispricing effect and bond prices reflect information beyond credit ratings. However, these results do not corroborate H3. In this section, we examine this further.

Table 6 presents the results of estimating equation (1) using a sample of 4,963 securitization bonds and 13,346 covered bonds, model [7], as well as the sub-samples by rating classes presented in Table 6, models [7a] to [7j], where a dummy variable *securitization*, equal to 1 if the bond is an ABS or an MBS, and 0 if it is, instead, a PCB or an MCB, is included as an additional regressor. The results suggest that securitization bonds are associated with higher credit spreads than covered bonds. When re-estimating model [7] for the sub-samples of comparable covered and securitization bonds, we find that ABS have higher credit spreads than PCB. Similarly, the MBS dummy is associated with a 28.3 bps increase in credit spreads. Untabulated results show that these results hold for sub-samples created based on whether the bond is issued in the pre-crisis or during the crisis period.

****** Insert Table 6 about here ******

Models [7a] to [7j] indicate that securitization bonds are issued with significantly higher credit spreads than covered bonds with identical credit ratings for AA, AA-, A+, A, A-, and BBB rating classes. In line with Brennan *et al.* (2009), we show that the difference in spreads increases as rating deteriorates. For the remaining rating classes, securitization bond credit spreads do not differ significantly from those of covered bonds. When comparing securities backed by public sector loans, AAA, AA+, A+, and BBB+ ABS have higher credit spreads than PCB, while for the remaining rating classes coefficients are statistically insignificant. Concerning MBS *vis-à-vis* MCB, our results show that MBS offer higher yields than similarly rated MCB for the majority of rating classes – the exceptions are AAA and AA+ rating classes.

Overall, our results corroborate H2 that there is a mispricing effect in securitization *versus* covered bond markets and credit spreads reflect information beyond credit ratings. Therefore, our results are in line with those of Cornaggia *et al.* (2017) and Marques and Pinto (2020). In fact, bond prices reflect additional information other than credit ratings across asset classes, which can be explained by the fact that ratings methodologies are based on physical default probabilities (or expected losses) that do not capture risk premia. A rating is a measure of total, individual bond risk and is not a measure of systematic risk that investors price. We thus show that systematic risk is relatively more important for securitization than for covered bonds; i.e., it constitutes a larger fraction of total risk. We also reject H3 as we find that securitization bonds have higher credit spreads than covered bonds for almost rating classes, especially for when comparing MBS with MCB.

### *4.4. Robustness checks*

We perform a number of additional robustness checks that further control for results in Table 4. First, we re-estimate our models for sub-samples created according to ECB eligibility criteria for purchase under CBPP1, CBPP2, CBPP3 and ABSPP.[17] We corroborate our previous results regarding the impact of ECB APP in credit spreads: (*i*) while both CBPP1 and CBPP3 show the strongest signs of reaching the ECB's target of improving funding conditions for banks by lowering covered bond yields, we find a significant and positive relationship between the CBPP2 dummy and covered bonds; (ii) we show a significant negative impact of the ABSPP on MBS credit spreads, but not for ABS. However, we do not find spillover effects of the CBPP1 on MBS credit spreads. Second, we test the robustness of our results by re-estimating our models for sub-samples after removing bonds issued in countries – Greece, Italy, Ireland, Portugal and Spain (GIIPS) – that were significantly affected by the

[17] We select securitization and covered bonds denominated in EUR, issued by Eurozone banks and with at least a BBB- credit rating. We excluded covered bonds with a tranche size lower than €100 million and €300 million for CBPP1 and CBPP2, respectively. Finally, we consider bonds with a time to maturity between 3 and 7 years for CBPP1 and lower than 10.5 years for CBPP2.

European sovereign debt crisis. Finally, we run estimations including year multiplied by country fixed effects. Overall, estimates are not driven by the exclusion of GIIPS and the inclusion of year*country fixed effects.

## 5. Bond issuance and banks' cost of borrowing: a deal-level analysis

In this section, we focus on the originating/issuing banks' cost of borrowing and their accounting and market characteristics. Our goal is to examine which financing structure, securitization or covered bond deals, allow banks to raise debt with a lower cost of borrowing.

### *5.1. Banks' characteristics*

After applying the procedures mentioned in section 3.2.4., we identified 337 and 4,849 banks that were originators and issuers of securitization and covered bonds, respectively. Of these banks, 52 were originators of securitization bonds only, 890 were issuers of covered bonds only, and 4,244 were classified as switchers. It is important to note that a very low fractions of banks are originators of securitization bonds only (1.0%) and a higher proportion of banks were switchers (81.8%). Table 7 reports characteristics of banks segmented into five categories according to their issuance record.

****** Insert Table 7 about here ******

Contrary to covered bonds, in securitization various classes are created to generate differential interests in the pool, such that the senior investors have priority rights over subordinated investors; that is, deals are structured with the aim of each tranche meeting a desired investor's risk-return profile. Therefore, the cost of borrowing is determined by the combination of the different tranches' credit spread. We use the weighted average spread (WAS), calculated as the sum of the product of the weight of each tranche in the transaction size and the tranche's credit spread, as a measure of the total cost of borrowing. We find that the average WAS for securitization transactions does not differ significantly from that of covered bond transactions. Similar results are obtained when comparing banks using

securitization or covered bonds only. Results presented in Table 7 also show that financial firms that use securitization are larger and 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 firms that use securitization (33.5%) is significantly lower than for covered bond (52.8%) users, which seems to indicate that banks that engage in securitization present lower liquidity. Financial firms using securitization have, on average, higher capital ratios and profitability than those using covered bonds. Results regarding capital adequacy and return on assets ratios also hold when comparing banks that originate securitization bonds only with those that issue covered bonds only. Finally, the ratio used as a proxy for banks' credit risk yields different results. While the non-performing loans ratio is lower for all banks that use securitization *vis-à-vis* covered bonds (3.1% *versus* 4.1%), this ratio is significantly higher for originating banks that use securitization only (4.3%) *versus* financial firms that use covered bonds only (4.1%).

*5.2. Banks' cost of borrowing: securitization versus covered bond deals*

We examine which of the two financing transactions have the lowest borrowing cost by using the model specified in equation (5). The dependent variable is the WAS, in basis points, and we create dummy variables set equal to one if the transaction is an ABS (*versus* a PCB) or an MBS (*versus* an MCB) deal. We employ OLS regression techniques and adjust for heteroskedasticity. Standard errors are clustered by year and country.

$$WAS_{i,t} = \alpha_0 + \beta_1 ABS_{i,t} + \beta_2 MBS_{i,t} + \gamma\ Contractual\ characteristics_{i,t} + \\ + \varphi\ Macroeconomic\ factors_t + \omega\ Firm\ characteristics_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

Columns 1 and 4 of Table 9 report estimates of this equation, models [8] and [10], using the samples presented in Table 7. The results suggest that while ABS deals collateralized by public loans in Europe are associated with lower WAS, holding other factors constant, when compared with PCB; the WAS does not differ significantly between MBS and MCB. However, these models do not control

for the deal's credit risk, which is a key factor in determining their overall borrowing cost. In models [8a] and [10a] we include the deal's weighted average rating (*WAR*) and results remain the same.

****** Insert Tables 8 and 9 about here ******

In previous models, ABS and MBS dummies may suffer from sample selection bias because we only observe borrowing costs for the bond type that banks choose; we do not observe counterfactual borrowing costs. To account for this problem, we re-estimate models [8] and [10] considering a sub-sample of transactions closed by switchers, banks that employ both securitization and covered bonds, over the sampling period. Table 8 provides information on the top 10 switchers and their relative importance in securitization and covered bond markets. Banco Santander, S.A. used both markets extensively in the 2000-2016 period, closing €317.4 billion and switching 73 times between bond types. The British Lloyds Banking Group plc has the highest proportion of securitization origination, corresponding to 76.2% of all bonds closed by this entity. Likewise, Commerzbank is the bank with the highest proportion of covered bonds issued (96.2%), with a total value of €244.4 billion, corresponding to 1,415 PCB and MCB deals carried out in our sampling period. Results in Table 9 show, again, that ABS transactions have lower WAS than PCB issues for a sub-sample of switchers, since the ABS dummy variable is associated with a 111.0 bps drop in WAS (model [9]). In line with previous findings, our results show that the WAS does not differ significantly between MBS and MCB.

Finally, as the choice between securitization and covered bond transactions may be endogenous – that is, banks determine whether they want to access the securitization/covered bond market and when or banks that securitize assets/use covered bonds are those that in fact have access to this market – we re-estimate models [8] and [10] using endogenous switching regression models, as presented in section 4.2. We use as our selection equation the model specified in equation (4) while WAS regressions follow the model specified in equation (5). We calculated the expected values of

WAS for securitization and covered bond transactions conditional on the debt choice and implemented a two-sample *t*-test assuming unequal variances. Untabulated results show, again, that ABS transactions' WAS are lower than PCB transactions' WAS, while the WAS does not differ significantly between securitization and covered bond deals backed by mortgages.

We can draw two major conclusions from our results. First, European banks do not choose between MBS and MCB deals to manage their cost of borrowing. The choice between these two financing solutions may depend on investors' appetite over time (e.g., ECB APP), exogenous factors like financial crises, and the objectives to be achieved by banks, particularly with regard to increasing liquidity and/or diversifying funding sources *versus* credit risk management and regulatory capital arbitrage, as shown in Table 5. Second, the cost of borrowing seems to affect the banks' choice between ABS collateralized by public loans and PCB. This finding is in line with the arguments of securitization and security design literature (Goldberg and Rogers, 1988; Diamond, 1993; Winton, 1995; Glaeser and Kallal, 1997; Gorton and Metrick, 2013) that the design and issuance of different classes of securities with different degrees of seniority – structuring and tranching – reduce the cost of borrowing. In asset-backed transactions, most of the tranches issued by SPVs have a higher rating than the bonds issued directly by the originating firm itself, due to asset pool segregation and credit quality assessment based on the underlying pool of assets, combined with credit enhancement mechanisms (Gorton and Souleles, 2007; Ayotte and Gaon, 2011). This is of particular importance for banks in countries with worse sovereign ratings. But if this is the case, why banks choose to issue PCB if they have a higher WAS? Fabozzi *et al.* (2006) point out that securitization deals have higher transaction costs – both up-front (e.g., with rating agencies, underwriters, setting-up the SPV, and arrangers) and ongoing (e.g., with trustees auditors and servicers) costs – *vis-à-vis* other bond issuances. Therefore, banks choose ABS for larger debt borrowings because of the economies of scale on issuance costs. This is

corroborated by our results: ABS deals are five times higher than PCB (Table 3) and we find a positive relationship between loan ratios and the probability of choosing ABS *versus* PCB deals (Table 5).

## 6. Summary and conclusions

The paper compares credit spreads and the pricing of securitization bonds – ABS and MBS – to that of covered bonds – PCB and MCB –, using a cross-section of European bonds issued by banks in the 2000-2016 period. We also examine if there is a mispricing effect on bond markets and whether credit spreads convey information beyond credit ratings across securitization and covered bonds.

We show that securitization and covered bonds are priced differently. Our results show evidence of a mispricing effect between securitization and covered bonds, which increases with the subordination level: securitization bonds have higher credit spreads than comparable covered bonds for almost rating classes, especially for MBS *vis-à-vis* MCB. We also corroborate securitization and security design literature for ABS *versus* PCB when implementing a deal-level analysis. We find that ABS backed by public loans can be used as a mechanism for reducing banks' cost of borrowing, by mitigating market imperfections and achieving credit quality improvement. Regarding MBS *vis-à-vis* MCB, the choice between securities backed by mortgages is not driven by borrowing costs, but by other motivation such as liquidity needs *versus* regulatory capital arbitrage. We consider that an analysis focused on the determinants of banks' choice between securitization and covered bonds is an important avenue for future research.

A correct security pricing is vital for a properly functioning bond market. Our findings indicate that credit ratings may be limited in this purpose, since credit spreads incorporate additional information beyond credit ratings. Given the contracting complexity of securitization and covered bond transactions and the frequent unavailability of detailed information about European collateral pools, many investors do not have the expertise to price these bonds correctly and have to rely on credit

ratings (Brennan *et al.*, 2009; Coval *et al.*, 2009a,b; Pagano and Volpin, 2012). We argue that the improving transparency and disclosure standards in both securitization and covered bond markets, mainly through rating agencies, may improve informational efficiency in both markets. In addition, several investors present evidence of 'rating inflation' in securitization products in the run up to the 2008 financial crisis (Griffin *et al.*, 2013; Cornaggia *et al.*, 2017). This led legislators and regulators to propose that credit ratings should be applied consistently across asset classes. We show that a standardized credit rating approach transversal to all bond classes can be dangerous. First, we find that while for ABS and MBS, credit rating is the most important determinant of credit spread, the impact of credit rating in covered bond credit spreads is relatively low. Second, we document differences in credit spreads between ABS and PCB, as well as between MBS and MCB, by rating scales and over time.

Finally, we conclude that bond markets respond efficiently to the announcement of asset purchase programmes when there is a clear rationale for central bank intervention. We identify an easing of bank funding conditions through the emission of PCB and MCB due to the announcement and implementation of CBPP1, but not for CBPP2. This indicates that market participants largely expected the programme or that it was not equipped to solve the prevalent sovereign debt crisis. Additionally, we find a significant and negative impact of CBPP3 on covered bond spreads. Similar results were obtained regarding the impact of the ABSPP on MBS credit spreads. The response to the 2008 financial crisis and the subsequent European sovereign debt crisis created a suite of tools for crisis response. This work contributes to the discussion on how these tools might be implemented and how effective they have proven to be, mainly in response to the COVID-19 pandemic.

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

**Panel A: Geographic distribution**

| Geographic location of originator/issuer | Securitization Bonds | | | | | | Covered Bonds | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ABS | | | MBS | | | PCB | | | MCB | | |
| | Number of tranches | Total value [€ Million] | Percent of total value | Number of tranches | Total value [€ Million] | Percent of total value | Number of tranches | Total value [€ Million] | Percent of total value | Number of tranches | Total value [€ Million] | Percent of total value |
| Austria | - | - | - | - | - | - | 77 | 17,900 | 1.25 | 131 | 15,174 | 0.91 |
| Belgium | - | - | - | 41 | 42,947 | 2.61 | 691 | 104,684 | 7.30 | 183 | 54,340 | 3.25 |
| Cyprus | - | - | - | - | - | - | - | - | - | 1 | 1,000 | 0.06 |
| Denmark | - | - | - | - | - | - | 1 | 1,000 | 0.07 | 6 | 6,000 | 0.36 |
| Finland | - | - | - | 8 | 8,291 | 0.50 | 2 | 2,000 | 0.14 | 25 | 14,775 | 0.88 |
| France | 11 | 1,752 | 1.02 | 127 | 33,597 | 2.04 | 68 | 39,928 | 2.78 | 909 | 388,884 | 23.28 |
| Germany | 136 | 12,823 | 7.48 | 315 | 75,969 | 4.62 | 5,787 | 953,813 | 66.49 | 3,651 | 408,101 | 24.43 |
| Greece | 21 | 15,115 | 8.82 | 39 | 15,245 | 0.93 | - | - | - | 4 | 4,250 | 0.25 |
| Ireland | - | - | - | 74 | 49,480 | 3.01 | 17 | 12,340 | 0.86 | 40 | 23,261 | 1.39 |
| Italy | 59 | 20,861 | 12.18 | 405 | 175,838 | 10.69 | 100 | 32,432 | 2.26 | 553 | 149,739 | 8.96 |
| Luxembourg | 1 | 115 | 0.07 | - | - | - | 1 | 37 | 0.00 | - | - | - |
| Netherlands | 19 | 4,468 | 2.61 | 705 | 353,539 | 21.48 | 8 | 9,058 | 0.63 | 73 | 45,157 | 2.70 |
| Portugal | 19 | 6,146 | 3.59 | 110 | 38,858 | 2.36 | 2 | 2,500 | 0.17 | 39 | 32,755 | 1.96 |
| Spain | 353 | 99,087 | 57.84 | 770 | 266,870 | 16.22 | 146 | 175,414 | 12.23 | 465 | 383,066 | 22.93 |
| Sweden | - | - | - | - | - | - | 64 | 15,746 | 1.10 | 101 | 22,769 | 1.36 |
| Switzerland | - | - | - | - | - | - | 2 | 1,284 | 0.09 | - | - | - |
| United Kingdom | 49 | 10,960 | 6.40 | 1,701 | 584,952 | 35.55 | 39 | 66,457 | 4.63 | 160 | 121,505 | 7.27 |
| **Total** | **668** | **171,326** | **100.00** | **4,295** | **1,645,586** | **100.00** | **7,005** | **1,434,593** | **100.00** | **6,341** | **1,670,777** | **100.00** |

**Panel B: Top originators/issuers**

| Securitization Bonds | ABS | | | MBS | |
|---|---|---|---|---|---|
| | By value of deals | By number of deals | | By value of deals | By number of deals |
| Banco Santander, S.A. | 14.2% | 6.0% | Banco Santander, S.A. | 9.1% | 5.4% |
| BBVA, S.A. | 8.2% | 5.0% | Lloyds Banking Group plc | 8.9% | 3.6% |
| La Caixa | 7.2% | 5.0% | UK Asset Resolution Ltd | 6.9% | 3.4% |
| Banco Popular Espanol, S.A. | 5.9% | 4.5% | Rabobank Nederland | 5.4% | 3.9% |
| Banco de Sabadell, S.A. | 5.2% | 6.0% | Royal Bank of Scotland Group plc | 4.9% | 2.7% |
| Cassa Depositi e Prestiti SpA | 4.3% | 2.5% | ABN AMRO Group NV | 4.3% | 1.6% |
| Eurobank Ergasias, S.A. | 4.3% | 1.5% | Barclays plc | 2.9% | 1.8% |
| Lloyds Banking Group plc+B13 | 3.7% | 2.5% | UniCredit SpA | 2.5% | 1.4% |
| UniCredit SpA | 3.0% | 4.0% | Deutsche Bank AG | 2.4% | 2.5% |
| BFA Tenedora de Acciones, S.A. | 2.7% | 3.0% | BBVA, S.A. | 2.3% | 1.8% |
| **Covered Bonds** | **PCB** | | | **MCB** | |
| | By value of deals | By number of deals | | By value of deals | By number of deals |
| Commerzbank AG | 12.0% | 10.6% | BPCE, S.A. | 9.6% | 7.5% |
| Landesbank Baden-Wuerttemberg | 10.3% | 17.1% | Banco Santander, S.A. | 6.3% | 1.9% |
| Norddeutsche Landesbank Girozentrale | 8.4% | 11.9% | UniCredit SpA | 5.0% | 7.3% |
| Confederacion Espanola de Cajas de Ahorros, S.A. | 7.5% | 0.7% | Commerzbank AG | 4.3% | 10.8% |
| Landesbank Hessen-Thueringen Girozentrale-Helaba | 5.9% | 6.5% | La Caixa | 4.3% | 1.0% |
| BayernLB Holding AG | 5.0% | 7.6% | BBVA, S.A. | 4.1% | 0.8% |
| DZ Bank AG | 4.1% | 7.3% | Caisse de Refinancement de l'Habitat, S.A. | 3.9% | 2.5% |
| Dexia, S.A. | 3.9% | 7.8% | BFA Tenedora de Acciones, S.A. | 3.1% | 0.8% |
| SFIL-Societe de Financement Local | 3.7% | 2.0% | SFIL-Societe de Financement Local | 2.9% | 2.8% |
| DekaBank Deutsche Girozentrale | 3.4% | 2.7% | Aareal Bank AG | 2.8% | 5.8% |

Panel A details the tranche allocation to originating/issuing banks in a particular country, whereas Panel B provides information on the biggest players and their relative importance in securitization and covered bond markets, by bond type. Data are for tranches with credit spread and tranche amount available, closed by European banks during the 2000-2016 period.

## Table 2: Definition of variables, sources, and the expected impact on credit spread

| Variable | Description | Source | Expected impact on credit spread | | | |
|---|---|---|---|---|---|---|
| | | | ABS | MBS | PCB | MCB |
| **Dependent Variables** | | | | | | |
| Credit 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 | | | | |
| **Independent variables:** | | | | | | |
| ***Contractual characteristics*** | | | | | | |
| Rated | Dummy equal to 1 if the bond has a credit rating from S&P or Moody's, and 0 otherwise. | DCM Analytics | - | - | - | - |
| 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 | | | | |
| Rating discordance | Dummy equal to 1 if S&P and Moody's assign a different credit rating for the same tranche, and 0 otherwise. | DCM Analytics | + | + | + | + |
| Maturity | Maturity of bonds, in years. | DCM Analytics | NL | NL | + | + |
| 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 | | | | |
| Transaction size | Bond transaction size. Transaction size is converted into Euro millions when necessary. | DCM Analytics | - | - | - | - |
| Tranche rank | Ordinal variable that ranges from 1 to 26 depending on the seniority of the tranche within the deal - a proxy of the subordination level. | DCM Analytics | + | + | - | - |
| Number of tranches | The number of tranches per transaction. | DCM Analytics | - | - | + | + |
| Currency risk | Dummy equal to 1 for bonds that are denominated in a currency different from the currency in the deal's nationality, and 0 otherwise. | DCM Analytics | + | + | + | + |
| Fixed rate | Dummy equal to 1 if a bond is fixed price, and 0 otherwise. | DCM Analytics | + | + | + | + |
| Number of banks | The number of banks participating in bond issuance, as bookrunners, underwriters or servicers. | DCM Analytics | - | - | - | - |
| Bank reputation | EMEA bookrunners rank according to Thomson Reuters League Tables. Ranks range from 1 (worst) to 25 (best). | Thomson Reuters DMI | - | - | - | - |
| Callable | Dummy equal to 1 if the bond has a call option, and 0 otherwise. | DCM Analytics | + | + | + | + |
| ***Macroeconomic factors*** | | | | | | |
| Volatility | The Chicago Board Options Exchange Volatility Index (VIX). | Datastream | + | + | + | + |
| EUSA5y-Libor3M | The difference between the five-year Euro swap rate and the 3-month Libor rate. | Datastream | - | - | - | - |
| Country risk | S&P's country credit rating at close. The rating is converted as follows: AAA=1, AA+=2, and so on until D=22. | S&P Global Ratings | + | + | + | + |
| Financial crisis | Dummy equal to 1 if the issue date belongs to the 2007-2008 financial crisis period (from September 15, 2008 - Lehman Brothers' bankruptcy filing date - through to April 23, 2010), and 0 otherwise. | Authors | + | + | + | + |
| Sovereign crisis | Dummy equal to 1 if the issue date belongs to the European sovereign debt crisis (from April 24, 2010 through to December 31, 2016), and 0 otherwise. | Authors | + | + | + | + |
| Creditor rights | Measured using La Porta, Lopez-de-Silanes, Shleifer and Vishny's (1998) indices. We use four creditor rights variables (no automatic stay on assets; secured creditors first paid; restrictions for going into reorganization; management does not stay in reorganization) and added up the scores to create an index as in Esty and Megginson (2003). | LLSV (1998) | - | - | - | - |
| Enforcement | Measured using La Porta, Lopez-de-Silanes, Shleifer and Vishny's (1998) indices. We use five enforcement variables (efficiency of judicial system; rule of law; corruption; risk of expropriation; risk of contract repudiation) and added up the scores to create an index. | LLSV (1998) | - | - | - | - |
| CBPP1 | Dummy equal to 1 if the bond was issued during the first CBPP (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 CBPP (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 CBPP or the first ABS Purchase Programme (from September 4, 2014 through to December 31, 2016), and 0 otherwise. | ECB | - | - | - | - |
| ***Banks' characteristics*** | | | | | | |
| Total assets | Banks' total assets measured in Euro million. | Bankscope | - | - | - | - |
| Loan ratio | The ratio of net loans to total assets. | Bankscope | + | + | + | + |
| Liquid assets to deposits & ST funding | The ratio of the value of liquid assets to short-term funding plus total deposits. Liquid assets include cash and due from banks, trading securities and at fair value through income, loans and advances to banks, reverse repos and cash collaterals. Deposits and short term funding includes total customer deposits and short term borrowing. | 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 | - | - | - | - |
| Non-performing loans ratio | The ratio of total non-performing (or doubtful) loans to gross loans. | Bankscope | + | + | + | + |

The following characters mean: – = negative impact on the credit spread | + = positive impact on the credit spread | NL = Not linear | ? = the impact cannot be clear determined following extant literature |

## Table 3: Univariate statistics - pricing features associated with bonds compared

| Variable of interest | Securitization Bonds | | | Covered bonds | | | Variable of interest | Securitization Bonds | | | Covered bonds | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | ABS | MBS | All | PCB | MCB | | All | ABS | MBS | All | PCB | MCB |
| ***Univariate analysis - continuous variables*** | | | | | | | | | | | | | |
| **Credit spread (bps)** | | | | | | | **Transaction size (€ Million)** | | | | | | |
| Number | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 | Number | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 |
| Mean | 96.1 [a] | 127.5 [b] | 91.2 [c] | 48.0 [a] | 35.4 [b] | 62.0 [c] | Mean | 2,049.3 [a] | 1,063.0 [b] | 2,202.7 [c] | 243.0 [a] | 214.9 [b] | 274.1 [c] |
| Median | 65.2 | 73.0 | 64.8 | 32.0 | 24.0 | 44.0 | Median | 1,025.3 | 703.6 | 1,081.0 | 75.0 | 100.0 | 60.0 |
| **Rating [1-22 weak]** | | | | | | | **Tranche size (€ Million)** | | | | | | |
| Number | 4,643 | 612 | 4,031 | 12,084 | 6,472 | 5,612 | Number | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 |
| Mean | 4.4 [a] | 5.6 [b] | 4.2 [c] | 1.6 [a] | 1.4 [b] | 1.8 [c] | Mean | 366.1 [a] | 256.5 | 383.1 [c] | 232.7 [a] | 204.8 | 263.5 [c] |
| Median | 3.0 | 5.0 | 3.0 | 1.0 | 1.0 | 1.0 | Median | 80.0 | 79.1 | 80.0 | 75.0 | 100.0 | 60.0 |
| **Tranche rank** | | | | | | | **Number of banks** | | | | | | |
| Number | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 | Number | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 |
| Mean | 3.7 [a] | 2.9 [b] | 3.8 [c] | 1.0 [a] | 1.0 [b] | 1.0 [c] | Mean | 2.8 [a] | 1.9 [b] | 2.9 [c] | 2.0 [a] | 2.0 [b] | 2.1 [c] |
| Median | 3.0 | 3.0 | 3.0 | 1.0 | 1.0 | 1.0 | Median | 2.0 | 1.0 | 2.0 | 1.0 | 1.0 | 1.0 |
| **Maturity (years)** | | | | | | | **Country risk [1-22 weak]** | | | | | | |
| Number | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 | Number | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 |
| Mean | 35.0 [a] | 26.5 [b] | 36.4 [c] | 5.8 [a] | 5.6 [b] | 6.1 [c] | Mean | 1.6 [a] | 1.9 [b] | 1.5 | 1.4 [a] | 1.2 [b] | 1.6 |
| Median | 36.3 | 29.9 | 37.0 | 5.0 | 5.0 | 5.0 | Median | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| **Number of tranches** | | | | | | | **Creditor rigths** | | | | | | |
| Number | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 | Number | 4,962 | 667 | 4,295 | 13,344 | 7,004 | 6,340 |
| Mean | 6.7 [a] | 4.9 [b] | 7.0 [c] | 1.0 [a] | 1.0 [b] | 1.0 [c] | Mean | 2.7 | 2.3 [b] | 2.8 [c] | 2.6 | 2.8 [b] | 2.3 [c] |
| Median | 6.0 | 5.0 | 6.0 | 1.0 | 1.0 | 1.0 | Median | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 |
| ***Univariate analysis - dummy variables*** | | | | | | | | | | | | | |
| **Fixed rate** | | | | | | | **Currency risk** | | | | | | |
| Nr. of tranches | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 | Nr. of tranches | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 |
| Nr. d=1 | 235 [a] | 74 [b] | 161 [c] | 11,963 [a] | 6,423 [b] | 5,540 [c] | Nr. d=1 | 1,200 [a] | 30 [b] | 1,170 [c] | 1,178 [a] | 573 [b] | 605 [c] |
| % of total | 4.7% | 11.1% | 3.7% | 89.6% | 91.7% | 87.4% | % of total | 24.2% | 4.5% | 27.2% | 8.8% | 8.2% | 9.5% |
| **Rating discordance** | | | | | | | **U.K. borrowers** | | | | | | |
| Nr. of tranches | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 | Nr. of tranches | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 |
| Nr. d=1 | 421 [a] | 45 [b] | 376 [c] | 571 [a] | 139 [b] | 432 [c] | Nr. d=1 | 1,750 [a] | 49 [b] | 1,701 [c] | 199 [a] | 39 [b] | 160 [c] |
| % of total | 8.5% | 6.7% | 8.8% | 4.3% | 2.0% | 6.8% | % of total | 35.3% | 7.3% | 39.6% | 1.5% | 0.6% | 2.5% |
| **Callable** | | | | | | | **Pre-crisis period** | | | | | | |
| Nr. of tranches | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 | Nr. of tranches | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 |
| Nr. d=1 | 3,055 [a] | 429 [b] | 2,626 [c] | 1,530 [a] | 987 [b] | 543 [c] | Nr. d=1 | 3,320 | 389 [b] | 2,931 [c] | 9,095 | 5,858 [b] | 3,237 [c] |
| % of total | 61.6% | 64.2% | 61.1% | 11.5% | 14.1% | 8.6% | % of total | 66.9% | 58.2% | 68.2% | 68.1% | 83.6% | 51.0% |

This table reports summary statistics for a sample of securitization – ABS and MBS – and covered bonds – PCB and MCB –, issued during the 2000-2016 period. Information on the characteristics of bond issuances was obtained from DCM Analytics and Datastream. We test for similar distributions in contractual characteristics using the Wilcoxon rank-sum test for continuous variables and the Fisher's exact test for discrete ones. [a] indicates significant difference at the 1% level between all securitization and covered bond tranches. [b] indicates significant difference at the 1% level between ABS and PCB tranches. [c] indicates significant difference at the 1% level between MBS and MCB tranches. For a definition of the variables, see Table 2.

## Table 4: Regression analyses of the determinants of credit spreads

| **Dependent variable:** | [1] | [1a] | [1b] | [2] | [2a] | [2b] | [3] | [4] |
|---|---|---|---|---|---|---|---|---|
| Credit spread (bps) | Securitization bonds | ABS | MBS | Covered bonds | PCB | MCB | ABS vesus PCB | MBS versus MCB |
| **Independent variables:** | | | | | | | | |
| Intercept | 68.81 | -384.86 | 118.47 *** | 248.47 *** | 130.64 *** | 315.61 *** | -111.51 * | 12.80 |
| | (1.45) | (-1.18) | (2.81) | (12.95) | (4.10) | (14.18) | (-1.84) | (0.61) |
| Rated | -84.34 *** | -193.26 ** | -62.34 *** | 2.37 | -0.09 | 3.49 * | -16.31 ** | -13.71 *** |
| | (-5.31) | (-2.39) | (-6.14) | (1.60) | (-0.04) | (1.70) | (-2.31) | (-4.07) |
| AA+ | 15.63 *** | -10.68 | 18.58 *** | 1.10 | 1.89 | 1.97 | 1.45 | 5.38 ** |
| | (2.70) | (-0.46) | (3.30) | (0.64) | (0.80) | (0.81) | (0.43) | (2.14) |
| AA | 14.42 *** | 6.94 | 18.53 *** | 6.29 ** | 16.80 *** | 4.22 | 4.40 | 8.46 *** |
| | (4.14) | (0.33) | (5.46) | (2.24) | (2.70) | (1.31) | (0.54) | (3.34) |
| AA- | 29.72 *** | -20.78 | 40.87 *** | 5.24 | 3.90 | 4.95 | -5.45 | 16.05 *** |
| | (3.32) | (-0.51) | (5.25) | (1.62) | (1.05) | (1.09) | (-0.87) | (3.85) |
| A+ | 43.81 *** | 51.12 *** | 42.55 *** | 4.20 | -4.89 | 8.38 ** | 7.81 | 23.74 *** |
| | (8.04) | (3.63) | (8.15) | (1.14) | (-0.63) | (2.04) | (0.94) | (6.70) |
| A | 36.35 *** | 12.20 | 41.48 *** | 6.62 | 13.45 | 4.50 | 0.82 | 27.19 *** |
| | (9.99) | (0.89) | (11.66) | (1.47) | (1.10) | (0.95) | (0.07) | (9.16) |
| A- | 68.57 *** | 3.49 | 83.94 *** | 30.00 *** | 17.21 * | 39.40 *** | 1.99 | 63.76 *** |
| | (7.06) | (0.15) | (7.81) | (3.58) | (1.75) | (3.77) | (0.17) | (7.75) |
| BBB+ | 68.91 *** | 42.24 | 72.24 *** | 18.39 *** | 7.82 *** | 31.50 *** | 7.99 * | 47.64 *** |
| | (9.23) | (0.92) | (9.60) | (5.14) | (2.72) | (4.44) | (1.94) | (8.63) |
| BBB | 73.68 *** | 83.88 *** | 72.90 *** | 56.03 *** | 37.10 *** | 65.87 *** | 65.35 *** | 63.94 *** |
| | (16.74) | (4.06) | (17.10) | (3.64) | (2.85) | (3.77) | (3.35) | (15.68) |
| BBB- | 97.05 *** | 75.29 *** | 102.83 *** | 21.05 | | 35.16 | 28.80 | 84.84 *** |
| | (11.49) | (3.38) | (11.14) | (0.91) | | (1.51) | (1.25) | (8.65) |
| BB+ | 216.22 *** | 231.09 *** | 207.19 *** | | | | 234.64 *** | 208.28 *** |
| | (14.12) | (4.23) | (14.80) | | | | (5.53) | (14.23) |
| BB | 236.32 *** | 261.96 *** | 230.42 *** | | | | 242.68 *** | 225.99 *** |
| | (21.41) | (6.00) | (25.14) | | | | (5.08) | (23.04) |
| BB- | 203.91 *** | 173.19 *** | 205.99 *** | -13.39 *** | 83.30 *** | | 121.07 ** | 185.05 *** |
| | (7.71) | (3.79) | (6.99) | (-3.01) | (4.70) | | (2.43) | (6.08) |
| B+ | 128.09 *** | 137.24 * | 136.21 *** | | | | -11.09 | 114.87 ** |
| | (3.28) | (1.73) | (3.19) | | | | (-0.11) | (2.47) |
| B | 182.51 *** | 148.59 | 189.15 *** | | | | 121.93 | 194.94 *** |
| | (3.03) | (1.23) | (6.22) | | | | (0.96) | (5.16) |
| B- | 301.42 *** | 309.35 ** | 305.35 *** | | | | 260.12 | 303.26 *** |
| | (3.32) | (2.08) | (26.53) | | | | (1.51) | (11.94) |
| CCC+ | 31.06 | 127.88 *** | 18.19 | | | | -6.86 | -4.32 |
| | (1.23) | (3.63) | (0.83) | | | | (-0.17) | (-0.12) |
| CCC | 191.86 *** | 275.84 *** | 177.57 *** | | | | 220.99 *** | 160.38 *** |
| | (4.18) | (8.51) | (3.45) | | | | (9.39) | (2.93) |
| CCC- | 260.22 *** | 285.11 *** | 256.80 *** | | | | 258.31 *** | 226.90 *** |
| | (6.47) | (3.92) | (5.73) | | | | (3.03) | (4.67) |
| CC | 266.73 *** | 267.73 *** | 299.14 *** | | | | 161.66 ** | 272.45 *** |
| | (7.22) | (4.66) | (7.66) | | | | (2.39) | (6.96) |
| D | 181.62 *** | 155.44 | 188.13 *** | | | | 124.61 | 149.10 *** |
| | (4.03) | (1.64) | (3.42) | | | | (1.35) | (2.57) |
| Rating discordance | -1.66 | -10.10 | -0.04 | -2.85 | 2.43 | -5.08 | -0.30 | 3.57 |
| | (-0.30) | (-0.67) | (-0.01) | (-1.05) | (0.56) | (-1.57) | (-0.05) | (1.04) |
| Maturity | 0.52 | -4.91 * | 0.54 | 1.97 *** | 2.78 *** | 1.43 *** | -2.25 *** | -0.71 *** |
| | (1.32) | (-1.92) | (1.62) | (6.97) | (6.05) | (4.53) | (-3.15) | (-4.13) |
| Log maturity | -30.76 *** | 70.92 | -29.94 *** | -5.43 *** | -5.14 ** | -7.11 *** | 19.30 *** | -2.04 |
| | (-3.04) | (1.28) | (-3.7) | (-3.75) | (-2.33) | (-3.71) | (4.83) | (-1.06) |
| Log transaction size | -6.46 *** | 2.27 | -5.05 *** | 2.91 *** | -0.25 | 6.35 *** | -1.03 | 2.72 *** |
| | (-2.85) | (0.20) | (-2.63) | (7.66) | (-0.50) | (10.88) | (-1.15) | (3.54) |
| Tranche rank | 2.43 *** | 5.14 | 1.97 *** | -10.27 ** | 1.64 | -23.50 *** | 14.75 *** | 2.56 *** |
| | (3.19) | (0.91) | (2.70) | (-2.32) | (0.26) | (-4.64) | (3.29) | (3.43) |
| Currency risk | -11.01 * | -34.46 | 0.43 | 23.43 *** | 21.34 *** | 23.31 *** | 18.46 *** | 6.67 ** |
| | (-1.72) | (-0.90) | (0.08) | (12.26) | (7.84) | (8.58) | (4.76) | (2.54) |
| Fixed rate | -48.09 *** | -131.26 * | -32.93 *** | 0.10 | 1.80 | 2.22 | -3.85 | -2.96 |
| | (-3.28) | (-1.96) | (-2.91) | (0.06) | (0.80) | (0.85) | (-0.93) | (-1.04) |
| Number of banks | 1.37 * | 5.84 | 0.37 | -1.09 *** | -0.71 *** | -2.01 *** | -0.35 | -0.08 |
| | (1.71) | (1.26) | (0.59) | (-6.91) | (-4.22) | (-6.16) | (-1.44) | (-0.2) |
| Bank reputation | 0.29 | 0.47 | -0.04 | -0.90 *** | -0.42 *** | -1.07 *** | 0.26 | -0.31 *** |
| | (1.13) | (0.48) | (-0.16) | (-9.62) | (-2.57) | (-9.36) | (1.21) | (-2.69) |

*(Continued)*

*(continued)*

| **Dependent variable:** Credit spread (bps) | [1] Securitization bonds | [1a] ABS | [1b] MBS | [2] Covered bonds | [2a] PCB | [2b] MCB | [3] ABS vesus PCB | [4] MBS versus MCB |
|---|---|---|---|---|---|---|---|---|
| **Independent variables:** | | | | | | | | |
| Country risk | 6.49 *** | 2.70 | 3.66 ** | 5.82 *** | 14.71 *** | 2.75 *** | 15.04 *** | 5.89 *** |
| | (3.77) | (0.45) | (2.26) | (7.68) | (6.69) | (3.38) | (5.75) | (7.26) |
| Creditor rights | 1.94 | 35.04 *** | -1.82 | -0.63 | -3.34 * | 1.36 ** | 2.87 | -4.11 *** |
| | (0.85) | (2.71) | (-0.83) | (-1.05) | (-1.90) | (2.09) | (1.07) | (-4.85) |
| Enforcement | 4.92 *** | 10.18 | 3.52 *** | -4.73 *** | -2.39 *** | -6.21 *** | 2.28 ** | 1.02 ** |
| | (5.99) | (1.54) | (5.78) | (-12.72) | (-3.7) | (-14.46) | (1.97) | (2.49) |
| Financial crisis | -67.93 ** | -99.66 | 51.05 ** | 20.89 *** | 13.34 ** | 27.01 *** | -18.64 | -10.37 |
| | (-2.36) | (-1.63) | (2.42) | (4.69) | (2.17) | (4.49) | (-1.07) | (-1.01) |
| Sovereign crisis | -55.28 | -156.78 | -42.49 | 41.82 *** | 24.92 *** | 45.78 *** | 0.53 | 11.98 |
| | (-1.60) | (-1.62) | (-1.37) | (7.28) | (2.77) | (6.24) | (0.03) | (0.97) |
| Volatility | 0.60 | 1.14 | 0.50 | 0.54 *** | 0.65 *** | 0.52 *** | 0.80 *** | 0.34 |
| | (1.25) | (0.91) | (0.99) | (5.72) | (5.03) | (4.08) | (4.02) | (1.54) |
| EUSA5y-Libor3M | -0.16 ** | -0.09 | -0.15 *** | -0.15 *** | -0.14 *** | -0.15 *** | -0.15 *** | -0.17 *** |
| | (-2.33) | (-0.26) | (-2.96) | (-10.49) | (-8.11) | (-6.90) | (-4.24) | (-6.32) |
| CBPP1 | 35.02 ** | 4.17 | 33.52 * | -15.50 *** | -12.16 *** | -17.22 *** | -1.73 | -5.07 |
| | (2.10) | (0.14) | (1.74) | (-5.65) | (-3.06) | (-4.87) | (-0.28) | (-0.75) |
| CBPP2 | 8.99 | 84.59 | 9.15 | 49.37 *** | 50.26 *** | 48.42 *** | 47.64 ** | 32.19 *** |
| | (0.51) | (1.36) | (0.58) | (6.72) | (2.68) | (6.18) | (2.41) | (3.22) |
| CBPP3/ABSPP | -49.22 ** | 35.91 | -33.49 * | -20.42 *** | -43.72 ** | -18.59 *** | -73.36 *** | -19.24 ** |
| | (-2.03) | (0.38) | (-1.85) | (-2.90) | (-2.13) | (-2.59) | (-2.79) | (-2.21) |
| MBS | -21.06 ** | | | | | | | 28.31 *** |
| | (-2.21) | | | | | | | (5.31) |
| ABS | | | | | | | 30.01 * | |
| | | | | | | | (1.89) | |
| MCB | | | | -1.43 | | | | |
| | | | | (-1.50) | | | | |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of observations | 4,963 | 668 | 4,295 | 13,346 | 7,005 | 6,341 | 7,673 | 10,636 |
| Adjusted $R^2$ | 0.41 | 0.32 | 0.53 | 0.46 | 0.32 | 0.54 | 0.31 | 0.46 |
| Rated and rating dummies as independent variables only | | | | | | | | |
| Adjusted $R^2$ | 0.29 | 0.20 | 0.37 | 0.03 | 0.01 | 0.05 | 0.15 | 0.20 |
| Differences in adjusted $R^2$ | 0.12 | 0.12 | 0.17 | 0.43 | 0.32 | 0.48 | 0.16 | 0.25 |

This table presents the results of an OLS regression analysis of the determinants of bond credit spreads for: (*i*) a sample of 4,963 securitization bonds – model [1] –, of which 668 are ABS – model [1a] – and 4,295 MBS – model [1b]; and (*ii*) a sample of 13,346 covered bonds – model [2] – of which 7,005 are PCB – model [2a] – and 6,341 MCB – model [2b]. For a definition of the variables, see Table 2. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. The *t*-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors. Due to time varying risk premia and cross-country differences, we estimate standard errors clustered by year and country.

## Table 5: Endogenous switching regression models

| **Dependent variable:** | [5] | | [6] | |
|---|---|---|---|---|
| Credit spread (bps) | ABS \| financial firms | PCB \| financial firms | MBS \| financial firms | MCB \| financial firms |
| **Independent variables:** | | | | |
| Intercept | 1180.11 * | 312.69 *** | 95.90 * | 275.60 *** |
| | (1.88) | (7.11) | (1.86) | (8.71) |
| Rated | -269.00 *** | -0.60 | -91.65 *** | 9.68 *** |
| | (-2.58) | (-0.11) | (-6.79) | (2.95) |
| Rating*rated | 12.87 *** | 1.23 | 13.56 *** | 1.89 *** |
| | (6.38) | (1.03) | (16.72) | (2.80) |
| Rating discordance | -43.68 * | 5.18 | -8.70 | -2.12 |
| | (-1.80) | (0.97) | (-1.36) | (-0.44) |
| Maturity | 1.33 | 0.96 ** | 0.85 *** | 1.11 *** |
| | (0.46) | (2.53) | (3.01) | (2.80) |
| Log maturity | -46.08 | -7.32 ** | -32.75 *** | -11.60 *** |
| | (-0.63) | (-2.33) | (-4.13) | (-4.55) |
| Log transaction size | -18.25 | -0.63 | -4.32 ** | 8.35 *** |
| | (-1.30) | (-0.87) | (-2.09) | (10.98) |
| Tranche rank | 6.98 | -10.92 | 0.62 | -28.01 *** |
| | (1.29) | (-1.54) | (1.04) | (-4.39) |
| Currency risk | 99.52 | 22.58 *** | 3.92 | 19.13 *** |
| | (1.57) | (7.06) | (0.81) | (6.76) |
| Fixed rate | -341.09 | 7.24 ** | -29.29 * | 12.40 *** |
| | (-1.44) | (2.29) | (-1.85) | (4.44) |
| Number of banks | -0.78 | -0.73 ** | -1.05 | -2.68 *** |
| | (-0.15) | (-2.51) | (-1.64) | (-5.59) |
| Bank reputation | 1.73 | -1.29 *** | -0.01 | -1.15 *** |
| | (1.39) | (-6.52) | (-0.02) | (-7.86) |
| Country risk | -11.34 | 6.07 ** | 2.40 | -0.22 |
| | (-0.75) | (2.08) | (1.13) | (-0.22) |
| Creditor rights | 5.37 | -2.13 | -5.81 ** | -1.89 * |
| | (0.10) | (-0.86) | (-2.51) | (-1.81) |
| Enforcement | 4.39 | -7.29 *** | 4.36 *** | -6.59 *** |
| | (0.43) | (-7.05) | (6.72) | (-11.77) |
| Financial crisis | 18.61 | 32.34 *** | -6.36 | 41.95 *** |
| | (0.34) | (5.76) | (-0.45) | (10.92) |
| Sovereign crisis | 58.83 | 53.36 *** | 73.14 *** | 62.69 *** |
| | (1.06) | (11.76) | (8.01) | (24.60) |
| Volatility | -1.27 | 1.10 *** | -0.18 | 1.57 *** |
| | (-0.92) | (5.81) | (-0.51) | (12.09) |
| EUSA5y-Libor3M | -0.58 * | -0.08 *** | -0.18 *** | -0.04 ** |
| | (-1.73) | (-4.45) | (-3.79) | (-2.36) |
| CBPP1 | 46.66 | -4.56 ** | 39.77 *** | -6.97 ** |
| | (1.11) | (-1.99) | (3.14) | (-1.98) |
| CBPP2 | -61.06 | 32.74 *** | 29.51 *** | 43.85 *** |
| | (-0.98) | (3.01) | (3.63) | (10.25) |
| CBPP3 | 33.53 | -49.82 *** | -19.51 * | -48.74 *** |
| | (0.23) | (-5.85) | (-1.79) | (-13.88) |
| Log total assets | -26.74 ** | 1.93 | -0.23 | -0.20 *** |
| | (-2.13) | (1.45) | (-0.18) | (-0.24) |
| Return on assets | | | -0.14 | -0.03 * |
| | | | (-0.58) | (-1.87) |
| Loan ratio | -4.21 ** | 0.45 *** | -0.45 *** | 0.62 *** |
| | (-2.38) | (4.52) | (-2.58) | (7.58) |
| Liquid assets to deposits & ST funding | -0.16 | 0.01 | -0.28 *** | 0.04 |
| | (-0.22) | (0.35) | (-2.91) | (1.07) |
| Capital adequacy ratio | -1.46 *** | -1.72 *** | -1.91 *** | -1.49 *** |
| | (-4.31) | (-6.16) | (-2.67) | (-5.06) |
| Non-performing loans ratio | 2.46 | -1.07 *** | -1.41 * | -0.42 |
| | (0.55) | (-2.60) | (-1.73) | (-1.01) |

*(Continued)*

*(continued)*

| **Dependent variable:** Probability of observing: | ABS versus PCB \| financial firms | MBS versus MCB \| financial firms |
|---|---|---|
| **Independent variables:** | | |
| Intercept | -11.07 *** | -32.60 *** |
| | (-3.05) | (-5.38) |
| Rated | -2.78 ** | -2.93 *** |
| | (-2.54) | (-4.48) |
| Rating*rated | 0.07 | 0.19 *** |
| | (0.73) | (2.57) |
| Rating discordance | -0.15 | 0.04 |
| | (-0.18) | (0.10) |
| Maturity | 0.17 *** | 0.39 *** |
| | (6.66) | (5.68) |
| Log maturity | -0.19 | 0.24 |
| | (-0.86) | (0.85) |
| Log transaction size | 1.24 *** | 1.69 *** |
| | (5.80) | (8.43) |
| Tranche rank | 1.91 *** | 1.64 *** |
| | (4.76) | (3.73) |
| Currency risk | 0.16 | -0.25 |
| | (0.31) | (-0.33) |
| Fixed rate | -3.84 *** | -7.06 *** |
| | (-5.69) | (-5.38) |
| Number of banks | -0.38 *** | -0.35 *** |
| | (-4.23) | (-3.71) |
| Bank reputation | 0.04 *** | 0.07 *** |
| | (2.80) | (2.68) |
| Country risk | 0.16 | 0.22 * |
| | (1.48) | (1.68) |
| Creditor rights | 0.60 | 0.38 ** |
| | (1.37) | (2.01) |
| Enforcement | 0.03 | 0.22 *** |
| | (0.44) | (2.95) |
| Financial crisis | 0.88 | -2.21 |
| | (0.83) | (-1.49) |
| Sovereign crisis | -0.61 | -1.90 *** |
| | (-0.60) | (-3.51) |
| Volatility | -0.02 | -0.05 |
| | (-0.59) | (-1.48) |
| EUSA5y-Libor3M | 0.00 | 0.00 |
| | (-0.90) | (0.36) |
| CBPP1 | -1.22 | 0.97 |
| | (-1.59) | (1.58) |
| CBPP2 | 0.30 | -1.44 *** |
| | (0.37) | (-3.55) |
| CBPP3 | 2.77 ** | -0.01 |
| | (2.41) | (-0.02) |
| Log total assets | -0.05 | 0.58 *** |
| | (-0.40) | (3.61) |
| Return on assets | | 0.04 ** |
| | | (1.97) |
| Loan ratio | 0.04 *** | -0.04 ** |
| | (2.80) | (-2.43) |
| Liquid assets to deposits & ST funding | 0.00 | -0.01 * |
| | (0.45) | (-1.82) |
| Capital adequacy ratio | -0.05 *** | -0.04 *** |
| | (-2.74) | (-3.45) |
| Non-performing loans ratio | -0.04 | -0.06 |
| | (-0.66) | (-1.17) |
| Number of observations | 2,495 | 4,830 |
| Wald chi2 | 1,179.23 *** | 2,479.78 *** |
| Log pseudolikelihood | -13,176.49 | -25,788.30 |
| Wald test of indep. equations | 1.43 | 6.49 ** |

This table presents the results of estimating endogenous switching regression models on: (*i*) a sub-sample of 375 ABS and 2,120 PCB – model [5]; and (*ii*) a sub-sample of 1,799 MBS and 3,031 MCB – model [6]. Sub-samples include observations with available accounting and market information on banks that closed ABS, MBS, PCB, and MCB in the 2000-2016 period. We implement the full information maximum likelihood (FIML) method to simultaneously estimate binary and continuous parts of the model in order to yield consistent standard errors. For a definition of the variables, see Table 2. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. The *z*-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors. Due to time varying risk premia and cross-country differences, we estimate standard errors clustered by year and country.

## Table 6: Regression analyses of credit spreads by rating category

| **Dependent variable:** | [7] | [7a] | [7b] | [7c] | [7d] | [7e] | [7f] | [7g] | [7h] | [7i] | [7j] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Credit spread (bps) | All bonds | AAA / Aaa | AA+ / Aa1 | AA / Aa2 | AA- / Aa3 | A+ / A1 | A / A2 | A- / A3 | BBB+ / Baa1 | BBB / Baa2 | BBB- / Baa3 |
| **Securitization *versus* covered bonds** | | | | | | | | | | | |
| Securitization | 27.26 *** | -2.42 | -9.85 | 30.84 *** | 47.69 *** | 61.61 *** | 67.21 *** | 96.88 ** | 22.67 | 193.34 *** | 88.30 |
| | (4.69) | (-0.71) | (-0.62) | (2.84) | (3.28) | (2.93) | (4.59) | (2.05) | (0.61) | (4.90) | (0.89) |
| [...] | | | | | | | | | | | |
| Number of observations | 18,309 | 11,843 | 1,029 | 763 | 435 | 449 | 648 | 181 | 346 | 544 | 152 |
| Adjusted $R^2$ | 0.39 | 0.37 | 0.50 | 0.51 | 0.30 | 0.34 | 0.30 | 0.48 | 0.71 | 0.38 | 0.50 |
| **ABS *versus* PCB** | | | | | | | | | | | |
| ABS | 29.65 * | 29.48 *** | 21.67 ** | -3.52 | -122.79 | 28.55 *** | 13.68 | 1.84 | 1970.5 *** | -196.55 | |
| | (1.86) | (3.04) | (2.47) | (-0.12) | (-1.13) | (2.87) | (0.26) | (0.02) | (4.81) | (-0.68) | |
| [...] | | | | | | | | | | | |
| Number of observations | 7,673 | 5,940 | 348 | 99 | 129 | 92 | 103 | 40 | 144 | 68 | |
| Adjusted $R^2$ | 0.31 | 0.28 | 0.50 | 0.58 | 0.38 | 0.73 | 0.32 | 0.74 | 0.50 | 0.57 | |
| **MBS *versus* MCB** | | | | | | | | | | | |
| MBS | 28.34 *** | 3.04 | -17.57 | 44.74 *** | 47.90 *** | 70.93 *** | 84.24 *** | 163.73 *** | 62.09 * | 158.76 *** | 241.09 *** |
| | (5.29) | (0.73) | (-1.02) | (3.55) | (3.67) | (3.09) | (4.8) | (2.88) | (1.83) | (4.69) | (3.25) |
| [...] | | | | | | | | | | | |
| Number of observations | 10,636 | 5,903 | 681 | 664 | 306 | 357 | 545 | 141 | 202 | 476 | 127 |
| Adjusted $R^2$ | 0.46 | 0.42 | 0.52 | 0.53 | 0.36 | 0.43 | 0.40 | 0.51 | 0.76 | 0.51 | 0.48 |

This table presents the results of an OLS regression analysis of the determinants of bond credit spreads for a sample of 4,963 securitization bonds and 13,346 covered bonds with available information on credit rating. Models [3] and [4] of Table 4 are re-estimated for a sample including both securitization and covered bonds simultaneously – model [7] – as well as sub-samples by rating scales – models [7a] to [7j]. *Securitization*, *ABS*, and *MBS* are dummy variables. In the top panel, we compare all securitization bond with all covered bond credit spreads. In the middle and bottom panels, we compare ABS with PCB and MBS with MCB credit spreads, respectively. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. The *t*-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors. Due to time varying risk premia and cross-country differences, we estimate standard errors clustered by year and country.

## Table 7: Descriptive statistics for WAS and banks' characteristics

| Variable of interest | | All originators/issuers | | Originators/issuers of | | Switchers |
|---|---|---|---|---|---|---|
| | | Securitization bonds | Covered bonds | Securitization bonds only | Covered bonds only | Securitization and Covered bonds |
| $WAS_t$ (bps) | Mean | 57.5 | 60.5 | 84.1 | 61.7 | 59.7 |
| | Median | 44.1 | 48.8 | 53.6 | 56.0 | 46.4 |
| | Number | 337 | 4,849 | 52 | 890 | 4,244 |
| Total $assets_{t-1}$ (€ million) | Mean | 676,000.0 | 552,000.0 * | 653,000.0 | 249,000.0 | 624,000.0 |
| | Median | 390,000.0 | 449,000.0 | 101,000.0 | 157,000.0 | 525,000.0 |
| | Number | 337 | 4,849 | 52 | 890 | 4,244 |
| Loan $ratio_{t-1}$ | Mean | 59.1% | 43.2% *** | 48.3% | 48.1% | 43.4% |
| | Median | 62.3% | 42.9% | 49.5% | 51.8% | 42.9% |
| | Number | 337 | 4,849 | 52 | 890 | 4,244 |
| Liquid assets to deposits & ST $funding_{t-1}$ | Mean | 33.5% | 52.8% *** | 49.5% | 40.8% | 53.8% |
| | Median | 24.2% | 49.9% | 27.0% | 33.4% | 51.8% |
| | Number | 337 | 4,849 | 52 | 890 | 4,244 |
| Capital adequacy $ratio_{t-1}$ | Mean | 13.0% | 12.6% *** | 14.4% | 13.8% *** | 12.3% |
| | Median | 12.2% | 12.3% | 13.7% | 12.1% | 12.3% |
| | Number | 337 | 4,849 | 52 | 890 | 4,244 |
| Return on $assets_{t-1}$ | Mean | 0.7% | 0.2% *** | 0.4% | 0.2% *** | 0.2% |
| | Median | 0.8% | 0.2% | 0.5% | 0.2% | 0.2% |
| | Number | 337 | 4,849 | 52 | 890 | 4,244 |
| Non-performing loans $ratio_{t-1}$ | Mean | 3.05% | 4.06% *** | 4.3% | 4.1% *** | 4.0% |
| | Median | 2.15% | 3.65% | 1.7% | 2.8% | 3.7% |
| | Number | 337 | 4,849 | 52 | 890 | 4,244 |

Our sample includes 5,186 transactions, of which 337 are securitization deals and 4,849 are covered bond deals. 52 and 890 transactions were closed by securitization originators only or covered bond issuers only, respectively. The switchers issued 4,244 of total transactions. We test for similar distributions in banks' characteristics across samples via the Wilcoxon rank-sum test. ***, **, and * indicate significant difference at the 1%, 5%, and 10% levels, respectively. For a definition of the variables, see Table 2.

## Table 8: Top 10 switchers

| Issuer/issuer parent | Number of switches \| AS *versus* CB | Number of ABS deals | ABS deal amount [€ Million] | Number of MBS deals | MBS deal amount [€ Million] | Number of PCB deals | PCB deal amount [€ Million] | Number of MCB deals | MCB deal amount [€ Million] |
|---|---|---|---|---|---|---|---|---|---|
| Banco Santander, S.A. | 73 | 12 | 26,927.1 | 61 | 174,571.0 | 12 | 11,089.5 | 120 | 104,788.0 |
| UniCredit SpA | 44 | 8 | 5,733.5 | 16 | 47,708.4 | 91 | 17,931.7 | 460 | 82,922.5 |
| Lloyds Banking Group plc | 42 | 5 | 6,919.9 | 41 | 171,479.6 | 13 | 27,534.6 | 40 | 28,267.0 |
| BBVA | 33 | 10 | 15,588.0 | 20 | 44,945.5 | 40 | 22,922.7 | 50 | 69,004.0 |
| Commerzbank AG | 32 | 4 | 1,047.1 | 13 | 8,519.1 | 735 | 171,950.5 | 680 | 72,439.0 |
| La Caixa | 30 | 10 | 13,560.0 | 21 | 42,590.9 | 12 | 8,250.0 | 65 | 71,226.3 |
| BFA Tenedora de Acciones, S.A. | 28 | 6 | 5,143.7 | 25 | 35,517.1 | 3 | 1,825.0 | 49 | 51,841.5 |
| Banco de Sabadell, S.A. | 25 | 12 | 9,794.1 | 22 | 30,118.4 | 3 | 2,050.0 | 38 | 27,702.2 |
| BPCE, S.A. | 18 | - | - | 14 | 10,302.2 | 36 | 9,398.1 | 469 | 161,211.6 |
| Banco Popular Espanol, S.A. | 18 | 9 | 11,127.3 | 6 | 10,315.5 | 9 | 13,755.0 | 41 | 25,574.9 |

This table provides information on the top 10 switchers, banks that employ both securitization and covered bonds in the sampling period, and their relative importance in these markets, by bond type. Data are for deals with WAS and tranche amount available, closed by European banks during the 2000-2016 period.

## Table 9: Regression analyses of the cost of borrowing: securitization *versus* covered bonds

| **Dependent variable:** WAS (bps) | [8] ABS and PCB | [8a] ABS and PCB | [9] ABS and PCB \| switchers | [10] MBS and MCB | [10a] MBS and MCB | [11] MBS and MCB \| switchers |
|---|---|---|---|---|---|---|
| **Independent variables:** | | | | | | |
| Intercept | 151.33 *** | 141.29 *** | 253.12 * | 70.94 * | 80.84 ** | 95.97 ** |
| | (3.51) | (3.53) | (1.65) | (1.91) | (2.13) | (2.28) |
| ABS | -94.02 *** | -67.43 *** | -111.04 ** | | | |
| | (-3.02) | (-4.33) | (-2.44) | | | |
| MBS | | | | 7.17 | 5.57 | -5.43 |
| | | | | (0.70) | (0.55) | (-0.46) |
| WAM | -0.16 | -0.47 * | 0.16 | -1.52 *** | -1.52 *** | -1.39 *** |
| | (-0.51) | (-1.67) | (0.43) | (-7.03) | (-6.97) | (-6.14) |
| WAR | | 1.62 | | | 2.09 *** | |
| | | (1.35) | | | (3.02) | |
| Log transaction size | -1.20 * | -1.23 * | -1.80 | 6.02 *** | 6.20 *** | 5.64 *** |
| | (-1.75) | (-1.78) | (-1.51) | (7.38) | (7.47) | (5.66) |
| Number of tranches | 18.36 *** | 14.22 *** | 19.90 ** | 1.89 | 1.94 | 1.31 |
| | (2.89) | (3.35) | (2.38) | (1.05) | (1.08) | (0.68) |
| Number of banks | 0.22 | 0.36 | 0.52 | -0.54 | -0.52 | -0.45 |
| | (0.80) | (1.31) | (1.44) | (-1.09) | (-1.05) | (-0.82) |
| Bank reputation | -0.89 *** | -0.76 *** | -0.67 *** | -0.98 *** | -0.93 *** | -1.16 *** |
| | (-4.62) | (-4.06) | (-2.78) | (-6.61) | (-6.29) | (-6.60) |
| Country risk | 12.51 *** | 12.99 *** | 9.49 * | 4.14 *** | 3.66 *** | 4.29 *** |
| | (4.56) | (4.83) | (1.67) | (3.44) | (3.07) | (3.22) |
| Creditor rights | 1.88 | 1.50 | 11.57 ** | -2.54 ** | -2.33 * | -1.40 |
| | (0.69) | (0.55) | (2.04) | (-1.98) | (-1.84) | (-0.98) |
| Enforcement | -3.66 *** | -3.37 *** | -5.77 *** | -2.00 *** | -2.11 *** | -2.90 *** |
| | (-3.46) | (-3.53) | (-4.41) | (-3.74) | (-3.94) | (-4.53) |
| Financial crisis | -1.48 | -1.22 | -12.68 | 1.94 | 3.40 | -10.84 |
| | (-0.19) | (-0.16) | (-0.93) | (0.23) | (0.37) | (-0.91) |
| Sovereign crisis | 14.60 | 13.37 | -7.27 | 32.32 *** | 33.34 *** | 22.92 |
| | (1.35) | (1.20) | (-0.40) | (3.18) | (3.04) | (1.64) |
| Volatility | 0.87 *** | 0.85 *** | 0.98 *** | 0.63 *** | 0.53 *** | 0.73 *** |
| | (3.90) | (3.63) | (2.95) | (3.33) | (2.61) | (3.06) |
| EUSA5y-Libor3M | -0.20 *** | -0.22 *** | -0.18 *** | -0.22 *** | -0.24 *** | -0.20 *** |
| | (-6.13) | (-6.68) | (-3.97) | (-6.73) | (-6.76) | (-5.33) |
| Switcher | 0.39 | 1.67 | | -0.11 | 1.79 | |
| | (0.13) | (0.54) | | (-0.03) | (0.56) | |
| Log total assets | 0.26 | 0.61 | 2.50 | 0.53 | 0.49 | 0.18 |
| | (0.16) | (0.38) | (0.35) | (0.41) | (0.38) | (0.12) |
| Return on assets | 0.14 | 0.13 | 0.29 | 0.09 | 0.02 | -0.03 |
| | (1.03) | (0.98) | (1.11) | (0.65) | (0.14) | (-0.17) |
| Loan ratio | 0.35 ** | 0.26 ** | -0.23 | 0.88 *** | 0.90 *** | 0.92 *** |
| | (2.51) | (2.22) | (-0.51) | (8.26) | (8.38) | (7.67) |
| Liquid assets to deposits & ST funding | 0.05 | 0.04 | -0.34 | 0.14 *** | 0.16 *** | 0.19 *** |
| | (1.10) | (0.75) | (-1.48) | (2.94) | (3.39) | (3.69) |
| Capital adequacy ratio | -0.17 | 0.11 | -2.34 | -1.02 ** | -0.96 ** | 0.58 |
| | (-0.24) | (0.16) | (-0.72) | (-2.55) | (-2.37) | (1.02) |
| Non-performing loans ratio | -0.62 | -0.73 | -3.69 ** | 0.19 | 0.19 | -0.58 |
| | (-1.22) | (-1.44) | (-2.30) | (0.34) | (0.34) | (-0.83) |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of observations | 2,138 | 2,031 | 1,199 | 3,048 | 2,762 | 2,310 |
| Adjusted $R^2$ | 0.46 | 0.49 | 0.48 | 0.50 | 0.51 | 0.55 |

This table presents the results of an OLS regression analysis of the determinants of transactions' weighted average spreads (WAS) for the samples in Table 8. *ABS* and *MBS* are dummy variables. For a definition of the variables, see Table 2. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. The *t*-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors. Due to time varying risk premia and cross-country differences, we estimate standard errors clustered by year and country.

**Online Appendix**

# Are covered bonds different from securitization bonds? A comparative analysis of credit spreads

In this appendix, we (*1*) discuss extant empirical literature on the determinants of bond credit spreads, (*2*) compare credit spreads between securitization and covered bonds, across rating classes; and (*3*) provide information on the distribution of tranches by bond type and year, present descriptive statistics for bond samples, and examine the impact of the financial crisis on the core pricing characteristics.

## *1. What we know about the determinants of bond credit spreads*

Compared with the considerable number of empirical studies on corporate bond credit spreads, research on securitization and covered bond credit spreads has been scant. Virtually all of the empirical studies on corporate bonds find credit ratings to be one of their most important determinants. Some of the more recent papers include Collin-Dufresne *et al.* (2001), Elton *et al.* (2001), Hull *et al.* (2004), Gabbi and Sironi (2005), and Longstaff *et al.* (2005). In searching for determinants of credit spreads, researchers also find other factors to be important, like liquidity, systematic risk, incomplete accounting information, leverage, and taxes (Chen *et al.*, 2007; Bao *et al.*, 2011; Flannery *et al.*, 2012). Market variables, like the level of interest rates, the yield curve slope, and market volatility, also have a significant impact on credit spreads (Campbell and Taksler, 2003; Krishnan *et al.*, 2005). A stream of the literature analyzes the relationship between spread and maturity. Several authors (Jones *et al.*, 1984; Sarig and Warga, 1989; Sorge and Gadanecz, 2008) argue that, on average, the term structure of spreads for investment grade bonds appears upward-sloping. However, the literature has been more

controversial regarding the term structure of spreads for non-investment grade bonds (Fons, 1987; Sarig and Warga, 1989; Helwege and Turner, 1999). More recently, Marques and Pinto (2020) find a convex relationship.

Vink and Thibeault (2008) show that ABS, MBS and CDO are influenced differently, but by common pricing characteristics. Ammer and Clinton (2004), Buscaino *et al.* (2012), Fabozzi and Vink (2012), and Marques and Pinto (2020) show that credit rating is the most important pricing factor for securitization bonds. However, authors find that investors also rely on factors other than credit ratings when pricing asset-backed claims. An *et al.* (2011) study the pricing of CMBS deals and show that interest rate volatility, the yield curve slope, and the property-type composition of the underlying asset pool have a significant impact on credit spreads. Fabozzi and Vink (2012) find that credit enhancement mechanisms, collateral-type, and level of creditor legal protection determine the pricing of ABS issued in the Euromarket. Marques and Pinto (2020) show that time to maturity, transaction size, number of banks involved and their reputation, country risk, legal enforcement, and market volatility are also important for determining credit spreads on ABS, MBS, and CDO. Regarding the impact of asset purchases by central banks on spreads, extant empirical literature has focused on the U.S. market. Hancock and Passmore (2011) and Krishnamurthy and Vissing-Jorgensen (2011) find that the Federal Reserve's Large-Scale Asset Purchases (LSAP) 1 has led to a tightening of MBS yields.

Extant literature on covered bond pricing determinants has focused mainly on the German market, due to its size and importance. Breger and Stovel (2004), Koziol and Sauerbier (2007), and Kempf *et al.* (2012) find that while credit ratings do not have a significant impact on spreads, as the probability of default is marginal, liquidity is a major pricing determinant. Prokopczuk *et al.* (2013) show that liquidity, credit quality of the cover-pool assets and whether they are covered by public sector or mortgage loans are important determinants of yield spreads issued by German banks.

Kettemann and Krogstrup (2014) find a 10 bps tightening of Swiss covered bond spreads for the announcement of the 2009 private sector bonds purchase programme by the Swiss National Bank. Few empirical papers aim to study the determinants of covered bond spreads in international markets. Prokopczuk and Vonhoff (2012) demonstrate that developments in the real estate sector and legislative frameworks explain the pricing of mortgage covered bonds during the financial crisis. Authors also demonstrate that country-specific differences exist and liquidity is an important determinant of mortgage covered bond credit spreads in both pre- and crisis periods. Gürtler and Neelmeier (2018) study the factors that influence risk premiums of public covered bonds. In line with Beirne *et al.* (2011) and Prokopczuk and Vonhoff (2012), authors find that whereas a higher interest rate level leads to lower risk premiums, market volatility has a positive effect on spreads. Moreover, the development of real estate prices also influences risk premiums of public covered bonds and both the financial crisis and the sovereign debt crisis increased credit spreads significantly. Finally, authors find mixed effects regarding the impact of ECB's CBPP on credit spreads: while the CBPP1 lowers risk premiums, the CBPP2 does not influence public covered bond spreads significantly. In the same stream of research, Szczerbowicz (2015) and Gibson *et al.* (2016) show evidence of CBPP1 and CBPP2 as effective mechanisms for lowering covered bond spreads. Schuller (2013) points out that the overall effect of CBPP2 on the spreads was a sharp difference between core Europe and distressed European countries, where the primary market virtually ran dry. Markmann and Zietz (2017) assess the effectiveness of the three CBPPs on secondary markets and find a 10 to 11 bps tightening of covered bond spreads upon the announcement of the CBPP1. Regarding CBPP2 and CBPP3, the results are mixed, with a tendency for a lower impact.

*2. Credit spreads across asset classes*

Table 1 presents the distribution of securitization and covered bonds issued in Europe by credit rating scale for investment-grade bonds. For securitization bonds, the top rating of AAA is seen for 41.6% of the total issues. Similarly, among all investment-grade issuances, 73.3% of covered bonds have an AAA credit rating. We find similar distributions when we divide the sample into bond subcategories. It is important to notice that PCB have the highest weight of AAA tranches, with an 81.6% of the total issues. With the exception of AA rating class, we find that average credit spreads are lower for PCB than for ABS for all rating classes.. Similarly, results show that average credit spreads for MBS are higher (with the exception of AAA, BBB, and BBB- bonds) than MCB credit spreads for the 2000-2016 period.

**Table 1: Securitization (ABS and MBS) and covered bonds (PCB and MCB) mean and median credit spreads by credit rating**

| Credit rating (S&P / Moody's) | Securitization bonds | | | ABS | | | MBS | | | Covered bonds | | | PCB | | | MCB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Credit spread | | Number | Credit spread | | Number | Credit spread | | Number | Credit spread | | Number | Credit spread | | Number | Credit spread | |
| | | Mean | Median | | Mean | Median | | Mean | Median | | Mean | Median | | Mean | Median | | Mean | Median |
| **AAA / Aaa** | 2,065 | 52.0 | 40.9 | 229 | 45.9 | 36.0 | 1,836 | 52.7 | 41.8 | 9,780 | 47.7 | 31.4 | 5,713 | 35.0 | 23.0 | 4067 | 65.5 | 47.7 |
| **AA+ / Aa1** | 121 | 87.4 | 61.3 | 10 | 91.9 | 41.8 | 111 | 87.0 | 65.7 | 908 | 40.8 | 29.5 | 338 | 32.9 | 30.7 | 570 | 45.4 | 28.0 |
| **AA / Aa2** | 463 | 68.5 | 53.6 | 36 | 55.2 | 41.4 | 427 | 69.6 | 53.8 | 300 | 61.6 | 45.4 | 63 | 74.1 | 52.4 | 237 | 58.3 | 41.1 |
| **AA- / Aa3** | 109 | 87.4 | 57.5 | 19 | 44.8 | 57.1 | 90 | 96.4 | 57.6 | 326 | 58.2 | 42.9 | 110 | 35.6 | 28.6 | 216 | 69.7 | 55.3 |
| **A+ / A1** | 200 | 91.8 | 58.8 | 34 | 128.5 | 86.7 | 166 | 84.2 | 57.8 | 249 | 76.4 | 57.4 | 58 | 54.3 | 49.2 | 191 | 83.1 | 63.9 |
| **A / A2** | 475 | 89.2 | 70.9 | 69 | 86.5 | 68.2 | 406 | 89.7 | 71.1 | 173 | 75.7 | 56.2 | 34 | 66.4 | 36.9 | 139 | 78.0 | 59.8 |
| **A- / A3** | 99 | 133.4 | 84.3 | 21 | 84.1 | 74.1 | 78 | 146.6 | 89.6 | 82 | 118.8 | 75.5 | 19 | 83.6 | 63.1 | 63 | 129.4 | 93.7 |
| **BBB+ / Baa1** | 117 | 111.7 | 83.6 | 11 | 116.1 | 95.6 | 106 | 111.3 | 81.2 | 229 | 52.5 | 26.5 | 133 | 25.2 | 22.9 | 96 | 90.2 | 51.7 |
| **BBB / Baa2** | 521 | 123.9 | 101.7 | 65 | 163.3 | 119.3 | 456 | 118.3 | 99.6 | 23 | 153.4 | 124.3 | 3 | 73.2 | 64.1 | 20 | 165.4 | 128.9 |
| **BBB- / Baa3** | 140 | 148.3 | 119.7 | 25 | 135.7 | 114.0 | 115 | 151.0 | 120.9 | 13 | 168.1 | 183.6 | - | - | - | 13 | 168.1 | 183.6 |

This table displays number, mean and median credit spread for securitization bonds – ABS and MBS – and corporate bond – PCB and MCB – issues by initial S&P and / or Moody's credit rating. Only investment grade bonds were included.

*3. Distribution over time and descriptive statistics for securitization and covered bond samples*

**Table 2: Distribution of tranches by bond type and year**

| Year | Securitization Bonds | | | | | | Covered bonds | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ABS | | | MBS | | | PCB | | | MCB | | |
| | Number of tranches | Total value [€ Million] | Percent of total value | Number of tranches | Total value [€ Million] | Percent of total value | Number of tranches | Total value [€ Million] | Percent of total value | Number of tranches | Total value [€ Million] | Percent of total value |
| 2000 | 74 | 4,625.42 | 2.35 | 221 | 50,695.01 | 2.14 | 711 | 165,124.04 | 10.19 | 270 | 46,026.69 | 2.51 |
| 2001 | 57 | 9,491.59 | 4.83 | 287 | 59,831.79 | 2.53 | 692 | 154,961.21 | 9.56 | 396 | 55,477.66 | 3.03 |
| 2002 | 37 | 3,418.35 | 1.74 | 342 | 65,181.84 | 2.75 | 876 | 159,172.19 | 9.82 | 441 | 68,562.05 | 3.74 |
| 2003 | 29 | 3,882.83 | 1.97 | 530 | 109,916.20 | 4.64 | 985 | 175,018.32 | 10.80 | 643 | 92,120.11 | 5.03 |
| 2004 | 36 | 11,656.87 | 5.93 | 537 | 120,687.41 | 5.10 | 900 | 160,341.49 | 9.89 | 426 | 71,346.90 | 3.90 |
| 2005 | 39 | 6,331.61 | 3.22 | 804 | 177,476.26 | 7.50 | 1,007 | 173,896.67 | 10.73 | 446 | 83,280.37 | 4.55 |
| 2006 | 104 | 19,987.99 | 10.17 | 1,325 | 292,000.36 | 12.33 | 772 | 167,063.84 | 10.31 | 366 | 102,616.27 | 5.60 |
| 2007 | 91 | 22,044.53 | 11.21 | 1,141 | 296,331.48 | 12.52 | 570 | 151,162.33 | 9.32 | 344 | 86,780.72 | 4.74 |
| 2008 | 149 | 35,349.12 | 17.98 | 527 | 483,423.86 | 20.42 | 499 | 99,949.89 | 6.17 | 607 | 98,803.45 | 5.40 |
| 2009 | 103 | 48,169.55 | 24.50 | 319 | 189,339.90 | 8.00 | 566 | 58,367.82 | 3.60 | 843 | 152,990.12 | 8.35 |
| 2010 | 21 | 4,790.26 | 2.44 | 210 | 187,640.81 | 7.93 | 224 | 51,310.31 | 3.17 | 622 | 188,548.53 | 10.30 |
| 2011 | 28 | 4,756.86 | 2.42 | 218 | 104,241.40 | 4.40 | 158 | 51,026.71 | 3.15 | 513 | 228,167.38 | 12.46 |
| 2012 | 19 | 9,148.71 | 4.65 | 185 | 75,557.19 | 3.19 | 61 | 13,875.41 | 0.86 | 401 | 193,927.87 | 10.59 |
| 2013 | 13 | 3,107.13 | 1.58 | 92 | 25,822.38 | 1.09 | 37 | 9,871.31 | 0.61 | 249 | 75,312.98 | 4.11 |
| 2014 | 7 | 1,575.75 | 0.80 | 93 | 23,580.38 | 1.00 | 31 | 10,917.45 | 0.67 | 217 | 83,746.04 | 4.57 |
| 2015 | 7 | 320.94 | 0.16 | 176 | 33,147.01 | 1.40 | 26 | 10,315.00 | 0.64 | 231 | 120,428.12 | 6.58 |
| 2016 | 29 | 7,951.43 | 4.04 | 230 | 72,398.03 | 3.06 | 25 | 8,710.58 | 0.54 | 179 | 83,214.85 | 4.54 |
| **Total** | **843** | **196,608.95** | **100.00** | **7,237** | **2,367,271.33** | **100.00** | **8,140** | **1,621,084.58** | **100.00** | **7,194** | **1,831,350.12** | **100.00** |

This table presents the distribution of the full sample of tranches by bond type and year. Data are for tranches reported in DCM Analytics with amount available, issued by European banks during the 2000-2016 period.

## Table 3: Descriptive statistics for securitization and covered bond samples

**Panel A: Continuous variables**

| Variable of interest | Securitization bonds | | | | | | Covered bonds | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Mean | Median | Std. Dev. | Min | Max | Number | Mean | Median | Std. Dev. | Min | Max |
| ***Contractual characteristics*** | | | | | | | | | | | | |
| Credit spread (bps) | 4,963 | 96.1 | 65.2 | 114.0 | -438.3 | 2,711.2 | 13,346 | 48.0 | 32.0 | 64.2 | -143.4 | 462.8 |
| WAS (bps) | 855 | 57.8 | 44.1 | 57.9 | -385.6 | 451.8 | 13,240 | 48.1 | 32.0 | 64.1 | -143.4 | 462.8 |
| Rating [1-22 weak] | 4,643 | 4.4 | 3.0 | 4.0 | 1.0 | 21.0 | 12,084 | 1.6 | 1.0 | 1.5 | 1.0 | 13.0 |
| Maturity (years) | 4,963 | 35.0 | 36.3 | 16.3 | 0.8 | 94.1 | 13,346 | 5.8 | 5.0 | 4.2 | 0.0 | 50.0 |
| Transaction size (€ Million) | 4,963 | 2,049.3 | 1,025.3 | 3,018.2 | 1.2 | 50,500.0 | 13,346 | 243.0 | 75.0 | 469.2 | 0.2 | 5,400.0 |
| Tranche size (€ Million) | 4,963 | 366.1 | 80.0 | 1,059.3 | 0.1 | 47,000.0 | 13,346 | 232.7 | 75.0 | 425.1 | 0.2 | 5,000.0 |
| Tranche to transaction | 4,963 | 23.8% | 8.3% | 30.7% | 0.03% | 100.0% | 13,346 | 99.2% | 100.0% | 6.8% | 6.3% | 100.0% |
| Number of tranches | 4,963 | 6.7 | 6.0 | 4.4 | 1.0 | 26.0 | 13,346 | 1.0 | 1.0 | 0.2 | 1.0 | 4.0 |
| Tranche rank | 4,963 | 3.7 | 3.0 | 3.1 | 1.0 | 26.0 | 13,346 | 1.0 | 1.0 | 0.1 | 1.0 | 4.0 |
| Number of banks | 4,963 | 2.8 | 2.0 | 2.2 | 1.0 | 17.0 | 13,346 | 2.0 | 1.0 | 2.5 | 1.0 | 27.0 |
| Bank reputation [1-25 best] | 4,963 | 4.5 | 1.0 | 4.5 | 1.0 | 24.0 | 13,346 | 3.2 | 0.0 | 6.4 | 1.0 | 25.0 |
| ***Macroeconomic factors*** | | | | | | | | | | | | |
| Country risk [1-22 weak] | 4963 | 1.6 | 1.0 | 1.5 | 1.0 | 20.0 | 13,346 | 1.4 | 1.0 | 1.3 | 1.0 | 13.0 |
| Volatility | 4963 | 19.6 | 15.7 | 11.0 | 10.0 | 80.9 | 13,346 | 21.8 | 19.9 | 9.4 | 9.9 | 80.9 |
| EUSA5y-Libor3M (bps) | 4963 | 60.7 | 56.8 | 60.1 | -107.6 | 211.9 | 13,346 | 90.3 | 88.7 | 62.5 | -90.8 | 218.6 |
| Creditor rights | 4962 | 2.7 | 2.0 | 1.1 | 0.0 | 4.0 | 13,344 | 2.6 | 3.0 | 0.9 | 0 | 4 |
| Enforcement | 4962 | 44.5 | 47.0 | 4.1 | 34.19 | 49.33 | 13,344 | 46.1 | 46.8 | 2.26 | 34.2 | 50.0 |
| ***Financial firms' characteristics*** | | | | | | | | | | | | |
| Total assets (€ Million) | 337 | 676,000.0 | 390,000.0 | 750,000.0 | 1,704.2 | 3,810,000.0 | 4,849 | 552,000.0 | 449,000.0 | 463,000.0 | 6,157.7 | 3,500,000.0 |
| Loan ratio | 337 | 59.1% | 62.3% | 19.9 | 0.8% | 92.8% | 4,849 | 43.2% | 42.9% | 13.8 | 0.8% | 89.1% |
| Liquid assets to dep. & ST fund. | 337 | 33.5% | 24.2% | 30.9 | 0.4% | 205.4% | 4,849 | 52.8% | 49.9% | 28.3 | 1.5% | 172.6% |
| Capital adequacy ratio | 337 | 13.0% | 12.2% | 2.9 | 8.2% | 27.0% | 4,849 | 12.6% | 12.3% | 2.9 | 8.0% | 39.9% |
| Return on assets | 337 | 0.7% | 0.8% | 0.7 | -6.7% | 3.1% | 4,849 | 0.2% | 0.2% | 0.4 | -2.8% | 2.4% |
| Non-performing loans ratio | 337 | 3.05% | 2.15% | 4.5 | 0.0% | 50.6% | 4,849 | 4.1% | 3.6% | 2.8 | 0.0% | 34.9% |

**Panel B: Dummy variables**

| Variable of interest | Securitization bonds | | | Covered bonds | | |
|---|---|---|---|---|---|---|
| | Number | % of total | Std. Dev. | Number | % of total | Std. Dev. |
| Rated | 4,963 | 93.6% | 0.25 | 13,346 | 90.5% | 0.29 |
| Pre-crisis | 4,963 | 66.9% | 0.47 | 13,346 | 68.1% | 0.47 |
| Currency risk | 4,963 | 24.2% | 0.43 | 13,346 | 8.8% | 0.28 |
| Fixed rate | 4,963 | 4.7% | 0.21 | 13,346 | 89.6% | 0.30 |
| Rating discordance | 4,963 | 8.5% | 0.28 | 13,346 | 4.3% | 0.20 |
| Callable | 4,963 | 61.6% | 0.49 | 13,346 | 11.5% | 0.32 |

This table presents the descriptive statistics of securitization (ABS and MBS) and covered bond (PCB and MCB) samples issued by banks during the 2000-2016 period in Europe. Information on the characteristics of bond issuances was obtained from DCM Analytics and Datastream. Banks' accounting and market data was obtained from Bankscope. For a definition of the variables, see Table 2.

## Table 4: The impact of the financial crisis on pricing characteristics of ABS, MBS, PCB, and MCB

**Panel A: The impact of the financial crisis on pricing characteristics - continuous variables**

| Variable of interest | ABS | | | | MBS | | | | PCB | | | | MCB | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Mean | Median | Wilcoxon z-test | Number | Mean | Median | Wilcoxon z-test | Number | Mean | Median | Wilcoxon z-test | Number | Mean | Median | Wilcoxon z-test |
| **Credit spread (bps)** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 128.5 | 69.9 | 0.46 | 2,931 | 78.2 | 59.1 | -12.08 *** | 5,858 | 26.1 | 19.7 | -38.38 *** | 3,237 | 28.5 | 22.5 | -49.69 *** |
| crisis | 279 | 126.1 | 87.9 | | 1,364 | 119.3 | 100.8 | | 1,147 | 82.9 | 68.4 | | 3,104 | 97.0 | 76.9 | |
| **Rating [1-22 weak]** | | | | | | | | | | | | | | | | |
| pre-crisis | 360 | 5.3 | 5.0 | -0.91 | 2,832 | 4.4 | 3.0 | 8.65 *** | 5,377 | 1.3 | 1.0 | -2.11 ** | 2,652 | 1.8 | 1.0 | 5.07 *** |
| crisis | 252 | 6.0 | 5.0 | | 1,199 | 3.5 | 1.0 | | 1,095 | 1.4 | 1.0 | | 2,960 | 1.8 | 1.0 | |
| **Tranche rank** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 3.1 | 3.0 | 3.22 *** | 2,931 | 4.2 | 3.0 | 11.76 *** | 5,858 | 1.0 | 1.0 | 0.73 | 3,237 | 1.0 | 1.0 | 3.44 *** |
| crisis | 279 | 2.6 | 2.0 | | 1,364 | 2.9 | 2.0 | | 1,147 | 1.0 | 1.0 | | 3,104 | 1.0 | 1.0 | |
| **Maturity (years)** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 26.0 | 31.2 | -0.59 | 2,931 | 33.8 | 35.7 | -12.54 *** | 5,858 | 5.6 | 5.0 | 1.14 | 3,237 | 5.7 | 5.0 | -9.01 *** |
| crisis | 279 | 27.0 | 29.6 | | 1,364 | 42.0 | 40.1 | | 1,147 | 5.6 | 5.0 | | 3,104 | 6.5 | 5.0 | |
| **Transaction size (€ million)** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 981.3 | 625.0 | -1.94 * | 2,931 | 2,074.0 | 1,104.4 | 1.56 | 5,858 | 217.6 | 100.0 | 6.24 *** | 3,237 | 208.1 | 50.0 | -9.00 *** |
| crisis | 279 | 1,176.9 | 837.2 | | 1,364 | 2,479.3 | 1,029.5 | | 1,147 | 201.0 | 50.0 | | 3,104 | 342.9 | 100.0 | |
| **Tranche size (€ million)** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 208.8 | 49.0 | -5.10 *** | 2,931 | 284.2 | 57.0 | -11.70 *** | 5,858 | 207.2 | 100.0 | 6.12 *** | 3,237 | 192.8 | 50.0 | -9.30 *** |
| crisis | 279 | 323.0 | 147.2 | | 1,364 | 595.6 | 193.7 | | 1,147 | 192.6 | 50.0 | | 3,104 | 337.2 | 100.0 | |
| **Number of tranches** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 5.2 | 5.0 | 5.20 *** | 2,931 | 7.7 | 6.0 | 15.42 *** | 5,858 | 1.0 | 1.0 | 1.07 | 3,237 | 1.0 | 1.0 | 4.59 *** |
| crisis | 279 | 4.4 | 4.0 | | 1,364 | 5.4 | 5.0 | | 1,147 | 1.0 | 1.0 | | 3,104 | 1.0 | 1.0 | |
| **Number of banks** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 2.4 | 2.0 | 12.28 *** | 2,931 | 3.3 | 3.0 | 14.46 *** | 5,858 | 2.0 | 1.0 | 0.40 | 3,237 | 1.9 | 1.0 | -15.31 *** |
| crisis | 279 | 1.4 | 1.0 | | 1,364 | 2.2 | 2.0 | | 1,147 | 1.7 | 1.0 | | 3,104 | 2.3 | 1.0 | |
| **Country risk [1-22 weak]** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 1.3 | 1.0 | -6.18 *** | 2,931 | 1.3 | 1.0 | -18.26 *** | 5,858 | 1.1 | 1.0 | -5.14 *** | 3,237 | 1.3 | 1.0 | -12.88 *** |
| crisis | 279 | 2.8 | 1.0 | | 1,364 | 1.9 | 1.0 | | 1,147 | 1.4 | 1.0 | | 3,104 | 2.0 | 1.0 | |
| **Creditor rights** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 2.3 | 2.0 | 2.88 *** | 2,931 | 2.8 | 2.0 | 2.10 ** | 5,857 | 2.8 | 3.0 | 4.57 *** | 3,237 | 2.5 | 3.0 | 8.43 *** |
| crisis | 278 | 2.2 | 2.0 | | 1,364 | 2.7 | 2.0 | | 1,147 | 2.7 | 3.0 | | 3,103 | 2.2 | 3.0 | |

**Panel B: The impact of the financial crisis on pricing characteristics - dummy variables**

| Variable of interest | ABS | | | | MBS | | | | PCB | | | | MCB | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Number (d=1) | % of total | Fisher's exact test | Number | Number (d=1) | % of total | Fisher's exact test | Number | Number (d=1) | % of total | Fisher's exact test | Number | Number (d=1) | % of total | Fisher's exact test |
| **Fixed rate** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 60 | 15.4% | 0.000 # | 2,931 | 117 | 4.0% | 0.228 | 5,858 | 5,439 | 92.8% | 0.000 # | 3,237 | 2,984 | 92.2% | 0.000 # |
| crisis | 279 | 14 | 5.0% | | 1,364 | 44 | 3.2% | | 1,147 | 984 | 85.8% | | 3,104 | 2,556 | 82.3% | |
| **Currency risk** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 21 | 5.4% | 0.255 | 2,931 | 1,008 | 34.4% | 0.000 # | 5,858 | 511 | 8.7% | 0.000 # | 3,237 | 292 | 9.0% | 0.158 |
| crisis | 279 | 9 | 3.2% | | 1,364 | 162 | 11.9% | | 1,147 | 62 | 5.4% | | 3,104 | 313 | 10.1% | |
| **U.K. borrowers** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 18 | 4.6% | 0.002 # | 2,931 | 1,161 | 39.6% | 1.000 | 5,858 | 37 | 0.6% | 0.078 | 3,237 | 1 | 0.0% | 0.000 # |
| crisis | 279 | 31 | 11.1% | | 1,364 | 540 | 39.6% | | 1,147 | 2 | 0.2% | | 3,104 | 159 | 5.1% | |
| **Callable** | | | | | | | | | | | | | | | | |
| pre-crisis | 389 | 248 | 63.8% | 0.806 | 2,931 | 1,694 | 57.8% | 0.000 # | 5,858 | 946 | 16.1% | 0.000 # | 3,237 | 385 | 11.9% | 0.000 # |
| crisis | 279 | 181 | 64.9% | | 1,364 | 932 | 68.3% | | 1,147 | 41 | 3.6% | | 3,104 | 158 | 5.1% | |

This table reports statistics for securitization (ABS and MBS) and covered bonds (PCB and MCB) separated into two sub-samples: pre-crisis period (from January 1, 2000 through to September 14, 2008) and crisis period (from September 15, 2008 through to December 31, 2016). We test for similar distributions using the Wilcoxon rank-sum test for continuous variables (Panel A) and the Fisher's exact test for discrete ones (Panel B). In Panel A, $^{***}$, $^{**}$, and $^{*}$ indicate significant difference at the 1%, 5%, and 10% levels, respectively. In Panel B, $^{\#}$ indicates that there is a statistically significant relationship between the dummy variable and the 2007-2008 financial crisis and subsequent European sovereign debt crisis.

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