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A COMPARATIVE ANALYSIS OF EX ANTE CREDIT SPREADS: STRUCTURED FINANCE VERSUS STRAIGHT DEBT FINANCE *

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Abstract

This paper examines the pricing of structured finance (SF) – asset-backed securities (ABS), mortgage-backed securities (MBS), and collateralized debt obligations (CDO) – and straight debt finance transactions. Using a cross-section of 24,525 European bonds issued by financial and nonfinancial firms in the 2000-2016 period, we show that although ratings are the most important pricing determinant for SF and corporate bonds (CB) at issuance, investors rely on other contractual, macroeconomic, and firms' characteristics beyond these ratings. We find that CDO tranches have, on average, higher credit spreads than similarly rated CB, while investors are not compensated for facing higher systematic risk components in relation to investment-grade ABS and MBS. Our results also support the hypothesis of SF transactions as mechanisms of reducing funding costs: SF transactions' weighted average spread is lower than that of comparable CB and originating firms' creditworthiness does not deteriorate when compared to a sample of matched firms.

Key words: Debt pricing; structured finance; corporate bonds; mispricing; cost of funding.

JEL classification: F34; G01; C12; C32

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1. Introduction

Structured Finance (SF), in the form of asset securitization (AS), has become a significant source of financing for a wide variety of assets in recent decades. According to the Securities Industry and Financial Markets Association (SIFMA), the volume of securitized assets in Europe grew from €78.2 billion in 2000 to €818.7 billion in 2008, an increase of 946.9%.[1] Despite the important role played by AS in the development and propagation of the 2007-2008 financial turmoil,[2] between 2009 and 2016 a total of €2,290.6 billion of securitized instruments were issued in Europe, compared with €11,732.0 billion in the United States (US). Although financial firms have issued the majority of AS bonds, we show that the issuance of AS bonds by nonfinancial firms located in Europe increased significantly by more than €34.0 billion in 2006, before declining to €1.65 billion in 2010, in the aftermath of the financial crisis (see Appendix A).

AS and corporate bond (CB) markets are the largest security markets for corporate debt financing, both in Europe and the US (Choudhry, 2004; Loutskina, 2011). In this paper we compare credit spreads and pricing of AS bonds – asset backed-securities (ABS), mortgage backed-securities (MBS), and collateralized debt obligations (CDO) – with those of CB in a large sample of bonds (9,217 AS and 15,308 CB) issued by European financial and nonfinancial firms between January 1, 2000 and December 31, 2016. We also examine whether credit spreads convey information beyond credit ratings across AS and CB and if AS transactions allow originating firms to reduce funding costs *vis-à-vis* CB issuances.[3]

This paper contributes to a recent body of literature on the determinants of SF bond credit spreads. Despite the significant attention devoted by both academics and practitioners to the analysis of CB spreads (e.g., Collin-Dufresne *et al.*, 2001; Elton *et al.*, 2001; Campbell and Taksler, 2003; Hull *et al.*, 2004; Titman *et al.*, 2004; Longstaff *et al.* 2005; Chen *et al.*, 2007; Bao *et al.*, 2011; Flannery *et al.*, 2012), research on bond spreads in the SF market is relatively scant. The few exceptions related to the pricing of AS securities are:

[1] Securitisation Data Report, European Structured Finance, Q4: 2018; Securities Industry and Financial Markets Association (https://www.sifma.org/). In this study, we define Europe as countries belonging to the European Economic Area plus Switzerland.

[2] See, among others, Benmelech and Dlugosz (2009), Brunnermeier (2009), Demyanyk and Van Hemert (2011), and Purnanandam (2011).

[3] Throughout the paper, we use AS securities as proxies for SF transactions and use CB issues as a proxy for straight debt finance transactions.

Vink and Thibeault (2008), who examine the pricing of non-US ABS, MBS and CDO and find that credit spreads per security class are influenced differently by common pricing characteristics. Furthermore, Cuchra (2005), Buscaino *et al.* (2012), and Fabozzi and Vink (2012), find that credit rating is the most important pricing factor for SF bonds at issuance. However, a stream of research suggests that investors also rely on factors other than credit ratings when pricing asset-backed claims. An *et al.* (2011) show that interest rate volatility, the yield curve slope, prepayment constrains, portfolio loan maturity, and the collateral-type of the underlying asset pool have a significant impact on US commercial mortgage-backed securities' spreads. Moreover, 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 Euro market. We believe our study is the first to examine how *ex ante* credit spreads and pricing compare between subcategories of SF tranches and CB. In addition, and to the best of our knowledge, we are the first to analyze the impact of originating firms' characteristics on the pricing of SF, taking into consideration the potential self-selection by firms between issuing SF *versus* CB.[4]

Our findings document that AS and CB tranches are differently priced and that, despite credit ratings being a major pricing determinant for AS and CB at issuance, investors rely on other pricing factors. We find that factors important for CB pricing, such as 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. Interestingly, we find non-linear relationships between credit spreads and maturity for SF tranches. Collateral type, subordination level, and originating firms' credit risk proxies also determine SF tranche credit spreads.

The paper also contributes to the literature by exploring a potential mispricing effect in the SF markets. One strand of the literature argues that, as AS securities carry large systematic risks relatively neglected by credit ratings, which are constructed to reflect only physical default probabilities (S&P) or expected losses (Moody's), securitized assets are expected to offer higher yields than similarly rated CB

[4] Our analysis uses a dataset of European AS and CB issues, developed based on a hand-matching procedure between bonds extracted from DCM Analytics and firms' characteristics drawn from Datastream and Bankscope. Additionally, we use endogenous switching regression models to mitigate potential self-selection problems.

(Brennan *et al.*, 2009; Coval *et al.*, 2009a,b; Wojtowicz, 2014).[5] On the other hand, segmented financial markets create the opportunity for the design of new securities to accomplish certain risk-return profiles desired by investors, who are available to pay a premium *vis-à-vis* comparable CB (Oldfield, 2000; Fender and Mitchell, 2005; Jobst, 2007). Empirically, Wojtowicz (2014) and Cornaggia *et al.* (2017) show that, in the US, SF bonds exhibit higher yields than similarly rated CB. On the contrary, Coval *et al.* (2009b) find that senior CDO tranches are significantly overpriced. In this paper, we extend Wojtowicz's (2014) and Cornaggia *et al.*'s (2017) work by comparing SF and CB credit spreads across subcategories of AS bonds and credit ratings, controlling for other macroeconomic factors, as well as contractual characteristics that arguably affect credit spreads.

Our findings document that CDO tranches have, on average, higher credit spreads than rating-matched alternatives, in line with the hypothesis that investors should demand larger spreads for holding securities, such as AS bonds, which carry higher systematic risks. On the other hand, our findings indicate that investment-grade ABS and MBS typically offer similar or lower compensation than CB with comparable credit risk, providing support to the segmented financial markets hypothesis. 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 for AS and CB issues with similar maturities. The results are qualitatively similar.

We also extend a growing body of literature, mostly focused on financial firms,[6] which explains why firms use AS. Limited research has been carried out in this area to examine nonfinancial corporations. A few exceptions are Katz and Blatt (2008), Ayotte and Gaon (2011), Riachi and Schwienbacher (2013, 2015), and Lemmon *et al.* (2014). The reduction in originators' funding costs is a commonly referred economic benefit of

[5] In this paper, we use systematic risk in the framework of the standard capital asset pricing model. As pointed out by Coval *et al.* (2009a,b), under this framework, unlike traditional CB, whose yields are primarily driven by firm-specific characteristics, the performance of SF securities is strongly affected by economywide non-diversifiable risks.

[6] See Greenbaum and Thakor (1987), Pennacchi (1988), Gorton and Pennacchi (1995), Loutskina and Strahan (2009), Affinito and Tagliaferri (2010), Casu *et al.* (2013), and Farruggio and Uhde (2015), for examples of this literature.

AS to either a financial or a nonfinancial firm. By using AS, a firm may be able to lower funding costs, when the benefits of the reduced cost of funding are greater than the cost of the required credit enhancement (Finnerty, 1988; Rosenthal and Ocampo, 1988; Roever and Fabozzi, 2003; Jobst, 2006). Lemmon *et al.* (2014) suggest that securitization minimizes financing costs for US nonfinancial firms by reducing expected bankruptcy costs and providing access to segmented credit markets. AS can reduce an originating firm's cost of funding when compared with straight debt financing if two conditions hold. First, if the AS transaction cost of borrowing is lower than that of the originator. Second, if the creditworthiness of the originating firm does not deteriorate after the closing of an AS transaction, when compared to non-securitizing firms. To the best of our knowledge, this paper is the first to estimate the cost of funding reduction for an originator using AS *versus* CB.

Our findings are consistent with the hypothesis that SF transactions reduce originating firms' cost of funding for both financial and nonfinancial firms. Our results indicate that ABS, MBS, and CDO transactions' weighted average spread is lower than that of CB and that the credit risk of AS users does not increase significantly, in the year and the year after an AS closing, when compared with matched non-users. Results are robust when considering firms that use both AS and CB deals during our sampling period, classified as switchers, and when using endogenous switching regression models.

Finally, we contribute to the extant literature on AS by focusing on the European market, which has been relatively neglected by the literature, despite the rise in importance of the SF market.[7] The European market is a sound laboratory to assess the pricing of SF securities *vis-à-vis* comparable CB and investigate if AS allows originators to reduce the cost of borrowing. First, unlike the US market, where government-sponsored institutions – Fannie Mae and Freddie Mac – have supported the AS market, in Europe such institutions do not exist (Kara *et al.*, 2016). Second, policy makers are discussing the revival of AS. A recent joint paper prepared by the Bank of England and the European Central Bank (BoE and ECB, 2014) points to

[7] Most of the existing evidence is based on the US. Notable exceptions are the recent works of Affinito and Tagliaferri (2010), Cardone-Riportella *et al.* (2010), Fabozzi and Vink (2012), Farruggio and Uhde (2015), and Kara *et al.* (2016).

the need for a better functioning AS market in the European Union due to its important role as a funding and risk transfer instrument.

This paper is organized as follows. Section 2 reviews the literature and describes the research hypotheses. Section 3 describes the data and variables we use in our tests. Section 4 examines the determinants of credit spreads for SF and CB tranches. It also analyzes if the market prices bonds differently across AS and CB classes, when controlling for credit ratings. Section 5 examines if SF reduces originating firms' cost of funding and section 6 concludes the paper.

2. Literature review and hypotheses

2.1. The financial economics of structured finance

SF security design technology involves the issuance of financial claims collateralized by a pool of assets, prioritizing the cash flows of the underlying collateral in a way that each senior claim has absolute priority over the junior classes (Caselli and Gatti, 2005; Jobst, 2006, 2007; Leland, 2007; Marques-Ibanez and Scheicher, 2010). Investors protection from dilution provided by the instrumental special purpose vehicle (SPV) in SF arrangements – the 'bankruptcy remoteness' – isolates cash flow generating assets from the originator. This feature is not available in on balance-sheet funding such as secured bonds (Ayotte and Gaon, 2011).[8]

In an economy *à la* Modigliani and Miller (1958), SF transactions would be irrelevant. Therefore, in such a world tranching, or encapsulating a pool of assets in an *ad hoc* organization, would be value neutral. Thus, the existence of market imperfections, including asymmetric information, agency conflicts, market incompleteness, or market segmentation, can be helpful in explaining tranching, off-balance sheet financing, and the benefits of SF transactions.

A robust body of literature provides relevant theoretical arguments and empirical findings documenting that, structured financing, namely AS, does matter, because of the deadweight costs associated with market imperfections and frictions, and market and contracting incompleteness. For example, Diamond

[8] See, among others, Gorton and Souleles (2007), Gorton and Metrick (2013) and Pinto (2016) for a detailed discussion of the securitization process.

(1993), Winton (1995), and Glaeser and Kallal (1997) argue that the design and issuance of different classes of securities with different degrees of seniority – structuring – reduces monitoring costs and adverse selection problems. Riddiough (1997), DeMarzo and Duffie (1999), Fulghieri and Lukin (2001), and DeMarzo (2005) point out that a bank can reduce asymmetric information costs by pooling assets and issuing different securities – tranching – against the pool of cash flows.

The economic motivations for nonfinancial firms using AS include, inter alia, reducing funding costs, diversifying funding sources, improving risk management, accelerating earnings for financial reporting purposes, and mitigating liquidity constrains by selling securities backed by financial claims (e.g., Fabozzi *et al.*, 2006; Ayotte and Gaon, 2010; Riachi and Schwienbacher, 2013, 2015; Lemmon *et al.*, 2014). For financial firms, extant literature suggests that AS can be used, namely to: (*i*) increase liquidity and diversify funding sources; (*ii*) improve originators' risk management; (*iii*) obtain new profit opportunities, by recognizing accounting gains when the market value of loans exceeds book value; (*iv*) adjust capital ratios; and (*v*) reduce funding costs (e.g., Greenbaum and Thakor, 1987; Pennacchi, 1988; Rosenthal and Ocampo, 1988; Jones, 2000; Ambrose *et al.*, 2005; Altunbas *et al.*, 2009; Loutskina and Strahan, 2009; Loutskina, 2011; Affinito and Tagliaferri, 2010; Cardone-Riportella *et al.*, 2010; Casu *et al.*, 2013; and Farruggio and Uhde, 2015).[9]

2.2. The European securitization market

While the concept of AS was introduced in the US financial system in the 1970s, the first European transaction was originated, in the United Kingdom, in 1987. In the 1990s, Spain, France, Finland, Sweden, Ireland, Italy, and Germany joined the trend. However, it was with the introduction of the euro in 1999 that AS really began to take off, strongly accelerating until mid-2007. The use of AS has increased since the beginning of the financial crisis in 2007. However, the European sovereign debt crisis has limited securitization activity; and its use has changed since that time, namely because an increasing number of banks have underwritten their

[9] Prior research documents that the use of AS transactions by financial institutions, mainly during the 2007-2008 financial crisis, was associated with (*i*) poorer screening standards and weaker monitoring of borrowers; (*ii*) incentives to securitize low quality assets; (*iii*) increased problems in renegotiating distressed assets; and (*iv*) failures in valuing complex securitization instruments (Benmelech and Dlugosz, 2009; Demyanyk and Van Hemert, 2011; Purnanandam, 2011; Michalak and Uhde, 2012).

own programs, to use them as a guarantee for obtaining resources in the ECB auctions, issuing the so-called Covered Bonds (Cardone-Riportella *et al.*, 2010).

The diversity of the assets and the direct involvement of the public sector are characteristics differentiating the European market from the larger and more developed US market. While, in the US, the catalyst for securitization was the US government's objective for encouraging home ownership and creating a secondary market for mortgages, in Europe, there has been no government body to act as a catalyst (Kara *et al.*, 2016).[10] In most European countries, larger commercial banks issued the first MBS with the objectives of regulatory arbitrage, diversification of funding sources, and as a response to the appeal of international investors. Additionally, lack of a large powerful body to provide homogenization and standards and the differing legal frameworks of each European government provide a very different setting for securitization than in the US.[11] Hence, these specificities of the European market demand a closer analysis.

2.3. Hypotheses

2.3.1. Pricing

AS securities are issued as subordinated, varying seniority and maturity claims, with a residual tranche, called the 'equity tranche' or retained interests, typically held by the originating firms. These various classes are created to generate differential interests in the pool, such that the senior investors have priority rights over subordinated investors. Moreover, additional credit enhancement mechanisms other than subordination, such as excess spread, overcollateralization, cash reserve accounts, or a guarantee by an insurance company, may be assigned to an SPV, to improve the credit rating of the issued securities (Fabozzi *et al.*, 2006). An important difference between the approach used to rate securitized debt and bonds is that CB are rated *ex-post* while securitized products are rated *ex-ante*; that is, AS transactions are generally structured with the idea of issuing securities that meet a specific rating profile (Roever and Fabozzi, 2003; Brennan *et al.*,

[10] In the US, the AS market was supported by means of government-sponsored agencies such as Fannie Mae and Freddie Mac, created in 1938 and 1968, respectively. See Acharya *et al.* (2014) for further discussion.

[11] While in the US trusts play an important role, in Europe all deals use a variant of the following structure: (*i*) the originator sells the assets to an SPV; and (*ii*) the SPV then issues a bond, which is purchased by various investors, backed by the assets owned by the SPV. As in Europe, it is very common to have a minimum amount of share capital necessary to set up a company, this type of structure can be much more costly than a US trust company. See Davidson *et al.* (2003) for further discussion of European securitization.

2009). Therefore, contrary to the traditional secured bonds, where the credit spread depends essentially on the issuing firm's characteristics, the credit spread of any SF tranche depends, instead, on the assets and cash flows pledged as collateral and on the credit enhancement mechanisms used (Liu *et al.*, 2018). This leads us to hypothesize:

Hypothesis 1 (H1): SF and CB issues are priced differently by common pricing factors and, as for CB, investors rely on factors other than credit ratings when pricing SF tranches.

2.3.2. Credit spreads across asset classes

According to Duffie and Rahi (1995) and Riddiough (1997), market imperfections may lead to the segmentation of financial markets, which may be exploited by originators when designing AS securities. The common types of arbitrage opportunities that usually arise when market segmentation exists are: (*i*) limits imposed by preferences, investment mandates and/or regulation, and (*ii*) pricing differentials among assets (Allen and Gale, 1989, 1991, 1994). DeMarzo (2005) offers market incompleteness and asymmetric information as major explanations for tranching in AS: (*i*) tranching makes the market more complete by satisfying the needs of some investors (Maskara, 2010); and (*ii*) tranching adds value when heterogeneous investors have different private information and different capabilities to screen investors (Boot and Thakor, 1993; DeMarzo and Duffie, 1999; DeMarzo, 2005; An *et al.*, 2011).[12] Models by Duffie and Rahi (1995) and Riddiough (1997) combine spanning with asymmetric information, showing that both arguments can coexist with respect to different tranches created within a single issue. For example, investors facing information asymmetry problems might prefer senior, or less 'information sensitive' tranches, while multiple junior tranches might be designed to exploit investors with private information and specific risk appetites. Therefore, Oldfield (2000), Fender and Mitchell (2005), and Jobst (2007) argue that segmented financial markets may make it attractive for SF arrangers to create new assets with desired risk-reward profiles in terms of security design for particular investor classes, and the market will place a premium on them – i.e., have lower credit spreads – when compared with similarly rated CB. Under this framework, we propose:

[12] There is also a growing body of theoretical literature that explains AS with a focus on agency issues rather than tranching. For example, Iacobucci and Winter (2005) argue that AS is 'driven by the propensity of the market to allocate assets to investors who are best informed about asset values.'

Hypothesis 2 (H2): ABS, MBS and CDO have lower credit spreads than similarly rated CB.

From a different perspective, Coval *et al.* (2009a,b) argue that AS substitutes diversifiable risk for systematic risk, which is mostly ignored by rating agencies. Further, authors suggest that credit ratings are constructed to reflect physical default probabilities (S&P) or expected losses (Moody's), disregarding whether a security is likely to default in extreme economic conditions (Brennan *et al.*, 2009; Coval *et al.*, 2009a; Shivdasani and Wang, 2011; Wojtowicz, 2014). As pointed out by Pagano and Volpin (2012), this implied information loss may be not only a source of mispricing but also the reason for secondary market illiquidity. If the secondary markets are expected to be illiquid, the SF bond price should also be lower. Coval *et al.* (2009b) argue that underlying the capital asset pricing model framework, securities that are correlated with the market should offer higher spreads to investors than securities with the same credit rating whose payoffs have a lower correlation. Brennan *et al.* (2009) develop a model predicting that CDO tranches with similar probabilities of default or expected default losses than CB can be expected to trade at higher yields, and that this mispricing effect increases with the subordination level. This leads to the third hypothesis:

Hypothesis 3 (H3): SF bonds have higher credit spreads than CB with identical credit ratings.

Empirically, in line with the predictions of Coval *et al.* (2009 a,b), Wojtowicz (2014) documents that CDO tranches have higher spreads compared to similarly rated bonds when priced according to the market standard models. Similarly, Cornaggia *et al.* (2017), using data of ratings for US corporate, municipal, sovereign, financial, and SF bonds show that bond prices reflect additional information other than credit ratings across asset classes, and that SF products offer higher yields than similarly-rated CB. However, Coval *et al.'s* (2009b) findings support the argument that AS contributes to complete inherently incomplete financial markets. Using market yields on CDX tranches for the 2004-2007 period, they find that CDO resemble 'economic catastrophe bonds', but offer investor's a lower return than comparable alternatives.[13]

[13] Contrary to Coval *et al.* (2009b), Collin-Dufresne *et al.* (2012) rely on the same data and show that if the model incorporates more dynamic features, CDX tranches were actually priced correctly. Driessen and Van Hermert (2012) use a structural pricing model and find no evidence that investors substantially overpriced senior tranches before and during the crisis period and that temporary mispricing effects are caused by price pressures due to hedging activities.

The volume and number of AS tranches have dropped significantly from 2009, as a consequence of the 2007-2008 financial crisis (see Appendix A). As pointed out by Kara *et al.* (2019), during good states of a credit cycle it might be more difficult for investors to assess the true value of information-intensive securities. Additionally, AS market regulations changed significantly during the crisis period (BCBS, 2014). In this respect, it is particularly important to observe how AS and CB credit spreads compare across rating classes in normal *versus* crisis times.

2.3.3. Cost of funding

Extant theoretical literature suggests that financial and nonfinancial firms with high-quality assets may be able to reduce their funding costs through AS, by minimizing the costs related to financial distress and bankruptcy (Greenbaum and Thakor, 1987; Goldberg and Rogers, 1988; Roever and Fabozzi, 2003; Fabozzi *et al.*, 2006). In AS, most of the tranches issued by SPVs are higher rated 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). Gorton and Souleles (2007) point out that AS can be value-enhancing by minimizing the expected cost of distress. Empirically, Lemmon *et al.*'s (2014) findings are consistent with AS reducing financing costs for a sample of US nonfinancial firms by reducing expected bankruptcy costs. Katz and Blatt (2008) report that ABS yields lower cost of borrowing than factoring, especially when the SPV used is bankruptcy remote. Casu *et al.* (2013) show that US securitizer banks have a higher cost of total liabilities than comparable nonsecuritizers, and that this cost drops significantly for first-time securitizers.[14] This supports a fourth hypothesis:

Hypothesis 4 (H4): SF transactions reduce originating firms' cost of funding.

3. Data, methodology, and variable definition

3.1. Sample selection

[14] Indirect evidence is provided by Nadauld and Weisbach (2012), who find that in the US, a loan that is subsequently securitized has a lower yield than an otherwise identical loan. Similarly, Shivdasani and Wang (2011) find lower cost spreads for LBO loans associated with the CDO channel. However, Kara *et al.* (2016), using a euro-denominated sample, point out that the relative level of banks' securitization activity is not related to narrower lending spreads.

Our sample consists of individual bond offers extracted from the DCM Analytics and covers the 2000-2016 period. DCM Analytics provides comprehensive information about bond securities issued on the debt capital markets. Although information is available on several types of bonds, we include only those with a deal-type code of "corporate bond investment-grade", "corporate bond high-yield", "asset-backed security", "mortgage-backed security", and "collateralized debt obligation". We also require that securities are issued by firms 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 AS tranches from the same transaction appear as separate observations in our database. Therefore, to perform a transaction-level analysis in section 5 we aggregate tranche-level data (e.g., credit spread and maturity).

Since we wish to analyze how credit spreads and pricing processes on ABS, MBS, and CDO compare with those of similarly rated CB, 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. 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" are excluded from the database. In order 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 24,525 debt issues (16,113 transactions) worth €9,346.9 billion, of which 9,217 tranches (2,806 transactions) worth €2,579.0 billion are classified as AS bonds – of which 2,520 are ABS (1,103 transactions), 4,522 are MBS (1,204 transactions), and 2,175 are CDO (499 transactions) – and 15,308 tranches (13,307 transactions) worth €6,767.9 billion as CB issues. Panel A of Table 1 presents the industrial distribution of the full sample of tranches, while Panel B details the tranche allocation to originators

(for AS) or issuers (for CB) in a particular country. Panel A shows that AS tranches are issued almost exclusively by financial institutions. Regarding nonfinancial firms, real estate, machinery and equipment, and public administration/government industries account for 1.4%, 1.1%, and 1.0% of all asset securitization lending, respectively. CB deals reveal a less concentrated industrial pattern *via-à-vis* AS, with financial institutions (52.2%), communications (8.5%), machinery and equipment (7.4%), and utilities (7.5%) receiving the highest shares of all CB issuance. Panel B reveals striking similarities between AS and CB issuance. AS and CB tranches are concentrated in six countries, with issuers located in France, Germany, Italy, the Netherlands, Spain and the United Kingdom accounting for 90.5% and 85.3% of all AS and CB issuance by volume, respectively.[15] Panel C provides information in relation to identifying the biggest players and their relative importance in AS and CB markets. In terms of financial firms, the top ten AS originators and CB issuers contributed to a similar weight (41%), by volume, of all tranches in our sample. It is interesting to note that 5 banks (Banco Santander, S.A., Lloyds Banking Group plc, Royal Bank of Scotland plc, Deutsche Bank AG, and Rabobank Nederland) are in the top 10 for both AS and CB issuance. Regarding nonfinancial firms, the top 10 CB issuers were involved in around 19.7% of all deals, a lower fraction when compared with 23.7% of AS deals closed between 2000 and 2016 by the top 10 originators.

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

3.2. Methodology and variables

To examine the common pricing determinants of individual AS and CB tranches, and how ABS, MBS and CDO credit spreads compare with similarly rated CB, we use the model described in equation (1).[16] The dependent variable is the *credit spread,* in basis points. We employ OLS regression techniques and

[15] In Panel B, with the exception of Finland, Nordic countries have no AS tranches. According to SIFMA, the volume of securitized assets issued in these countries is practically inexistent, except in 2013, when Santander Consumer Bank AS completed the first auto-loan AS in Denmark for an amount of €800 million – tranches of deal drop when the screens identified in section 3.1 are applied. However, the European market for covered bo (1) has grown significantly in recent years, particularly in Nordic countries. For example, between 2000 and 2016, Denmark was the European country with the largest issuance of covered bonds (€1,844.6 billion), followed by Germany (€1,539.2 billion).

[16] We use a reduced-form model along the lines of existing pricing models for CB (e.g., Campbell and Taksler, 2003; Gabbi and Sironi, 2005; Chen *et al.*, 2007)

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

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

A discussion of the variables used follows. 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. Summary descriptive statistics are presented in Appendix B.

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

3.2.1. Credit Spread

Credit spread corresponds to the price for the risk associated with the bond at closing, defined as the margin yielded by the security at issue above a corresponding currency treasury benchmark with a comparable maturity – the option adjusted spread (OAS).[17] Considering that CB typically have fixed-rate coupons, whereas AS bonds 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. Hence, to ensure comparability of spreads at issuance, we converted floating rate bonds to fixed rates using fixed-for-floating rate swaps. This conversion was implemented individually for each bond, using the appropriate quote for the swap matching the maturity of the bond and taken at the issuance date.[18]

3.2.2. Credit rating

Credit ratings are a central determinant of CB credit spreads (e.g., Collin-Dufresne *et al.*, 2001; Elton *et al.*, 2001; Hull *et al.*, 2004; Titman *et al.*, 2004; Longstaff *et al.*, 2005). Regarding SF, Cuchra (2005) reports

[17] We use the credit spread at issuance because it is difficult to obtain reliable secondary market spread information for SF securities, which are typically derived from pricing matrices or dealer quotes. In addition, we use the OAS as it 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 SF bonds. See Cuchra (2005) and Fabozzi and Vink (2012).

[18] We also consider the specific interest rate market (EUR Libor, USD Libor and GBP Libor) and even different reference rates within the same market (e.g., USD Libor 1M, USD Libor 3M, USD Libor 6M, and USD Libor 12M). The data on daily swap curves for maturities between 3 months and 50 years, and 3 interest rate market benchmarks with four different reference rates, were drawn from Datastream.

that the importance of credit ratings seems to be far greater than in the case of CB. All tranches in our study 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 (Gabbi and Sironi, 2005; Cornaggia *et al.*, 2017). If a tranche has two credit ratings, we computed the average. Rating scales are inverse scales, so we expect spreads to increase as rating decreases. As some SF bonds, namely first-loss tranches, are not rated, we include the dummy variable *rated*, equal to 1 if the bond has a credit rating from S&P and/or Moody's, 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 leads to a higher credit spread, reflecting a higher degree of uncertainty concerning the transaction's default risk.

3.2.3. Contractual characteristics

Recent empirical studies indicate that several contractual factors beyond rating categories convey information about the pricing of CB (Campbell and Taksler, 2003; Elton *et al.*, 2003; Gabbi and Sironi, 2005; Chen *et al.*, 2007). These include maturity, deal size, number of banks in the issuing syndicate, and gross fees. Similarly, SF literature also present factors, like subordination level, collateral-type, currency risk, and the type of interest rate that affect credit spreads, when controlling for credit ratings (Vink and Thibeault, 2008; Fabozzi and Vink, 2012).

It is widely agreed that bonds with longer maturities tend to be riskier than bonds with shorter maturities. Therefore, investors usually demand higher premiums for longer-term securities. While several authors (Jones *et al.*, 1984; Sarig and Warga, 1989; Gabi and Sironi, 2005) argue that, on average, the term structure of spreads for investment grade bonds appears upward-sloping, 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). For SF, reported results suggest that the impact of maturity on spreads is non-linear (Sorge and Gadanecz, 2008) or negative (Vink and Thibeault, 2008). In addition to

controlling for *maturity*, we specified the logarithm of maturity in our baseline multiple regression, as a surrogate for any non-linear relationships between credit spread and maturity.

The issue size of a CB is, *ceteris paribus*, positively related with lower uncertainty and higher liquidity than smaller offerings (Gabbi and Sironi, 2005; Chen *et al.*, 2007; Sorge and Gadanecz, 2008). Similarly, Couchra (2005), Vink and Thibeault (2008), and Buscaino *et al.* (2012) find a negative impact of *transaction size* on the spread for AS. We thus expect larger issues to exhibit lower spreads.

AS structure is layered so that each position benefits from the credit protection of all the positions subordinated to it. We use two variables to control for differences in risk existing among different tranches of a deal. First, the *subordinated* dummy variable, which is equal to one for tranches that are subordinated. We expect subordinated bonds to have higher credit spreads than senior bonds. Second, as in Kara *et al.* (2016), we use the *tranche rank*, an ordinal variable that ranges from 1 to 21 depending on the seniority of the tranche within the deal, as a proxy of the subordination level. We expect a positive impact of this ratio on credit spread for AS, but a negative relationship for CB.[19] In section 5, when examining if AS deals reduce an originator's cost of borrowing, we use the *number of tranches* to control for the deal's tranching level (Cumming *et al.*, 2019).

We expect tranches exposed to *currency risk* to have higher spreads than those that are not (Vink and Thibeault, 2008; Vink and Fabozzi, 2012). In line with Sorge and Gadanecz (2008), we expect issuers to raise funds at a higher spread through fixed priced issues than through floating priced issues. Bank involvement is measured by the *number of banks* supporting the transaction, and we expect a negative relationship for both SF and CB credit spreads.[20] To capture additional differences in bank syndicates, we also control for *bank reputation*, computed according to the yearly Thomson Reuters EMEA bookrunners ranks. As the involvement of banks with a higher reputation may reduce information asymmetries, we expect a negative relationship between bank reputation and credit spreads (Kara *et al.*, 2016).

[19] A tranche belonging to a CB issue with a relatively higher number of tranches is generally seen as less risky in that the deal allows for risk spreading as it is split into several tranches.

[20] Underlying this conjecture is Sufi's (2007) argument that smaller bank syndicates signal higher borrower's opacity.

Ayotte and Gaon's (2011) model shows that ABS value depends on the type of the underlying assets. While SF credit spreads might generally be considered less determined by originator-specific characteristics, they are considerably dependent on the specific type of assets sold to the SPV. Empirically, Fabozzi and Vink (2012) find that primary market spreads are lower for consumer ABS than mortgage ABS issued by nonfinancial firms. We thus use dummy variables to control for collateral type: (*i*) regarding financial firms, commercial *versus* residential for MBS and commercial *versus* consumer for ABS; and (*ii*) fixed assets *versus* current assets, for nonfinancial firms. Residential or consumer loans are more homogenous and can hence more readily be used as collateral (Loutskina, 2011). This contrasts with commercial or equipment loans, which typically are more relationship based, requiring more monitoring and screening. We thus expect a positive impact of both commercial and fixed collateral on credit spreads.

3.2.4. Macroeconomic factors

To examine the impact of macroeconomic factors on credit spreads, we use *EUSA5y-Libor3M*, estimated as the difference between the five-year Euro swap rate and the 3-month Libor rate, and *market volatility*, measured by the Chicago Board Options Exchange Volatility Index. We expect, for both AS and CB, that increases in the slope of the yield curve should have a negative impact on credit spreads, while a contrary effect is expected for market volatility (Campbell and Taksler, 2003; Titman *et al.*, 2004; Cuchra, 2005; Krishnan *et al.*, 2005; Cremers *et al.*, 2008; An *et al.*, 2011).

We collected the S&P's country rating to control for *country risk*. Boubakri and Ghouma (2010) report that investors charge higher CB yields to firms that are located in countries with poor creditor rights protection. Similarly, Fabozzi and Vink (2012) stress that the legal infrastructure that provides the safeguarding of the collateral on behalf of ABS investors is key in the securitization process. Considering the syndicated loan market, Cumming *et al.* (2019) point out that strong credit protection and efficient debt collection decrease tranche spreads. We thus analyze the impact of *creditor rights* and *enforcement* level on AS and CB credit spreads. 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*. As in Riachi and Schwienbacher (2015),

we also use year and industry dummy variables to control for unobserved macroeconomic trends and possible industry-specific variations.

3.2.5. Originating/issuing firms' characteristics

Although SF deals employ bankruptcy remote SPVs, the financial strength of the originator may matter in pricing the debt issued by the SPV (Gorton and Souleles, 2007; Landsman *et al.* 2008). Longstaff and Rajan (2008) show that CDO credit spread are driven by firm-specific factors, while He *et al.* (2011) find that MBS issued by larger originating firms are sold at higher yields. We thus examine the impact of firms' characteristics on credit spreads in sections 4.2 and 5.2. At the nonfinancial firms' level, in line with other studies (Chen *et al.*, 2007; Landsman *et al.*, 2008; Flannery *et al.*, 2013; Riachi and Schwienbacher, 2013, 2015; Lemmon *et al.*, 2014) we include proxies for originating/issuing firms' size (*log total assets*), financial leverage (*total debt to total assets*), asset tangibility (*fixed assets to total assets*), profitability (*return on assets*), growth opportunities (*market to book*), and credit risk (*Z-score*). We expect a negative impact of total assets, fixed assets-to-total assets, ROA, market-to-book and Z-score variables, on credit spreads, but a positive relationship between total debt-to-total assets ratio and credit spreads. Consistent with other studies on the motivations for financial firms using AS (Affinito and Tagliaferri, 2010; Cardone-Riportella *et al.*, 2010; Farruggio and Uhde, 2015), 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* and *Z-score*), profitability (*return on assets*), and regulatory capital (*capital adequacy ratio*). We expect a significantly negative impact of total assets, return on assets, *liquid assets to deposits & ST funding*, Z-score, and capital adequacy ratio variables, on credit spreads, but a positive relationship between loan ratio and *non-performing loans ratio* and credit spreads. We collect firm specific accounting and market data in the fiscal year ending just prior to bond issuance from Datastream and Bankscope for nonfinancial and financial firms, respectively. As DCM Analytics does not provide an identification code, we hand-matched AS originators with Datastream and Bankscope by using the issuer-parent's name. For CB deals, data from Datastream and Bankscope are merged with transaction information from DCM Analytics by hand-matching issuers' names.

3.3. Financial characteristics of SF versus SDF tranches

We describe the sample, by asset class, in Table 3. 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 ABS, MBS, and CDO sub-samples with the corresponding values in the CB sample. Almost all of the pair-wise comparisons indicate statistically significant differences between the common pricing variables associated with SF *vis-à-vis* CB tranches.

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

Regarding the relative pricing of ABS, MBS, and CDO *versus* CB, Table 3 shows that the average credit spreads are economically and statistically higher for CB (173.4 bps) than they are for ABS (116.4 bps) and MBS (103.9 bps). On the other hand, average credit spreads for CDO do not differ significantly from those of CB issues at the 1% significance level. We also compare the evolution of credit spreads for SF and CB securities, 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 (see Appendix C). As expected, the evidence strongly supports the assumption that the average credit spread is significantly higher for ABS (126.7 bps *versus* 104.3 bps), MBS (142.9 bps *versus* 85.2 bps), CDO (308.7 bps *versus* 142.3 bps), and CB issues (236.0 bps *versus* 83.7 bps) during the financial crisis and the subsequent European sovereign debt crisis.[21]

A CB tranche of average size matures in 7.8 years, which is a short period if we compare it with the average 16.7, 20.1, and 35.6 years for ABS, CDO, and MBS tranches, respectively. Average credit ratings for ABS (4.2 | AA-), MBS (4.3 | AA-), and CDO (5.2 | A+) tranches are significantly better than for CB issues (6.2 | A). This may suggest that CB transactions are riskier than AS lending. However, this can reflect the country rating, since CB issuers are, on average, located in far riskier countries than AS originators. The average country risk for CB (2.1) borrowers is significantly higher than the corresponding value for ABS (2.0), MBS (1.5), and CDO (1.6). The observed level of the number of banks participating in the issuing syndicate

[21] Almost all the pair-wise comparisons presented in Panel A of Appendix B indicate that equality of means for continuous variables can be rejected for ABS, MBS, CDO, and CB issues – except transaction size for MBS and the number of banks for CB. Similar findings are presented in Panel B for dummy variables.

does provide indirect evidence that CB lending may be considered relatively riskier than AS lending: the average number of banks participating in CB issues is 4.2 and is significantly larger than the average of 1.5 for CDO, 2.5 for ABS, and 2.9 for MBS. These findings suggest that underwriting banks wish to increase the number of institutions participating in a CB issuance of a given size in order to spread risks over a larger number of banks. Similarly, CB are more commonly issued by firms located in countries with lower creditor rights, when compared with MBS and CDO.

CB exhibit the highest average tranche size of €442.1 million, more than the €102.9 million, €281.4 million, and €364.0 million average tranche size exhibited by CDO, ABS, and MBS, respectively. On the contrary, with the exception of CDO, the average transaction size exhibited by CB issues is lower than the average tranche size exhibited by ABS and MBS transactions. This can be explained by the fact that a significantly larger number of tranches per transaction is issued in an SF transaction. In a typical CB transaction, the average number of tranches per transaction is 1.5, which is smaller than the average of 3.8 for ABS, 6.8 for CDO, and 6.9 for MBS. Additionally, the tranche rank for SF transactions – 3.9 for CDO, 3.7 for MBS, and 2.3 for ABS – is significantly higher than the tranche rank for CB (1.2). We can thus conclude that SF transactions benefit from tranching to a larger degree than straight debt finance transactions.

Most of the non-price variables detailed in Table 3 clearly suggest that AS and CB tranches are fundamentally different financial instruments. A significantly larger fraction of CB is fixed rate (82.7%) compared to the sample of MBS (4.7%), CDO (14.3%), and ABS (22.2%). While UK borrowers only represent 20.4% of the CB issues, they account for 39.0% and 38.7% of the MBS and CDO. CB are much more likely to be subject to currency risk than ABS and MBS tranches, but less likely to have a tranche denominated in a currency different from that of the deal's nationality for CDO. While about 55% of CB issues are arranged for financial firms, these entities overwhelmingly use AS transactions: only 14.1% of ABS are issued by nonfinancial firms, with financial firms issuing all the MBS and CDO in our sample. Additionally, SF tranches are more frequently issued with a call option than CB issues. A significantly small fraction of CB is closed in the pre-crisis period (20.4%) compared to the sub-samples of SF transactions. Contrary to MBS and CDO, which verify a significant decrease in the number of tranches issued during the

2007-2008 financial crisis and the subsequent European sovereign debt crisis, more than half of ABS tranches were issued in this period. Finally, reflecting the pooling and tranching process of AS, a higher fraction of SF tranches is subordinated versus CB.

Our results indicate that the common pricing characteristics differ significantly in value between SF and CB tranches. Therefore, we would expect the impact on pricing to be bond-specific.

4. The pricing of SF *versus* CB

4.1. Determinants of SF and SDF credit spreads

A Chow test for a structural break is used to examine whether the credit spreads associated with AS and CB issues are influenced differently by common pricing characteristics. In essence, we are testing whether the pricing characteristics used in equation (1) are significant in both AS and CB tranches and, if so, whether they have the same coefficient values. Cornaggia *et al.* (2017) show that ratings present significant differences not only across asset classes, but also across subcategories of AS bonds. We thus perform the same methodology to examine if ABS, MBS, and CDO are priced differently. We conclude that AS and CB tranches are distinct financial instruments and that ABS, MBS, and CDO are financial instruments influenced differently by common pricing characteristics because of the Chow test statistics – of 18.6 for CB issues *versus* AS bonds; 11.8 for ABS *versus* MBS; 13.1 for MBS *versus* CDO; and 3.9 for ABS *versus* CDO – are all higher than the critical levels. Hence, we examine the determinants of credit spreads for each debt instrument separately.

Table 4 presents the results of estimating equation (1) using each of the four samples discussed in section 3.3.[22] Models [1], [2], [3] and [4] present pricing regression results for a sample of 2,520 ABS, 4,522 MBS, 2,175 CDO and 15,308 CB issues, respectively.[23] Regarding the impact of credit risk on credit spread, Table 4 shows exactly the results expected; rated bonds have lower credit spreads and the higher the credit risk, the higher the credit spread. For example, AA- tranches have 36.3 bps, 63.6 bps, 32.9 bps, and 24.8 bps

[22] 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 3.21 for enforcement in model [1]; 3.74 for subordinated in model [2]; 2.37 for creditor rights in model [3]; and 3.30 for rated in model [4].

[23] Estimations have also been carried out by including year fixed effects multiplied by country fixed effects and results are available with the authors.

higher credit spreads than AAA tranches for ABS, MBS, CDO, and CB issues, respectively. However, it should be noted that the relationship between spread and rating is not linear; the impact of one unit increase in *credit rating* increases as the credit rating deteriorates. We also estimate models [1], [2], [3], and [4] considering only rated and credit rating dummies as independent variables and find that models yield adjusted R2 values of 0.31, 0.37, 0.55, and 0.46, respectively. This confirms credit ratings as the most important determinant of credit spreads in both AS and CB issues. Furthermore, the adjusted R^2 value increases, on average, 0.16 for SF bonds and 0.19 for CB with the inclusion of additional contractual and macroeconomic variables, which shows that credit rating is not the only determinant of credit spread. In fact, investors do not rely exclusively on ratings: they consider other factors when pricing AS and CB, and therefore do rely on information beyond the assigned credit rating, which corroborates H1. Additionally, we find that credit rating discordance between S&P and Moody's has a substantial positive impact (7.8 bps) on the credit spread for CB issues only. This result shows that: (*i*) rating agencies' discordance is incorporated by investors in the pricing of CB, requiring an additional risk premium to compensate a greater degree of uncertainty concerning the issuer's default risk; and (*ii*) in SF, tranches are created to achieve a particular credit rating, reflecting a lower rating discordance (6.1%) *vis-à-vis* CB (14.7%).

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

Interestingly, a convex relationship between credit spread and maturity appears strongly significant for CB in model [4]. Similarly, we find non-linear relationships between credit spreads and maturity for SF tranches. While for ABS, a robust hump-shaped relationship between credit spread and maturity is found, the relationship between credit spreads and maturity is convex for MBS and CDO. The influence of *transaction size* on credit spread is negative and significant for SF trances, but insignificant for CB issues. This suggests that increasing the transaction size of an ABS, MBS, or a CDO transaction by €100 million will reduce the required credit spread by 23.1 bps, 13.7 bps, and 17.9 bps, respectively. Our results indicate a positive price liquidity effect related to the size of the issue.

The tranche rank behaves differently for AS bonds than for CB. 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, after adjusting for the other factors included in the regression. In an AS transaction, the structure is layered so that each position benefits from the credit protection of all the positions subordinated to it. For example, 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 CB issues, suggesting that investors associate an increase in the number of tranches with a decrease of credit risk. As expected, and with the exception of ABS, subordinated bonds have higher credit spreads than senior ones.

The influence of currency risk on credit spread is insignificant for ABS, MBS, and CB, but positive and significant for CDO. Such a mismatch in the currency of the deal's nationality and the currency of the bond issue significantly increases the rate charged by 24.7 bps. Contrary to what is expected, issuers raise funds via MBS at a lower credit spread through fixed priced issues than through floating rate issues. While credit spread and the *number of banks* have an insignificant relationship for all security types, the better the reputation of the banks involved, the lower the credit spread for ABS and CB.

As expected, *country risk* is significantly positively related to spread for ABS and CB issues, indicating that lending to a borrower 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 120.8 bps and 91.7 bps for ABS and CB, respectively. The impact of the creditor rights index is positive and significant for ABS, but significant and negative, as expected, for CDO. Contrary to what we expected, SF securities issued in countries with a strong legal enforcement system pay higher yields. As we use year fixed effects, *financial crisis* and *sovereign crisis* dummies capture the impact of tranches issued between the starting date of each crisis and the end of that year. *Financial crisis* dummy is associated with a 38.0 bps increase in credit spreads for CB issues, while the start of the European sovereign debt crisis has imposed a significant increase in credit spreads for CDO and CB of 151.4 bps and 49.7 bps, respectively. In line with the results presented by Hu and Cantor (2006) and Sorge and Gadanecz (2008), credit spread and the slope of the Euro swap curve, *EUSA5y-Libor3M*, are significantly negatively related for CB, meaning a steeper Euro swap curve is associated with lower credit spreads. However, this relationship is insignificant for SF tranches. As expected, credit spread and market volatility are significantly positively related for CDO and CB. Finally, the results suggest that ABS tranches with

commercial collateral are associated with 20.2 bps higher credit spreads than consumer ABS. Still, collateral-type does not affect MBS credit spreads.

To examine further the pricing of AS and CB issues, we split our samples into bonds issued by financial and nonfinancial firms. Models [1a] and [1b] in Table 4 show that ABS bonds have different rating distributions: while for ABS bonds issued by financial firms there are observations for the entire rating spectrum, for those issued by nonfinancial firms there are no observations for the worst rating scales – from B to D. The impact of maturity on credit spread behaves differently for ABS bonds issued by firm type. While for ABS bonds issued by nonfinancial firms, spread and maturity have an insignificant relationship, for bonds issued by financial firms, a robust hump-shaped relationship between credit spread and maturity is found. The influence of deal size and bank reputation on credit spread is significant and negative for ABS issued by financial firms, while insignificant for those issued by nonfinancial firms. Similarly, the tranche rank, country risk, creditor rights and enforcement indexes, as well as collateral type, affect significantly (and positively) ABS credit spreads for tranches issued by financial firms only.

When comparing regression results for CB issued by financial and nonfinancial firms – models [4a] and [4b] – the following main differences can be pointed out: (*i*) rating agencies' discordance has a substantial positive impact (20.9 bps) on the credit spread for CB issued by nonfinancial firms only; (*ii*) while there is a convex relationship between time to maturity and credit spreads for bonds issued by nonfinancial firms, a positive linear relationship appears significant for bonds issued by financial firms; (*iii*) only for nonfinancial firms the transaction size can be seen as a liquidity proxy, affecting negatively the credit spread; (*iv*) while banks' reputation is seen as a proxy for the overall risk of the transaction when considering CB issued by nonfinancial firms, investors associate a larger number of banks and a higher level of their reputation with an increase in the certification of a CB transaction issued by financial firms; and (*v*) the tranche rank only impacts negatively CB issued by financial firms, while fixed rate influences positively CB credit spreads issued by both firm types.

4.2. Bond pricing and borrowing choice

In our sample, nonfinancial firms can choose between ABS and CB, while financial firms issue SF tranches, in the form of ABS, MBS, CDO, and CB. For example, Banco Santander, S.A. issued €526,434.3 billion of bonds over the 2000-2016 period, using both AS – ABS (€80.5 billion), MBS (€222.9 billion), and CDO (€11.9 billion) – and CB (€211.1 billion), switching 181 times between AS and CB deals. Similarly, Groupe PSA, from the Machinery and Equipment industry, issued €18.0 billion of bonds, switching 16 times between ABS and CB (see Appendix D). As the choice between SF and CB deals 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 the pricing, taking into consideration the potential self-selection by firms between issuing SF *versus* CB. For example, nonfinancial firms with significant trade receivables are most likely to issue AS because ABS transactions mainly involve account receivables. We perform a full information maximum likelihood (FIML) method on the credit spread samples of our model specifications – models [5] to [8] of Table 5 – simultaneously with a probit selection equation, where the choice between SF and CB is a function of contractual and firm's characteristics, and macroeconomic factors.[24] The empirical model consists of the following three equations:

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

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

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

where the third equation models bond selection: if $I^*_i > 0$, then firm *i* issues an AS bond; otherwise it issues CB. We adjust for heteroscedasticity and due to time varying risk premia and cross-country differences, we estimate standard errors clustered by year and country. Considering the Wald test statistics of independent equations, we reject the hypothesis of equations being independent for models [5] to [7], but not for model [8].

[24] 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).

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

Results in Table 5 show that the impact of financial and nonfinancial firms' characteristics is different for the three SF tranches. Regarding ABS issued by nonfinancial firms, detailed in model [5], the return on assets ratio is the only variable that impacts on credit spreads, meaning that ABS originated by nonfinancial firms with more profitability have lower credit spreads. For ABS issued by banks, in model [6], firm's size has a significant negative impact on credit spreads. In addition, return on assets, non-performing loans and capital adequacy ratios impact significantly credit spreads, but with signs contrary to expectations. This can be explained by the fact that financial firms with more negative ratios have to resort to higher credit enhancement mechanisms to be able to issue bonds with relatively lower yields. Model [7] shows, as expected, that while the loan ratio has a significant positive impact on MBS credit spreads, the higher the financial firm's liquidity the lower the credit spreads. Finally, banks' accounting and market characteristics do not influence CDO credit spreads – model [8]. What is noteworthy in this analysis is that investors do consider factors other than credit ratings, some of them already considered by rating agencies in assessing ratings, in pricing ABS and MBS.

Results reported for CB issued by nonfinancial firms in model 5 indicate, as expected, that larger firms and those with higher profitability pay lower credit spreads. Similarly, we find in models [6] to [8] that larger and more profitable banks and those with more liquid assets and more regulatory capital pay lower credit spreads. Additionally, loan ratio and credit spread have a significant positive relationship. Again, our results show that investors rely on information beyond the credit ratings when pricing CB. 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*) as expected, rating discordance variable becomes significantly positively related to credit spread for CB issued by financial firms; (*ii*) the coefficients on maturity and log maturity become insignificant for CDO, and there is a convex relationship between credit spread and maturity for CB issued by financial firms; (*iii*) the impact of transaction size on credit spread becomes insignificant for CB issued by nonfinancial firms; (*iv*) the relationship between tranche rank and credit spread become insignificant for CDO and, as expected, significant and negative for CB issued by nonfinancial firms; and *(v*) the number of banks involved affects ABS and MBS (negatively), as well as

CDO (positively) credit spreads. Overall, our results corroborate H1 that SF and CB issues are priced differently by common pricing factors and investors rely on factors other than credit ratings when pricing SF tranches.

Although a thorough analysis of the determinants of debt financing choice between AS and CB is beyond the scope of this paper, Table 5 presents some interesting results. Findings suggest that nonfinancial firms choose ABS *vis-à-vis* CB when they are more levered, less profitable and have a lower growth opportunity set. Regarding financial firms, model [6] shows that banks with lower capital adequacy and non-performing loan ratios prefer ABS over CB, which is in line with the idea that banks use AS to adjust capital ratios, but not to transfer credit risk. In addition, banks chose ABS when they are larger, and have less liquidity and higher loan ratios. Banks choose MBS *versus* CB when they are relatively larger and have lower loan ratios. Additionally, less profitable banks, and those with lower loan ratios prefer CDO rather than CB. We consider that a further analysis of the firms' choice between AS and CB is an important avenue for future research.

4.3. Additional sensitivity tests

We perform a number of additional robustness checks that further control for results in Table 4. First, we re-estimate our models controlling for fees, and find that *management fee* and *gross spread* are significantly and positively correlated with spreads for ABS and CDO, supporting the idea that risk is priced jointly through spreads and fees for these bonds. However, we find an insignificant impact of these variables on credit spread for MBS and CB. Second, we test the sensitivity of our results to the inclusion of *callable* dummy variable. We find that, as expected, the introduction of a call option on a CB increases the credit spread for both financial and nonfinancial firms. However, the impact of *callable* dummy on AS bond credit spreads is insignificant. In addition, we test the robustness of our results by re-estimating our models for SF and CB sub-samples after removing, firstly, bonds issued by firms located in the United Kingdom and, subsequently, excluding tranches issued in countries – Greece, Italy, Ireland, Portugal and Spain (GIIPS) – that were significantly affected by the European sovereign debt crisis. Finally, we run estimations including year

multiplied by country fixed effects. Overall, estimates in Table 4 appear robust to the inclusion of these variables and are not driven by the United Kingdom market or by the inclusion of GIIPS.

4.4. Do AS bonds offer higher yields than similarly rated CB?

In this section, we examine if European investors are effectively compensated for facing higher systematic risk components when investing in ABS, MBS and CDO *versus* comparable CB issues [H3] or if, instead, the market will place a premium on them, as hypothesized by security design literature [H2].

Table 6 presents the distribution of AS and CB issued in Europe by credit rating scale for investment-grade bonds. For AS bonds issued in the 2000-2016 period, the top rating of AAA is seen for 52.4%, 48.1%, and 37.0% of the total issues for ABS, MBS and CDO, respectively. As expected, over the same period, the distribution of CB by rating scale paints a starkly different picture: among all investment-grade issuances, only 9.0% are AAA bonds. We find similar distributions when we divide the sample into bonds issued by financial firms only or bonds issued in the 2005-2008 period, the period when the rate of SF issuance is the highest within our sample period – Appendix A shows that the rate of issuance of AS bonds was high in the 2005-2008 period, aggregating about 48% of total issues by volume. Contrary to Coval *et al.* (2009b), median credit spread for AAA CDO (54.7 bps) is higher than CB issue median credit spread (45.7 bps). Similar results are obtained when considering bonds issued by financial firms or a sub-sample of bonds issued in the 2005-2008 period. Considering the remaining rating classes and in line with Wojtowicz (2014), we find that CDO median credit spread is consistently higher than that of CB issues for the three sub-samples. With the exception of AA+ MBS, median credit spreads are lower for this AS class than for CB issues for all rating classes when considering the entire sample period. Similarly, ABS median credit spreads are lower than those of CB issues for bonds belonging to A, A-, BBB+, BBB, and BBB- rating classes. However, and in line with what was found by Cornaggia *et al.* (2017), results show that median credit spreads for ABS and MBS are higher (with the exception of BBB+, BBB, and BBB- bonds) than CB issue credit spreads for the 2005-2008 sub-sample. These simple sample analyses, however, do not allow us to control for other micro and macro pricing factors. Thus, in order to further test if ABS, MBS and CDO have higher spreads than comparable CB issues for

different rating categories, we proceed with regression analyses taking those pricing characteristics directly into account.

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

Table 7 presents the results of estimating equation (1) using a sample of 9,217 AS bonds and 15,308 CB issues, model [9], as well as the sub-samples by rating classes presented in Table 6, models [9a] to [9j], where dummy variables ABS, MBS, and CDO are included as additional regressors. As in prior tables, the constant captures CB issues, which serve as our benchmark. The results suggest that while ABS in WE are associated with lower credit spreads than CB issues in model [9], CDO have a higher credit spread than CB issues. Finally, MBS and CB issue credit spreads do not differ significantly in the 2000-2016 period. Similar results were obtained for the crisis period – between 2009 and 2016. When re-estimating model [9] for the 2005-2008 period, we find that, as for MBS, ABS do not offer different yields than comparable CB issues, while the CDO dummy is associated with a 29.4 increase in credit spreads.

Table 3 shows that AS and CB have significant different maturities. Thus, to avoid misspecification in the previous regression – if the sample is dominated by, say, CB issues, the estimated parameters of maturity might be relatively less calibrated to AS bonds – we re-estimate model [9] for AS and CB issues with similar maturities, per AS type.[25] As for the 2000-2016 period, results show that: (*i*) ABS credit spreads are, on average, 5.5 bps lower than CB issue credit spreads with similar maturities; (*ii*) credit spreads do not differ significantly between MBS and CB issues; and (*iii*) CDO have a higher credit spread than CB issues.

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

Considering the 2000-2016 period, models [9a] to [9j] indicate that CDO are issued with significantly higher credit spreads than CB with identical credit ratings for AA+, AA, AA-, A+, A, and BBB rating classes. For the remaining rating classes, CDO credit spreads do not differ significantly from those of CB issues. Regarding ABS, only AA, AA-, A+, and BBB tranches do not have relatively lower spreads than CB issues with identical credit rating. In addition, A+, A-, BBB+, BBB- MBS have lower credit spreads than CB issues,

[25] Similar maturities mean, for each AS bond type, the maturity quartile with a higher number of observations: ABS [9.83-19.03 yrs.]; MBS [9.84-26.74 yrs.]; and CDO [7.04-17.28 yrs.].

while for the remaining rating classes coefficients are statistically insignificant. When re-estimating our models for the 2005-2008 period, we find that: (*i*) CDO only offer higher yields than similarly rated CB for A+ and BBB+ rating categories; (*ii*) only for AAA MBS credit spreads are European investors compensated for facing higher systematic risk components when investing in AS *versus* CB; and (*iii*) again, only AAA, AA+, AA, A+, BBB+, and BBB ABS do not have relatively lower spreads than CB issues with identical credit rating. Results obtained for the crisis period only are similar to those obtained for the 2000-2016 period and corroborate our expectation of obtaining stronger results in favor of H3 in the crisis period, especially for CDO. Finally, when comparing AS bonds with comparable CB issues with similar maturities, our results show that CDO offer higher yields than similarly rated CB for the majority of rating classes. Regarding MBS, average credit spreads differ significantly between MBS and CB issues for the BBB+ rating class only. ABS offer similar (AAA, AA+, AA, A+, BBB+, BBB, and BBB-) or lower (AA-, A, and A-) credit spreads than CB issues.

Overall, our results diverge from Coval *et al.* (2009b) but are in line with those of Cornaggia *et al.'s* (2017) findings for CDO, since CDO tranches are on average being priced to have yield spreads higher than rating-matched alternatives. For investment-grade ABS and MBS, our findings diverge from Cornaggia *et al.* (2017): these securities typically offer similar or less compensation than CB alternatives with comparable credit risk. We thus conclude that while for CDO the systematic risk effect appears as preponderant [H3], for ABS and MBS the segmented financial market effect dominates in determining the yield of these bonds [H2]. Our results also show, in line with Griffin *et al.* (2013), Wojtowicz (2014), and Coval *et al.* (2009b) that ratings are either not perfect measures of credit quality or that the information credit rating agencies provide to their customers is inadequate for pricing. In fact, security prices reflect information beyond credit ratings across asset classes for specific rating categories and time periods, 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.

5. Do SF transactions reduce originating firms' cost of funding?

AS can reduce the cost of funding when compared with traditional on-balance-sheet financing (H4) if the following two conditions hold. First, if the AS transaction cost of borrowing is lower than that of the originator, as a result of the improved credit rating that can be obtained by the SPV (Casu *et al.*, 2013; Gorton and Metrick, 2013; Lemmon *et al.*, 2014). Second, if the off-balance sheet treatment of the funding raised by the SPV does not deteriorate originator's creditworthiness when compared with nonsecuritizing firms. Since securitization involves the sale of assets to an SPV, if the asset pool contains relatively higher quality assets, the originating firm's balance sheet may become skewed in favor of riskier assets, which may increase the risk of default for existing creditors. In this section, we focus on the originating firm's cost of funding and annual changes in their credit risk against a control group of non-users (i.e., CB users only).

5.1. Firm's characteristics

In this section, we perform a transaction-level analysis using accounting and market information available on originating (for SF) and issuing (for CB) firms. After applying the procedures mentioned in section 3.2.5., we identified 87 and 3,570 nonfinancial firms that were originators and issuers of AS and CB, respectively. Of these firms, 28 were originators of AS only, 3,047 were issuers of CB only, and 582 were classified as switchers. Similarly, our financial firm's sample includes 462 AS originators and 3,406 CB issuers, of which virtually all banks (97.7%) were switchers. It is important to notice that very low fractions of banks are originators of AS only (19) or issuers of CB only (71). Panels A and B of Table 8 report characteristics of nonfinancial and financial firms, respectively, segmented into five categories according to their issuance record.

****** Insert Table 8 about here ******

AS transforms pools of assets into securitized tranches characterized by different risk-return properties. Essentially, in SF, the cost of borrowing is determined by the combination of the different tranches. We thus 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. When assessing WAS differences across nonfinancial firms, we find that the average WAS for AS transactions

(89.6 bps) is significantly lower than the WAS for CB transactions (215.7 bps). In addition, financial firms face, on average, a WAS of 67.1 bps when using AS, which is significantly lower than the 150.5 bps faced when issuing CB. Similar results are obtained for transactions closed by firms that are AS originators only or CB issuers only. These univariate results suggest that AS transactions are associated with a lower cost of borrowing than CB transactions. Results presented in Table 8 also show that, on average, nonfinancial firms that used AS are more levered and have lower profitability than those accessing CB markets. Firm's size and fixed assets-to-total assets and market-to-book ratios do not differ significantly between the two subsets of firms. As expected, firms utilizing both markets (switchers) are much larger than are those reliant on either one alone. Finally, CB issuers have lower credit risk than AS originating firms. Financial firms that use AS deals have, on average, a higher proportion of loans to total assets than CB issuers have. Also, the mean percentage of liquid assets to deposits and short-term funding for firms that use AS (33.8%) is significantly lower than for CB (46.3%) users, which seems to indicate that banks that engage in AS present lower liquidity. Financial firms using AS have, on average, lower capital ratios but higher profitability than those using CB. Finally, the ratios used as proxies for the financial firm's credit risk yield different results. While the non-performing loans ratio is lower for firms that use AS (3.1% *versus* 4.0%), the Z-score for CB users (4.4) is significantly higher than that for financial firms that use AS (2.2).

5.2. Do AS transactions have a lower cost of borrowing than CB?

We examine if AS is likely to succeed in reducing the total cost of borrowing 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, MBS or CDO. We employ OLS regression techniques and adjust for heteroskedasticity. Standard errors are clustered by year and country.

$$WAS_{i,t} = \alpha_0 + \beta_1 ABS_{i,t} + \beta_2 MBS_{i,t} + \beta_3 CDO_{i,t} + \gamma\, Contractual\ characteristics_{i,t} + \varphi\, Macroeconomic\ factors_t + \omega\, Firm\ characteristics_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

Columns 1 and 5 of Table 9 report estimates of this equation, models [10] and [13], using the samples presented in Table 8. The results suggest that AS transactions in Europe are associated with lower WAS, holding other factors constant, since the ABS dummy variable for nonfinancial firms, as well as ABS, MBS,

and CDO dummy variables for financial firms are associated with a statistically significant drop in WAS, when compared with CB. Results remain the same when we control for firm's credit risk in models [10a] and [13a].

****** Insert Table 9 about here ******

In previous models, AS dummies may suffer from sample selection bias because we only observe borrowing costs for the debt type that issuers choose; we do not observe counterfactual borrowing costs. To account for this problem, we re-estimate models [10] and [13] considering a sub-sample of transactions closed by switchers, firms that employ both AS and CB, over the sampling period. Results show, again, that ABS transactions issued by nonfinancial firms have lower WAS than CB issues, since the ABS dummy variable is associated with a 105.7 bps drop in WAS (model [11]). Concerning financial firms, in line with previous findings, our results show that ABS, MBS, and CDO dummy variables are associated with 120.5 bps, 141.2 bps, and 81.0 bps drops in WAS, respectively. Results also show that the WAS reduction is higher for MBS transactions and that CDO transactions have higher WAS than MBS and ABS transactions. This can be explained by the fact that CDO are more complex and opaque than ABS and MBS, and the underlying pool of assets can be managed in terms of assets and cash flows. Therefore, CDO suffer from higher asymmetric information problems and principal-agent conflicts and investors require higher yields.

The robustness of our results was tested by re-estimating our models for a matched sample. We follow the approach of Lemmon *et al.* (2014) and match each AS deal to a CB deal closed in the same year based on firm size and Z-score. We match (with replacement) each AS originator to no more than five CB users in the same industry and in the same total asset decile with the closest Z-score. If there are not five firms in the industry, we use as many as possible. In this analysis, we only consider an AS originating firm the first time it appears in our sample; if a firm closes more than one AS transaction during our sampling period, we only consider the first transaction. Results presented in columns 4 and 8 of Table 10 show that ABS transactions' WAS is lower than that of matched CB deals for nonfinancial firms, and that ABS and MBS dummy variables are associated with significantly lower WAS than CB transactions issued by banks. Due to the relatively small

number of observations for CDO transactions, the CDO dummy was omitted due to collinearity in model [15].[26]

Finally, as the choice between SF and SDF transactions may be endogenous – that is, firms determine whether they want to access the securitization market and when or firms that securitize assets are those that in fact have access to this market – we re-estimate models [10] and [13] 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 AS and CB conditional on the debt choice and implemented a two-sample t-test assuming unequal variances. Results show that AS (ABS, MBS, and CDO) transactions' WAS are lower than CB transactions' WAS.

So far, our results seem to support SF and security design literature (Goldberg and Rogers, 1988; Diamond, 1993; Winton, 1995; Glaeser and Kallal, 1997; Gorton and Metrick, 2013): in ABS, MBS, and CDO transactions, the design and issuance of different classes of securities with different degrees of seniority reduce the cost of funding. Making use of a process whereby financial assets are pooled together with their cash flows, and converted into negotiable securities using an SPV, offers a low cost and reliable way for information about the firm's receivables to be accessed by investors. However, to have a complete analysis on this subject, we also need to analyze the evolution of the originating firms' overall cost of funding after the AS deal. As the cost of funding evolution depends on the evolution of the credit risk, in the next section we also examine changes in Z-score around the closing of AS transactions.

5.3. The changes in originating firm's credit risk around the implementation of an AS transaction

In this section, we use a difference-in-difference approach to compare AS *versus* CB effects on credit risk. We compare changes in Z-score among AS users against a control group of non-users, using the matched sample presented in the previous section. For each AS originating firm, we take the mean of the corresponding matching firms as our control and examine the differences between the firm and the industry mean. Table 10

[26] In unreported estimations, we examine whether results presented in Table 9 are robust over time 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. In addition, we re-estimate models [10] and [13] for sub-samples excluding AS and CB closed, firstly, by firms located in the United Kingdom and, secondly, by firms located in GIIPS. Results remain robust in these models.

shows unadjusted means for the AS originating nonfinancial (Panel A) and financial (Panel B) firms only, as well as differences between users and matched non-users. The first column in Table 10 reports the level of Z-score as of one year before the closing of an AS transaction. Results show that our matching firms provide a good control group; the differences for Z-score are not significantly different from zero.

****** Insert Table 10 about here ******

We find that one year prior to the AS transaction closing, nonfinancial firms have an average Z-score of 2.84 and it decreases not only during the year of AS usage, but also one year after. Between *t-1* and *t+1*, the Z-score decreases by 0.90. However, this change is not statistically different from the change in Z-score for the control group. Regarding financial firms, Table 10 shows that AS firms' credit does not change significantly in the period *t-1* through to *t+1*, and that the change in the difference on Z-score between AS users and the control group is similar. Coupling these results with those obtained in the previous section, we can conclude that, in fact, AS transactions reduce funding costs in relation to on-balance-sheet CB issuance. Considering that the WAS is lower in AS than CB transactions and that prior to AS, originating firms do not experience higher credit risk than the control group, AS transactions reduce the originating firms' cost of funding, which corroborates H4.

6. Summary and conclusions

The paper compares credit spreads and the pricing of SF – ABS, MBS, and CDO – to that of straight debt finance – CB – securities, using a cross-section of European bonds closed in the 2000-2016 period. We also examine whether credit spreads convey information beyond credit ratings across SF and CB, and study if SF transactions allow originating firms to reduce financing costs. Our results are consistent with AS being used as a mechanism for reducing the cost of funding by mitigating market imperfections and achieving credit quality improvement for transactions closed by both financial and nonfinancial firms. We find that SF transactions have lower borrowing costs than CB and originating firm's credit risk does not deteriorate significantly when compared with a matched sample of CB users. Results document that despite the negative effects of securitization – reduced incentives to appropriately screen borrowers (Loutskina and Strahan, 2009), incentives to securitize low quality assets (Downing *et al.*, 2009), and lowering the impact

of monetary policy (Loutskina, 2011) – securitization plays a relevant role in allowing originators to solve liquidity problems with better funding conditions. Monetary authorities should pay closer attention at the positive impact of this market in helping to reduce financing frictions for European originators without intensifying incentive problems, and lessening the segmentation of the European Union (single) financial market.

A properly functioning bond market requires investors to price SF tranches correctly. Our findings indicate that credit ratings may be limited in this purpose, since the market prices seem to incorporate additional information beyond credit ratings in both normal and crisis periods. Given the contracting complexity of SF transactions and the frequent unavailability of detailed information about collateral pools, mainly in European markets, many investors do not have the expertise, or the incentive, to price these bonds correctly and have to rely on credit ratings, or incurring in free riding (Brennan *et al.*, 2009; Pagano and Volpin, 2012). We argue that the improving transparency and disclosure standards in SF markets, mainly through rating agencies (e.g., methodological information, key assumptions, underlying data used, and fees), may improve markets informational efficiency. In addition, the 'rating inflation' observed in SF products, mainly for CDO, during the 2007-2008 financial crisis (Griffin and Tang, 2012; Griffin *et al.*, 2013; Cornaggia *et al.*, 2017) led legislators and regulators to propose that credit ratings should be applied consistently across asset classes. We show that a standardized credit rating approach for SF and SDF classes can be dangerous, since we document differences in credit spreads, which are significant and consistent over time, between SF and CB by rating scales and/or subcategories of SF bonds. Finally, our results are consistent with the view (Duffie and Rahi, 1995; Riddiough, 1997) that tranching helps to complete markets, namely for ABS and MBS.

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Table 1: Industrial and geographic distribution, and top originators/issuers

Panel A: Industrial distribution

	Industrial category of originator/issuer	Asset securitization			Corporate bonds		
		Number of tranches	Total value [€ Million]	Percent of total value	Number of tranches	Total value [€ Million]	Percent of total value
	Commercial and Industrial						
1	Agriculture, Forestry and Fishing	3	370	0.01	89	20,081	0.30
2	Communications	2	444	0.02	768	575,633	8.51
3	Construction/Heavy Engineering	31	9,797	0.38	416	137,097	2.03
	Manufacturing						
4	Chemicals, Plastic and Rubber	-	-	-	252	104,423	1.54
5	Food and Beverages	10	2,310	0.09	421	194,241	2.87
6	Machinery and Equipment	105	28,630	1.11	939	498,879	7.37
7	Steel, Aluminum and other Metals	-	-	-	140	54,743	0.81
8	Other	3	490	0.02	290	121,952	1.80
9	Mining and Natural Resources	-	-	-	68	39,838	0.59
10	Oil and Gas	7	1,158	0.04	513	285,348	4.22
11	Real Estate	151	36,037	1.40	458	108,842	1.61
12	Retail Trade	14	3,235	0.13	342	141,124	2.09
13	Services	74	19,725	0.76	686	264,796	3.91
15	Utilities	29	10,340	0.40	992	509,257	7.52
16	*Financial Institutions*	8,641	2,417,032	93.72	8,426	3,529,655	52.15
17	*Transportation*	79	23,775	0.92	459	169,887	2.51
18	*Public Administration/Government*	58	25,783	1.00	5	369	0.01
19	*Other*	-	-	-	44	11,691	0.17
	Total	**9,217**	**2,579,115**	**100.00**	**15,308**	**6,767,854**	**100.00**

Panel B: Geographic distribution

	Geographic location of originator/issuer	Asset securitization			Corporate bonds		
		Number of tranches	Total value [€ Million]	Percent of total value	Number of tranches	Total value [€ Million]	Percent of total value
1	Austria	50	3,894	0.15	1,020	131,209	1.94
2	Belgium	89	46,944	1.82	488	175,835	2.60
3	Cyprus	3	689	0.03	11	3,756	0.06
4	Denmark	-	-	-	8	2,521	0.04
5	Finland	30	11,931	0.46	196	58,046	0.86
6	France	534	107,714	4.18	2,469	1,223,424	18.08
7	Germany	1,433	273,765	10.61	3,082	1,208,238	17.85
8	Greece	88	47,618	1.85	163	68,617	1.01
9	Iceland	-	-	-	2	306	0.00
10	Ireland	328	72,538	2.81	218	118,688	1.75
11	Italy	874	342,585	13.28	1,785	734,360	10.85

12	Luxembourg	50	3,131	0.12	99	41,533	0.61
13	Netherlands	983	334,576	12.97	1,099	645,735	9.54
14	Norway	-	-	-	1	350	0.01
15	Portugal	190	57,869	2.24	369	93,897	1.39
16	Spain	1,482	445,708	17.28	1,141	650,340	9.61
17	Sweden	-	-	-	9	3,107	0.05
18	Switzerland	-	-	-	29	26,983	0.40
19	United Kingdom	3,083	830,151	32.19	3,119	1,580,909	23.36
	Total	**9,217**	**2,579,115**	**100.00**	**15,308**	**6,767,854**	**100.00**

Panel C: Top originators/issuers

Financial firms

Asset securitization			**Corporate bonds**		
	By value of deals	**By number of deals**		**By value of deals**	**By number of deals**
Banco Santander, S.A.	9.25%	5.16%	Commerzbank AG	5.99%	2.14%
Lloyds Banking Group plc	9.22%	2.34%	Rabobank Nederland	5.11%	6.71%
Royal Bank of Scotland plc	5.06%	2.58%	HSBC Holdings plc	4.34%	2.02%
Barclays plc	4.04%	2.09%	Banco Santander, S.A.	4.32%	2.75%
UniCredit, SpA	2.84%	1.97%	Lloyds Banking Group plc	4.02%	2.12%
ABN AMRO NV	2.72%	0.73%	Deutsche Bank AG	3.93%	3.33%
Deutsche Bank AG	2.23%	2.22%	Intesa Sanpaolo, SpA	3.90%	3.84%
BBVA, S.A.	2.15%	1.34%	Royal Bank of Scotland plc	3.29%	1.67%
Rabobank Nederland	1.75%	1.78%	Crédit Agricole, S.A.	2.91%	2.34%
La Caixa	1.74%	1.12%	BNP Paribas, S.A.	2.79%	2.62%

Nonfinancial firms

Asset securitization			**Corporate bonds**		
	By value of deals	**By number of deals**		**By value of deals**	**By number of deals**
Faurecia SE	3.35%	2.27%	Daimler AG	2.48%	1.70%
British Land Company plc	3.05%	1.94%	British Petroleum plc	2.24%	1.60%
Getlink SE	2.99%	0.97%	Deutsche Telekom AG	2.18%	1.03%
Greene King plc	2.78%	2.91%	Électricité de France, S.A.	2.12%	1.05%
Renault, S.A.	2.77%	1.94%	Orange, S.A.	1.99%	0.81%
Anglian Water Group plc	2.00%	1.62%	Vodafone Group plc	1.94%	0.96%
Volkswagen AG	1.95%	1.62%	Bayerische Motoren Werke AG	1.83%	1.75%
Mitchells & Butlers plc	1.91%	0.65%	Daimler AG	1.72%	1.73%
Groupe PSA, S.A.	1.45%	1.29%	Royal Dutch Shell	1.72%	0.50%
Bayerische Motoren Werke AG	1.42%	1.62%	Telecom Italia, SpA	1.43%	0.55%

Panel A describes the industrial distribution of tranches, whereas Panel B details the tranche allocation to originators/issuers in a particular country. Panel C provides information on the biggest players and their relative

importance in AS and CB markets. Data are for tranches with credit spread and tranche amount available, closed by European originators/issuers during the 2000-2016 period.

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

Variable name	Variable definition	Source	Expected impact on credit spread			
			AS | non-financial firms	AS | financial firms	CB | non-financial firms	CB | financial firms
Dependent variable:						
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				
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	+	+	+	+
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 / -	+	+
Transaction size	Bond transaction size. Transaction size is converted into Euro millions when necessary.	DCM Analytics	-	-	-	-
Subordinated	Dummy equal to 1 for tranches that are subordinated, and 0 otherwise.	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 financial institutions 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	-	-	-	-
Collateral type	For financial firms: dummy equal to 1 if ABS or MBS tranches are backed by commercial loans, and 0 if, instead, they are backed by consumer loans/mortgages. For nonfinancial firms: dummy equal to 1 if ABS tranches are backed by fixed assets, and 0 if, instead, they are backed by current assets.	DCM Analytics	+	+	NA	NA
Management fee	Fees (in bps) that are periodically paid to the bank syndicates.	DCM Analytics	+	+	+	+
Gross spread	The difference between the underwriting price received by the bond issuer and the actual price offered to the investing public, divided by the tranche size.	DCM Analytics	+	+	+	+
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). VIX reflects a market estimate of future volatility.	Datastream	+	+	+	+
EUSA5y-Libor3M	The slope of the Euro swap curve. Obtained as the difference between the five-year Euro swap rate and the 3-month Libor rate.	Datastream	-	-	-	-
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)	-	-	-	-
Financial firms' characteristics						
Total assets	Banks' total assets measured in Euro million.	Bankscope	NA	-	NA	-
Loan ratio	The ratio of net loans to total assets.	Bankscope	NA	+	NA	+
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	NA	-	NA	-
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	NA	-	NA	-
Return on assets	The net income divided by total assets.	Bankscope	NA	-	NA	-
Non-performing loans ratio	The ratio of total non-performing (or doubtful) loans to gross loans.	Bankscope	NA	+	NA	+
Z-score	Ratio of the sum of equity capital to total assets and the return on average assets before taxes (ROAA) to the standard deviation of ROAA per year. The standard deviation of ROAA is calculated employing a three-year rolling window.	Bankscope	NA	-	NA	-
Nonfinancial firms' characteristics						
Total assets	Firms' total assets measured in Euro million.	Datastream	-	NA	-	NA
Total debt to total assets	The ratio of total debt to total assets.	Datastream	+	NA	+	NA
Fixed assets to total assets	The ratio of fixed assets to total assets. Fixed assets include property, plant and equipment.	Datastream	-	NA	-	NA
Market to book	The sum of book value of liabilities and market value of equity divided by the book value of assets.	Datastream	-	NA	-	NA
Return on assets	The net income before preferred dividends minus preferred dividend requirement, divided by total assets.	Datastream	-	NA	-	NA

Z-score	Altman's (1993) Z-score, calculated as Z= 1.2 (Working Capital/Total Assets) + 1.4 (Retained Earnings/Total Assets) + 3.3 (Earnings Before Interest and Taxes/Total Assets) + 0.6 (Market Value of Equity/Book Value of Liabilities) + 0.999 (Net Sales/Total Assets)	Datastream	-	NA	-	NA

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

Variable of interest	Asset securitization			Corporate bonds	Variable of interest	Asset securitization			Corporate bonds
	ABS	MBS	CDO			ABS	MBS	CDO	
Univariate analysis - continuous variables									
Credit spread (bps)					**Transaction size (€ Million)**				
Number	2,520	4,522	2,175	15,308	Number	2,520	4,522	2,175	15,308
Mean	116.4 [a]	103.9 [b]	181.6	173.4 [a,b]	Mean	864.8 [a]	2,100.8 [b]	509.6 [c]	668.6 [a,b,c]
Median	82.3	66.8	122.5	122.0	Median	43.5	1,045.4	382.4	354.9
Rating [1-22 weak]					**Tranche size (€ Million)**				
Number	2,270	4,212	2,027	12,806	Number	2,520	4,522	2,175	15,308
Mean	4.2 [a]	4.3 [b]	5.2 [c]	6.2 [a,b,c]	Mean	281.4 [a]	364.0 [b]	102.9 [c]	442.1 [a,b,c]
Median	2	3	3	6	Median	103.8	79.0	25.0	300.0
Tranche rank					**Number of banks**				
Number	2,520	4,522	2,175	15,308	Number	2,520	4,522	2,175	15,308
Mean	2.3 [a]	3.7 [b]	3.9 [c]	7.2 [a,b,c]	Mean	2.5 [a]	2.9 [b]	1.5 [c]	4.2 [a,b,c]
Median	2	3	4	1	Median	2	2	1	3
Maturity (years)					**Country risk [1-22 weak]**				
Number	2,520	4,522	2,175	15,308	Number	2,520	4,522	2,175	15,308
Mean	16.7 [a]	35.6 [b]	20.1 [c]	7.8 [a,b,c]	Mean	2.0 [a]	1.5 [b]	1.6 [c]	2.1 [a,b,c]
Median	12.8	36.6	14.2	6.0	Median	1	1	1	1
Number of tranches					**Creditor rigths**				
Number	2,520	4,522	2,175	15,308	Number	2,520	4,522	2,175	15,308
Mean	3.8 [a]	6.9 [b]	6.8 [c]	1.5 [a,b,c]	Mean	2.4	2.8 [b]	2.7 [c]	2.3 [b,c]
Median	3	6	7	1	Median	2	2	3	2
Univariate analysis - dummy variables									
Fixed rate					**Currency risk**				

Nr. of tranches	2,520		4,522		2,175		15,308		Nr. of tranches	2,520		4,522		2,175		15,308	
Nr. of tranches with d=1	560	a	213	b	311	c	12,665	a, b, c	Nr. of tranches with d=1	310	a	1,176	b	881	c	4,632	a, b, c
% of total	22.2%		4.7%		14.3%		82.7%		% of total	12.3%		26.0%		40.5%		30.3%	
Financial institutions									**U.K. borrowers**								
Nr. of tranches	2,520		4,522		2,175		15,308		Nr. of tranches	2,520		4,522		2,175		15,308	
Nr. of tranches with d=1	2,165	a	4,522	b	2,175	c	8,426	a, b, c	Nr. of tranches with d=1	490	a	1,764	b	842	c	3,119	b, c
% of total	85.9%		100.0%		100.0%		55.0%		% of total	[illegible]		39.0%		38.7%		20.4%	
Rated									**Subordinated**								
Nr. of tranches	2,520		4,522		2,175		15,308		Nr. of tranches	2,520		4,522		2,175		15,308	
Nr. of tranches with d=1	2,271	a	4,210	b	2,027	c	12,813	a, b, c	Nr. of tranches with d=1	935	a	2,225	b	1,068	c	1,301	a, b, c
% of total	90.1%		93.1%		93.2%		83.7%		% of total	37.1%		49.2%		49.1%		8.5%	
Callable									**Pre-crisis period**								
Nr. of tranches	2,520		4,522		2,175		15,308		Nr. of tranches	2,520		4,522		2,175		15,308	
Nr. of tranches with d=1	1,191	a	2,713	b	1,024	c	3,460	a, b, c	Nr. of tranches with d=1	1,162	a	3,061	b	1,661	c	6,295	a, b, c
% of total	47.3%		60.0%		47.1%		22.6%		% of total	46.1%		67.7%		76.4%		20.4%	

This table reports summary statistics for a sample of AS bonds – ABS, MBS and CDO –, and CB 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 ABS and CB tranches. [b] indicates significant difference at the 1% level between MBS and CB tranches. [c] indicates significant difference at the 1% level between CDO and CB tranches. Bond rating is 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. For a definition of the variables, see Table 2.

Table 4: Regression analyses of the determinants of credit spreads

Dependent variable: Credit spread (bps)	[1] ABS	[1a] ABS | nonfinancial firms	[1b] ABS | financial firms	[2] MBS | financial firms	[3] CDO | financial firms	[4] CB	[4a] CB | nonfinancial firms	[4b] CB | financial firms
Independent variables:								
Intercept	-185.08 (-2.11) **	-142.59 (-0.76)	-200.28 (-2.02) **	145.64 (1.76) *	0.03 (0.01)	151.50 (2.36) **	237.36 (3.33) ***	54.85 (0.87)
Rated	-118.22 (-8.03) ***	-50.62 (-1.59)	-131.08 (-8.11) ***	-137.03 (-6.14) ***	-162.40 (-5.42) ***	-112.87 (-6.77) **	-189.53 (-9.37) ***	-53.79 (-3.70) ***
AA+	13.11 (1.13)	-53.42 (-1.91) *	20.85 (1.67) *	35.60 (3.32) ***	28.40 (2.86) ***	4.45 (0.60)	-18.08 (-1.03)	26.11 (2.36) **
AA	29.85 (3.21) ***	11.48 (0.48)	33.76 (2.30) ***	44.65 (4.97) ***	8.42 (0.96)	12.13 (1.25)	4.21 (0.22)	12.61 (1.31)
AA-	36.29 (3.07) ***	41.99 (0.97)	58.27 (3.13) ***	63.57 (4.70) ***	32.90 (1.76) *	24.81 (1.99) **	36.14 (1.98) **	26.92 (2.10) **
A+	57.13 (3.82) ***	38.80 (1.31)	64.26 (3.65) ***	70.91 (6.07) ***	56.98 (4.05) ***	12.63 (1.98) **	43.14 (2.45) **	12.40 (1.15)
A	36.88 (3.95) ***	11.16 (0.64)	40.38 (3.78) ***	70.65 (7.09) ***	57.29 (3.96) ***	29.35 (2.63) ***	57.13 (3.14) ***	27.80 (2.27) **
A-	54.41 (3.73) ***	30.09 (0.98)	61.34 (3.91) ***	111.70 (6.15) ***	49.66 (2.27) **	26.51 (2.03) **	70.21 (3.95) ***	26.56 (1.90) *
BBB+	66.41 (4.27) ***	40.40 (1.94) *	75.81 (3.99) ***	122.08 (7.00) ***	124.60 (5.48) ***	58.37 (4.26) ***	95.32 (5.16) ***	78.50 (4.73) ***
BBB	109.08 (6.84) ***	100.48 (3.44) ***	109.65 (5.96) ***	108.45 (10.13) ***	154.27 (9.79) ***	84.82 (5.64) ***	116.97 (6.09) ***	111.04 (7.38) ***
BBB-	110.	117.	111.	150.	133.	115.	153.	151.

	30	*	28		98	*	50	*	46	*	68	*	98	*	78	*
	(5.82)		(1.92)		(5.56)		(7.97)		(7.31)		(7.07)		(7.60)		(6.85)	
BB+	260.81	***	97.66	**	271.57	***	249.42	***	335.95	***	191.16	***	252.62	***	180.54	***
	(11.27)		(2.03)		(11.57)		(12.22)		(9.81)		(11.23)		(11.97)		(8.17)	
BB	249.30	***	127.78	*	258.74	***	255.81	***	390.78	***	233.70	***	301.06	***	212.68	***
	(10.00)		(1.68)		(9.68)		(14.07)		(24.66		(12.01)		(13.69)		(4.94)	
BB-	216.32	***	756.91	***	196.25	***	290.55	***	368.65	***	298.77	***	364.93	***	290.33	***
	(4.70)		(19.41)		(5.00)		(8.45)		(13.92)		(17.30)		(17.56)		(6.82)	
B+	171.99	**	404.91	***	150.52	**	180.43	***	369.90	**	422.06	***	483.81	***	454.31	***
	(2.49)		(10.67)		(2.14)		(4.54)		(25.9		(23.51)		(23.14)		(11.53)	
B	319.85	***			320.51	***	409.65	***	455.79	***	453.21	***	518.49	***	390.86	***
	(4.22)				(4.25)		(6.57)		(25.43)		(26.22)		(24.75)		(8.53)	
B-	284.76	***			287.44	***	321	***	475.82	***	462.85	***	534.53	***	356.58	***
	(3.24)				(3.30)		(16.45)		(10.46)		(21.05)		(23.82)		(3.12)	
CCC+	71.94	**			78.35		31.15		98.66	***	460.76	***	551.65	***	227.05	***
	(2.41)				(2.63		(0.62)		(4.55)		(12.22)		(17.91)		(4.50)	
CCC	309.46	***			312.18	***	193.73	***			461.73	***	676.24	***	61.94	
	(27.63)				(26.42)		(2.89)				(3.85)		(14.92)		(0.85)	
CCC-											-	***	-	**		
	318.83	***			322.29	***	321.33	***			89.01		58.54			
	(4.61)				(4.72)		(5.70)				(-5.18)		(-2.52)			
CC	231.63	***			235.41	***	354.72	***								
	(4.67)				(4.72)		(11.36)									
D	262.55	***			263.27	***	303.84	***			520.10	***	540.90	***		
	(8.60)				(8.90)		(4.18)				(35.92)		(24.52)			
Rating discordance	-6.75		33.33		-11.13		-1.69		-3.79		7.84	*	20.88	***	-8.41	
	(-0.62)		(1.21)		(-0.90)		(-0.26)		(-0.21)		(1.73)		(2.73)		(-1.63)	
Maturity	-2.62	**	-1.63		-2.92	**	0.66	**	1.30	**	1.49	**	3.17	**	1.54	*

			*			*			*		*		*							
	(-3.93)		(-1.05)		(-4.03)		(2.09)		(2.82)		(2.72)		(5.03)		(1.73)					
Log maturity						**	-	**	-	**	-		-	**						
	27.77	**	12.79		33.35	*	29.83	*	40.31	*	16.16	**	43.56	*	-4.11					
	(2.45)		(0.52)		(2.62)		(-2.72)		(-3.30)		(-2.17)		(-5.27)		(-0.44)					
Log transaction size	-11.53	** *	-4.31		-12.94	** *	-6.83	**	-8.97	**	0.55		-10.82	** *	3.95	**				
	(-3.77)		(-0.68)		(-3.87)		(-2.21)		(-2.51)		(0.29)		(-3.30)		(2.20)					
Tranche rank		** *				** *		**		*	-	** *			-	** *				
	6.17		-0.14		7.68		3.49		3.54		12.95		-1.61		10.94					
	(2.73)		(-0.04)		(3.06)		(2.05)		(1.00)		(-4.82)		(-0.59)		(-4.64)					
Subordinated					-			**				**		**		**				
	-8.98		14.43		16.19		33.99	*	23.14	**	81.92	*	89.96	*	62.89	*				
	(-0.91)		(0.73)		(-1.47)		(3.27)		(2.32)		(9.94)		(4.12)		(8.39)					
Currency risk			-										-	**		**				
	-6.53		15.97		-6.91		-1.13		24.71	**	2.16		16.72	*	11.75	*				
	(-0.52)		(-0.50)		(-0.48)		(-0.14)		(2.44)		(0.66)		(-4.32)		(3.03)					
Fixed rate							-		-					**		*				
	-7.90		1.12		-0.80		32.69	**	13.18		7.10		33.27	*	8.42					
	(-0.95)		(0.09)		(-1.04)		(-2.07)		(-1.19)		(1.49)		(4.14)		(1.68)					
Number of banks	-1.26		-2.60		-0.68		0.15		0.65		-0.14		0.87		-	**				
															1.01	*				
	(-0.70)		(-0.83)		(-0.37)		(0.18)		(0.23)		(-0.38)		(1.56)		(-2.82)					
Bank reputation	-1.21	** *	-0.98		-1.19	** *	0.07		0.20		-1.00	** *	0.60		-	*				
															1.62	** *				
	(-4.02)		(-1.23)		(-3.70)		(0.23)		(0.47)		(-4.15)		(1.87)		(-5.66)					
Country risk	12.08	** *	4.01		13.37	** *	3.82		2.98		9.17	** *	8.49	** *	8.10					
	(5.05)		(0.67)		(5.36)		(0.98)		(1.31)		(4.74)		(4.87)		(2.53)	**				
Creditor rights	15.04	** *	4.23		15.83	** *	-4.76		-5.73	*	-0.30		1.24		1.31					
	(4.72)		(0.63)		(4.66)		(-1.35)		(-1.64)		(-0.17)		(0.78)		(0.59)					
Enforcement		** *				** *		**		**										
	7.26		6.36		8.02		5.03	*	7.94	*	1.07		0.38		0.20					

	(4.06)	(1.44)	(4.11)	(3.36)	(3.66)	(0.87)	(0.30)	(0.17)
Financial crisis	-0.11	-45.27	5.62	-47.85	-69.73	-37.97**	-55.60*	-37.58**
	(-0.01)	(-0.94)	(0.30)	(-1.19)	(-1.16)	(2.24)	(1.74)	(2.15)
Sovereign crisis	-1.71	23.98	3.19	-39.85	151.38**	49.66**	40.95	66.43**
	(-0.09)	(0.49)	(0.16)	(-1.05)	(2.44)	(2.29)	(1.06)	(2.45)
Volatility	0.10	0.96	-0.08	0.33	2.01*	1.68**	3.18**	0.81**
	(0.19)	(0.79)	(-0.14)	(0.52)	(1.88)	(5.09)	(6.43)	(2.16)
EUSA5y-Libor3M	-0.11	0.03	-0.14	-0.06	-0.21	-0.22**	-0.39**	-0.15**
	(-1.34)	(0.16)	(-1.56)	(-0.77)	(-1.27)	(-3.74)	(-5.73)	(-2.37)
Commercial	20.21**	8.58	23.25**	6.26				
	(2.45)	(0.52)	(2.64)	(0.91)				
Industry fixed effects	Yes	Yes	No	No	No	Yes	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,520	359	2,161	4,522	2,175	15,308	6,883	8,425
Adjusted R^2	0.48	0.54	0.49	0.52	0.72	0.65	0.71	0.58
Rated and rating dummies as independent variables only								
Adjusted R^2	0.31	0.33	0.32	0.37	0.55	0.46	0.56	0.25
Differences in adjusted R^2	0.17	0.21	0.17	0.15	0.17	0.19	0.15	0.33

Table 4 presents the results of an OLS regression analysis of the determinants of bond credit spreads for: (*i*) a sample of 2,520 ABS – model [1] –, of which 359 were closed by nonfinancial firms – model [1a] – and 2,161 by financial firms – model [1b]; (*ii*) a sample of 4,522 MBS closed by financial firms – model [2]; (*iii*) a sample of 2,175 (CDO) closed by financial firms – model [3]; and (*iv*) a sample of 15,308 CB issues – model [4] –, of which 6,883 were closed by nonfinancial firms – model [4a] – and 8,425 by financial firms – model [4b]. 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]		[7]		[8]	
Credit spread (bps)	ABS | nonfinancial firms	CB | nonfinancial firms	ABS | financial firms	CB | financial firms	MBS | financial firms	CB | financial firms	CDO | financial firms	CB | financial firms
Independent variables:								
Intercept	-13.81 (-0.04)	217.76 (4.97) ***	-14.23 (-0.07)	164.98 (2.89) ***	100.55 (1.32)	155.77 (2.72) ***	414.78 (1.78) *	97.46 (1.84) *
Rated	-30.24 (-1.05)	-323.17 (-32.26) ***	-165.77 (-6.78) ***	-76.76 (-8.12) ***	-55.57 (-3.22) *	-76.90 (-8.13) ***	-247.70 (-5.03) **	-73.32 (-8.10) ***
Rating*rated	22.43 (5.77) ***	35.28 (38.56) ***	15.24 (11.47) ***	12.42 (10.50) ***	17.65 (14.61) ***	12.21 (10.36) ***	27.80 (12.22) **	11.94 (10.14) ***
Rating discordance	29.63 (0.89)	33.11 (5.78) ***	-8.74 (-2.54)	13.67 (4.15) ***	-6.38 (-1.05)	12.82 (3.94) ***	31.67 (1.03)	11.75 (3.61) ***
Maturity	-1.04 (-0.91)	4.61 (6.56) ***	-2.90 (-2.99) ***	2.05 (2.28) **	1.47 (3.96) ***	2.45 (2.77) ***	-0.11 (-0.08)	1.47 (1.71) *
Log maturity	-14.20 (0.77)	-52.77 (-6.73) ***	26.57 (1.73) *	-16.00 (-2.54) **	-50.11 (-5.08) ***	-16.81 (-2.65) ***	-34.83 (-0.77)	-11.18 (-1.66) *
Log transaction size	-6.87 (-0.63)	-3.13 (-1.38)	-13.91 (-2.59) ***	9.33 (5.77) ***	-7.43 (-2.96) ***	9.58 (5.93) ***	-39.75 (-4.52) **	8.16 (5.34) ***
Tranche rank	-0.11 (-0.04)	-7.63 (-3.46) ***	10.92 (3.41) ***	-1.33 (-0.26)	2.76 (2.98) ***	2.60 (0.57)	3.99 (1.12)	1.69 (0.25)
Subordinated	48.23 (0.89) ***	4.25	48.51 (3.41) ***	107.70 (3.41) ***	45.99 (2.98) ***	107.90 (3.41) ***	37.48 (1.12) **	106.89 (3.41) ***

	(3.25)		(0.13)		(3.98)		(13.32)		(6.19)		(13.45)		(2.32)		(13.80)				
Currency risk	8.22		5.79	*	-47.20	**	-9.33	**	4.12		-10.59	**	-10.24		-7.16				
	(0.43)		(1.66)		(-2.65)	*	(-1.95)		(0.65)		(-2.25)		(-0.56)		(-1.55)				
Fixed rate	-17.87		47.53	**	-51.32	**	27.23	**	-7.63		25.29	**	-22.83		26.02	**			
	(-1.02)		(6.40)	*	(-3.04)	*	(7.75)	*	(-0.35)		(7.21)	*	(-0.72)		(7.09)	*			
Number of banks	-7.59	**	0.23		-8.18	**	-1.59	**	-1.52	*	-1.76	**	10.83	**	-1.38	**			
	(-2.20)		(0.56)		(-3.38)	*	(-3.49)	*	(-1.90)		(-3.86)	*	(2.08)		(-2.94)	*			
Bank reputation	-0.33		0.84	**	0.01		-1.19	**	0.43		-1.19	**	0.33		-1.15	**			
	(-0.32)		(2.90)	*	(0.01)		(-4.36)	*	(1.60)		(-4.39)	*	(0.37)		(-4.46)	*			
Country risk	4.95		9.03	**	13.9	**	5.62	**	4.62		5.91	**	-10.99		6.80	**			
	(0.60)		(8.10)	*	(3.64)	*	(3.96)	*	(0.96)		(4.18)	*	(-0.92)		(5.38)	*			
Creditor rights	7.84	*	-3.00	**	16.92	**	9.64	**	-7.41	**	9.87	**	15.86	**	9.29	**			
	(1.77)		(-2.61)	*	(2.08)		(5.56)	*	(-2.48)		(5.68)	*	(2.34)		(5.82)	*			
Enforcement	1.09		0.33		9.31	**	-2.20	**	5.11	**	-2.10	**	4.62	*	-2.05	**			
	(0.16)		(0.71)		(2.94)	*	(-3.10)	*	(5.52)	*	(-2.95)	*	(1.65)		(-3.20)	*			
Financial crisis	-37.19		98.44	**	-12.52	**	68.71	**	-60.09	**	68.75	**	-73.38	**	61.84	**			
	(-0.97)		(14.39)	*	(-0.55)	*	(8.46)	*	(-3.57)	*	(8.46)	*	(-1.22)	*	(7.95)	*			
Sovereign crisis	8.13		58.75	**	-18.09	**	107.12	**	41.97	**	106.69	**	172.21	**	99.25	**			
	(0.34)		(15.60)	*	(-0.87)	*	(15.61)	*	(3.69)	*	(15.51)	*	(4.96)	*	(15.81)	*			
Volatility	4.50	**	4.46	**	0.71		2.33	**	1.17	**	2.31	**	3.89	**	2.52	**			
	(4.2	*	(18.5	*	(1.1		(9.3	*	(2.7	*	(9.2	*	(2.8	*	(10.	*			

	5)		4)			2)		0)			3)		0)			9)		67)		
EUSA5y-Libor3M	-0.01 (-0.13)		-0.11 (-3.45)	** *		0.24 (-2.19)	**	0.08 (2.39)	**		0.06 (0.90)		0.08 (2.34)		**	-0.19 (-0.83)		0.10 (2.74)		** *
Log total assets	-7.72 (-0.68)		-19.82 (-5.44)	** *		-10.08 (-1.99)	**	-4.22 (-2.80)	** *		0.90 (0.52)		-4.05 (-2.68)		** *	-3.92 (-0.85)		-3.12 (-2.37)		**
Total debt to total assets	-0.02 (-0.03)		0.01 (0.02)																	
Fixed assets to total assets	0.35 (1.05)		0.04 (0.59)																	
Market to book ratio	-0.02 (-1.17)		-0.01 (-0.89)																	
Return on assets	-3.48 (-1.90)	*	-1.13 (-3.02)	** *		0.82 (1.68)	*	-0.49 (-2.62)	** *		-0.27 (-0.92)		-0.48 (-2.57)		** *	-0.78 (-0.50)		-0.49 (-2.63)		** *
Loan ratio						0.19 (0.22)		0.35 (2.43)	**		0.46 (2.64)	** *	0.35 (2.47)		**	-0.41 (-0.92)		0.17 (1.64)		*
Liquid assets to deposits & ST funding						-35.51 (-1.03)		-21.99 (-4.07)	** *		-13.86 (-2.14)	**	-21.97 (-4.08)		** *	-11.60 (-1.25)		-2.69 (-1.44)		
Capital adequacy ratio						7.54 (1.76)	*	-1.87 (-2.36)	**		-0.65 (-0.72)		-1.95 (-2.45)		**	-2.82 (-0.52)		-0.16 (-0.25)		
Non-performing loans ratio						-2.21 (-1.65)	*	-0.83 (-0.95)			-0.97 (-0.89)		-0.86 (-0.99)							
Dependent variable: Probability of	ABS versus CB | nonfinancial firms					ABS | financial firms							MBS | financial firms					CDO | financial firms		

observing:

Independent variables:				
Intercept	-3.67 *	-8.20 ***	-15.60 ***	-3.65
	(-1.70)	(-4.96)	(-5.45)	(-1.03)
Rated	2.76 ***	0.32	-0.30	1.20 ***
	(9.18)	(1.32)	(-0.89)	(2.71)
Rating*rated	-0.35 ***	-0.16 ***	-0.17 ***	-0.22 ***
	(-12.84)	(-7.09)	(-3.94)	(-3.80)
Rating discordance	-0.14	-1.15 ***	-0.58 ***	-0.74 ***
	(-0.66)	(-7.52)	(-2.87)	(-2.95)
Maturity	-0.04 ***	0.05 ***	0.33 ***	-0.05 *
	(-3.18)	(2.65)	(4.66)	(-1.64)
Log maturity	0.52 ***	0.88 ***	-0.11	3.08 ***
	(2.81)	(3.29)	(-0.24)	(6.59)
Log transaction size	0.30 ***	0.20 ***	0.39 ***	0.25 ***
	(2.81)	(4.70)	(5.95)	(3.32)
Tranche rank	0.09	0.96 ***	1.03 ***	1.11 ***
	(1.35)	(7.79)	(6.98)	(4.75)
Subordinated	2.01 ***	0.26 *	-0.22	-0.21
	(4.91)	(1.85)	(-0.80)	(-0.53)
Currency risk	-0.33 ***	-0.60 **	-0.71 ***	-0.16
	(-3.12)	(-2.14)	(-2.69)	(-0.70)
Fixed rate	-0.76 ***	-1.18 ***	-6.90 ***	-2.04 ***
	(-3.94)	(-8.74)	(-5.95)	(-6.12)
Number of banks	-0.07 **	-0.17 ***	-0.41 ***	-0.23 ***
	(-1.98)	(-7.38)	(-5.54)	(-4.37)
Bank reputation	-0.01	-0.02 **	-0.03 ***	-0.01
	(-0.54)	(-2.48)	(-2.63)	(-0.68)
Country risk	0.01	0.20 ***	0.21 ***	-0.29 *
	(0.30)	(6.84)	(3.22)	(-1.69)
Creditor rights	0.13 *	0.06	0.19 **	0.01
	(2.30)	(1.01)	(2.45)	(0.02)
Enforcement	0.01	0.06 **	0.13 ***	-0.01
	(0.32)	(2.51)	(2.73)	(-0.12)
Financial crisis	-1.06 **	1.08 ***	0.12	-1.10
	(-1.99)	(4.16)	(0.16)	(-1.05)
Sovereign crisis	-0.49 ***	0.18	-0.25	-1.10 ***
	(-3.42)	(1.05)	(-0.79)	(-2.90)
Volatility	-0.01	-0.03 ***	-0.07 ***	0.03
	(-0.76)	(-4.18)	(-2.90)	(1.24)
EUSA5y-Libor3M	-0.01	-0.01 ***	0.01	0.01
	(-0.89)	(-3.89)	(0.33)	(0.25)
Log total assets	-0.13	0.10 **	0.29 ***	-0.11
	(-1.42)	(2.47)	(3.00)	(-1.57)

Total debt to total assets	0.01	***						
	(3.79)							
Fixed assets to total assets	-0.01							
	(-1.38)							
Market to book	-0.01	*						
	(-1.79)							
Return on assets	-0.01	**	0.01		0.01		-0.02	***
	(-2.29)		(1.19)		(0.35)		(-3.57)	
Loan ratio			0.02	***	-0.02	**	-0.04	***
			(2.73)		(-2.5[illegible])		(-5.81)	
Liquid assets to deposits & ST funding			-0.54	**	0.12		-0.17	
			(-1.97)		(0.[illegible]6)		(-1.59)	
Capital adequacy ratio			-0.05	***	-0.07		-0.05	
			(-2.93)		(-1.60)		(-1.01)	
Non-performing loans ratio			-0.03	**	-0.03			
			(-2.02)		(-0.59)			
Number of observations	4,900		4,[illegible]		5,355		4,266	
Wald chi2	350.48	***	5[illegible].10	***	801.09	***	574.20	***
Log pseudolikelihood	-29,802.27		-2[illegible]6,201.55		-31,596.58		-25,412.21	
Wald test of indep. equations	3.91	**	5.85	**	7.21	***	0.97	

Table 5 presents the results of estimating endogenous switching regression models on: (*i*) a sub-sample of 198 ABS and 4,702 CB issued by nonfinancial firms – model [5]; (*ii*) a sub-sample of 721 ABS and 3,632 CB issued by financial firms – model [6]; (*iii*) a sub-sample of 1,72[illegible] MBS and 3,632 CB issued by financial firms – model [7]; and (*iv*) a sub-sample of 322 CDO and 3,632 CB issued by financial firms – model [8]. Sub-samples include observations with available accounting and market information on financial and nonfinancial public firms that closed ABS, MBS, CDO, and CB 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: AS (ABS, MBS, and CDO) and CB mean and median credit spreads by credit rating

2000-2016 Period | Financial and nonfinancial firms

Credit rating (S&P / Moody's)	ABS			MBS			CDO			CB		
	Number	Credit spread		Number	Credit spread		Number	Credit spread		Number	Credit spread	
		Mean	Median		Mean	Median		Mean	Median		Mean	Median
AAA / Aaa	1,098	62.8	52.7	1,893	54.2	41.9	650	67.1	54.7	1033	64.4	45.7
AA+ / Aa1	63	76.8	69.9	116	85.5	61.3	61	143.9	132.9	532	80.4	55.0
AA / Aa2	120	96.0	74.5	444	72.9	55.4	307	100.[illegible]	91.2	1,003	84.1	63.2
AA- / Aa3	78	97.4	90.4	93	94.9	54.7	4[illegible]	127.9	104.5	1,325	109.1	83.1
A+ / A1	169	122.7	89.4	167	86.6	58.5	[illegible]6	140.2	121.0	1,822	96.3	80.1
A / A2	221	96.9	80.0	426	94.6	71.4	259	152.2	112.1	1,708	125.8	103.0
A- / A3	71	134.7	100.0	82	155.2	93.[illegible]	50	148.4	155.4	1,654	141.5	119.9
BBB+ / Baa1	49	133.2	119.0	115	136.[illegible]	86.2	25	209.3	219.3	1,224	187.2	151.4
BBB / Baa2	171	167.2	128.9	470	130.[illegible]	104.0	222	259.0	242.4	812	222.4	195.0
BBB- / Baa3	54	169.8	134.7	127	181.5	130.6	83	199.5	153.0	386	272.9	244.5

2000-2016 Period | Financial firms

Credit rating (S&P / Moody's)	ABS			MBS			CDO			CB		
	Number	Credit spread		Number	Credit spread		Number	Credit spread		Number	Credit spread	
		Mean	Median		Mean	Median		Mean	Median		Mean	Median
AAA / Aaa	939	64.2	53.5	1,834	53.9	41.8	640	68.3	55.1	951	66.0	46.0
AA+ / Aa1	58	83.1	79.7	111	87.0	65.7	61	143.9	132.9	303	88.6	47.3
AA / Aa2	107	97.3	75.3	415	71.5	54.9	303	107.9	91.2	809	85.9	63.5
AA- / Aa3	72	97.5	90.4	90	96.4	57.6	42	127.9	104.5	1,092	106.6	76.3
A+ / A1	144	127.9	90.5	164	86.5	58.2	55	140.4	119.0	1,372	92.3	75.0
A / A2	178	96.3	71.4	404	92.5	71.3	255	154.1	112.1	1,095	120.7	96.2
A- / A3	53	134.7	100.0	80	156.6	92.1	49	148.4	155.6	786	135.4	119.1
BBB+ / Baa1	40	129.9	96.5	110	137.4	84.6	24	211.1	224.9	410	212.3	189.7
BBB /	141	162.	119.3	448	125.	101.7	217	262.	251.2	242	258.	242.5

Baa2		3			1			5			7	
BBB- / Baa3	52	168.1	134.7	122	175.6	124.4	82	199.3	151.3	110	322.5	291.1

2005-2008 Period | Financial and nonfinancial firms

Credit rating (S&P / Moody's)	**ABS**			**MBS**			**CDO**			**CB**		
	Number	**Credit spread**		**Number**	**Credit spread**		**Number**	**Credit spread**		**Number**	**Credit spread**	
		Mean	**Median**		**Mean**	**Median**		**Mean**	**Median**		**Mean**	**Median**
AAA / Aaa	342	42.2	38.8	1,062	39.5	36.7	348	32.9	38.5	245	44.9	28.7
AA+ / Aa1	13	60.1	39.3	61	47.0	42.8	21	83.0	70.8	195	56.8	34.9
AA / Aa2	38	50.4	43.9	334	54.4	49.9	165	59.1	54.3	363	66.6	37.9
AA- / Aa3	29	64.7	46.1	51	51.8	48.1	11	82.1	78.2	539	66.2	43.3
A+ / A1	75	125.5	62.0	120	60.9	53.7	27	85.9	89.1	513	52.1	38.3
A / A2	90	74.0	65.6	311	76.7	68.3	165	91.7	65.1	411	91.7	53.6
A- / A3	24	91.4	82.1	44	85.0	70.9	20	104.9	85.9	305	99.3	66.0
BBB+ / Baa1	15	107.5	77.2	82	115.5	61.7	14	135.1	113.8	195	126.7	93.0
BBB / Baa2	100	134.8	99.5	370	110.9	97.5	107	168.0	128.1	92	140.2	99.5
BBB- / Baa3	25	128.1	123.9	85	135.[illegible]	118.6	65	161.3	128.5	33	164.0	157.0

Table 6 displays number, mean and median credit spread for asset securitization (AS) bonds – ABS, MBS, and CDO – and corporate bond (CB) issues by initial S&P and / or Moody's credit rating. Only investment grade bonds were included.

Table 7: Regression analyses of credit spreads by rating category

Dependent variable:	[9]	[9a]	[9b]	[9c]	[9d]	[9e]	[9f]	[9g]	[9h]	[9i]	[9j]
Credit spread (bps)	AS bonds and CB	AS bonds and CB | AAA / Aaa	AS bonds and CB | AA+ / Aa1	AS bonds and CB | AA / Aa2	AS bonds and CB | AA- / Aa3	AS bonds and CB | A+ / A1	AS bonds and CB | A / A2	AS bonds and CB | A- / A3	AS bonds and CB | BBB+ / Baa1	AS bonds and CB | BBB / Baa2	AS bonds and CB | BBB- / Baa3
2000-2016 period											
ABS	-13.41 ** (-1.99)	-18.49 * (-1.96)	-36.24 * (-1.85)	2.45 (0.21)	-22.72 (-1.23)	-1.60 (-0.11)	-24.35 * (-1.89)	-67.89 ** * (-3.22)	-69.13 ** * (-3.08)	6.54 (0.33)	-74.73 * (-1.96)
MBS	5.62 (0.71)	-10.10 (-1.31)	-15.45 (-1.14)	9.53 (1.16)	-21.61 (-1.31)	-21.93 * (-1.93)	5.97 (0.55)	-13.39 * (-1.86)	-91.98 ** * (-3.57)	-13.58 (-0.67)	-73.99 * * (-2.17)
CDO	63.17 ** * (5.61)	8.53 (0.87)	48.88 ** * (2.08)	34.05 ** * (3.24)	43.45 ** (2.17)	47.91 ** (2.50)	53.22 ** * (3.04)	-25.60 (-1.13)	25.41 (0.77)	81.30 ** * (3.83)	-44.65 (-1.24)
[...]											
Number of observations	24,525	4,660	770	1,868	1,538	2,213	2,608	1,842	1,398	1,638	644
Adjusted R^2	0.58	0.26	0.35	0.46	0.42	0.49	0.38	0.44	0.53	0.47	0.44
2005-2008 period											
ABS	7.92 (1.19)	14.52 (1.37)	7.59 (0.29)	-15.11 (-0.84)	-32.43 * (-1.69)	36.12 (1.08)	-43.04 ** * (-3.14)	-70.53 ** (-2.15)	33.39 (0.90)	16.22 (0.48)	-70.60 * (-1.81)
MBS	2.24	18.0 **	-	-6.80	- **	-8.64	- *	-	25.52	3.38	- *

		8	24.47		31.22 *		19.74	24.58				58.93
	(0.40)	(2.31)	(-1.32)	(-0.62)	(-2.74)	(-0.64)	(-1.87)	(-1.17)	(1.17)		(0.14)	(-1.89)
CDO								-22.74			36.65	-38.58
	29.42 ** *	8.48	15.43	-1.08	2.72	31.58 *	-4.55		66.28 *			
	(3.04)	(1.21)	(0.49)	(-0.08)	(0.12)	(1.91)	(-0.27)	(-0.68)	(1.97)		(1.46)	(-1.08)
[...]												
Number of observations	7,861	1,987	290	895	630	734	972	389	300		666	204
Adjusted R^2	0.57	0.25	0.29	0.48	0.33	0.49	0.50	0.49	0.63		0.41	0.21
2009-2016												
ABS	-43.86 ** *	-54.75 ** *	-76.33 ** *	-14.07	-119.35 **	-9.02	-87.42 ** *	-93.24 ** *	-118.54 **		-60.20	-75.79
	(-2.69)	(-4.36)	(-2.72)	(-0.75)	(-2.89)	(-0.35)	(-2.91)	(-2.81)	(-2.55)		(-1.27)	(-1.17)
MBS	-9.47	-42.05 ** *	-50.36 *	9.60	-59.52	-30.17	-13.86	-45.14	-127.18 *		-72.54	-94.82
	(-0.58)	(-3.39)	(-1.51)	(0.50)	(-0.99)	(-1.17)	(-0.49)	(1.25)	(-1.80)		(-1.58)	(-1.52)
CDO	104.05 ** *	46.38 ** *	89.27 ** *	75.92 ** *	18.97	82.89	84.44 ** *	117.31 ** *	199.18 ** *		99.70 *	67.12
	(5.84)	(2.77)	(3.04)	(3.47)	(0.30)	(1.40)	(2.72)	(2.67)	(3.21)		(1.89)	(0.92)
[...]												
Number of observations	12,269	1,854	332	626	649	1,033	1,280	1,201	856		731	402
Adjusted R^2	0.54	0.38	0.36	0.27	0.35	0.26	0.33	0.46	0.50		0.38	0.42
Similar maturities - ABS | MBS | CDO												
ABS	-5.53 **	3.13	-39.09	-28.54	-74.63 **	-6.57	-56.23 **	-72.72 *	-32.32		9.08	138.58
	(-	(0.22	(-	(-	(-	(-	(-	(-	(-		(0.23	(1.62

	2.43)	)	0.99)	1.19)	2.31)	0.42)	2.55)	1.84)	0.91)	)	)
[...]											
Number of observations	4,064	479	156	253	304	438	465	370	394	279	106
Adjusted R^2	0.58	0.28	0.34	0.53	0.59	0.62	0.48	0.39	0.60	0.57	0.59
MBS											
	25.40		-22.54	14.36	-	-15.97		46.51	-	60.39	12.03
		-8.97			13.05		8.47		28.49*		
	(1.02)	(-1.11)	(-0.50)	(1.21)	(-0.39)	(-0.72)	(0.51)	(1.03)	(-1.70)	(1.30)	(0.12)
[...]											
Number of observations	4,434	540	150	296	326	453	510	407	432	321	123
Adjusted R^2	0.59	0.24	0.32	0.54	0.57	0.58	0.48	0.40	0.55	0.53	0.55
CDO											
	66.68**		64.53*	42.95**		54.38**	38.51	-51.50		26.93	60.51
		1.75			70.60				59.82		
	(5.21)	(0.15)	(1.97)	(3.32)	(1.77)	(2.67)	(1.33)	(-1.08)	(1.07)	(0.90)	(0.67)
[...]											
Number of observations	5,967	690	186	379	372	511	679	470	498	464	195
Adjusted R^2	0.58	0.50	0.55	0.64	0.55	0.61	0.56	0.35	0.55	0.59	0.49

Table 7 presents the results of an OLS regression analysis of the determinants of bond credit spreads for a sample of 9,217 AS bonds and 15,308 CB issues with available information on credit rating. Model [4] of Table 4 is re-estimated for a sample including both AS and CB simultaneously – model [9] – as well as sub-samples by rating scales – models [9a] to [9j]. ABS, MBS, and CDO are dummy variables. Similar maturities mean, for each AS bond type, the maturity quartile with a higher number of observations: ABS [9.83-19.03 yrs.]; MBS [9.84-26.74 yrs.]; and CDO [7.04-17.28 yrs.]. ***, ** 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 8: Descriptive statistics for WAS and firms' characteristics

Panel A: Nonfinancial firms categorized according to choice of bond issuance							
Variable of interest		**All originators/issuers**			**Originators/issuers of**		**Switchers**
		AS	**CB**		**AS only**	**CB only**	**AS and CB**
WAS_t (bps)	Mean	89.6	215.7	*** *	93.9	219.6	*** * 182.1
	Median	66.8	157.0		75.8	160.6	120.8
	Number	87	3,570		28	3,047	582
Total $assets_{t-1}$ (€ million)	Mean	77,610.0	46,958.1		157,687.5	37,257.2	97,000.8
	Median	13,239.9	21,277.9		12,459.5	17,030.0	68,965.0
	Number	87	3,570		28	3,047	582
Total debt to total $assets_{t-1}$	Mean	40.9%	34.9%	** *	44.2%	34.1%	** * 39.7%
	Median	43.3%	34.5%		44.0%	33.0%	42.3%
	Number	87	3,570		28	3,047	582
Fixed assets to total $assets_{t-1}$	Mean	39.9%	37.3%		34.9%	37.1%	38.7%
	Median	29.2%	33.8%		21.6%	34.8%	31.0%
	Number	87	3,570		28	3,047	582
Market to $book_{t-1}$	Mean	97.5%	95.1%		74.3%	98.9%	76.5%
	Median	75.6%	77.5%		80.4%	78.6%	72.9%
	Number	87	3,570		28	3,047	582
Return on $assets_{t-1}$	Mean	4.1%	5.3%	** *	4.2%	5.6%	* 3.7%
	Median	4.0%	4.7%		4.1%	5.1%	3.7%
	Number	87	3,570		28	3,047	582
Z-$score_{t-1}$	Mean	1.6	1.9	** *	1.5	1.9	1.4
	Median	1.1	1.5		1.1	1.6	1.3
	Number	41	2,671		6	2,245	461

Panel B: Financial firms categorized according to choice of bond issuance						
Variable of interest	**All originators/issuers**		**Originators/issuers of**		**Switchers**
	AS	**CB**	**AS only**	**CB only**	**AS and CB**

WAS_t (bps)	Mean	67.1	150.5	***	89.1	154.3	*** 140.5
	Median	48.3	126.3		57.5	116.8	116.8
	Number	462	3,406		19	71	3,778
Total $assets_{t-1}$ (€ million)	Mean	679,000.0	704,000.0		276,000.0	94,600.0	715,000.0
	Median	449,000.0	365,000.0		246,000.0	72,700.0	391,000.0
	Number	462	3,406		19	71	3,778
Loan $ratio_{t-1}$	Mean	58.1%	49.7%	***	36.6%	52.9%	* 50.7%
	Median	61.9%	52.0%		41.9%	50.7%	52.1%
	Number	462	3,406		19	71	3,778
Liquid assets to deposits & ST $funding_{t-1}$	Mean	33.8%	46.3%	***	56.4%	32.3%	44.9%
	Median	27.5%	45.6%		22.0%	30.9%	41.0%
	Number	462	3,406		19	71	3,778
Capital adequacy $ratio_{t-1}$	Mean	13.0%	14.3%	***	14.3%	14.7%	14.1%
	Median	12.5%	13.5%		14.0%	12.4%	13.5%
	Number	462	3,406		19	71	3,778
Return on $assets_{t-1}$	Mean	0.7%	0.4%	***	0.8%	-0.1%	** 0.5%
	Median	0.8%	0.3%		0.5%	0.3%	0.4%
	Number	462	3,406		19	71	3,778
Non-performing loans $ratio_{t-1}$	Mean	3.1%	4.0%	***	3.9%	6.7%	*** 3.9%
	Median	2.1%	3.3%		1.4%	2.6%	3.2%
	Number	462	3,406		19	71	3,778
Z-$score_{t-1}$	Mean	2.2	4.4	***	4.9	21.5	3.2
	Median	1.2	2.2		5.5	4.8	2.1
	Number	187	480		6	19	642

Our sample includes 87 and 3,570 AS and CB transactions, respectively, closed by European nonfinancial firms between 2000 and 2016. Of these 3,657 transactions, 28 were closed by AS originators only, 3,047 were closed by CB issuers only, and 582 were closed by switchers. Regarding financial firms, our sample includes 3,868 transactions, of which 462 are AS and 3,406 are CB. 19 and 71 transactions were closed by AS originators only or CB issuers only, respectively. The switchers issued 3,778 of total transactions. We test for similar distributions in

public firms' characteristics across AS and CB 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 9: Regression analyses of the cost of borrowing: SF versus CB

Dependent variable:	[10]	[10a]	[11]	[12]	[13]	[13a]	[14]	[15]
WAS (bps)	AS and CB | nonfinancial firms	AS and CB | nonfinancial firms	AS and CB | nonfinancial firms | switchers	AS and CB | nonfinancial firms | matched sample	AS and CB | financial firms	AS and CB | financial firms	AS and CB | financial firms | switchers	AS and CB | financial firms | matched sample
Independent variables:								
Intercept	482.01*** (4.98)	420.12*** (4.03)	700.25** (1.63)	-46.03 (-0.23)	21.52 (0.14)	77.07 (0.46)	166.39 (0.89)	-471.45 (-0.98)
ABS	-92.25*** (-4.10)	-83.63*** (-5.07)	-105.68** (-4.99)	-67.17** (-2.47)	-83.33*** (-2.95)	-115.82*** (-4.90)	-120.47*** (-4.93)	-123.49*** (-2.38)
MBS					-105.28*** (-3.95)	-131.05*** (-6.11)	-141.22*** (-6.05)	-100.34* (-1.73)
CDO					-54.11*** (-2.48)	-76.85** (-2.37)	-81.03** (-2.59)	
WAM	1.86** (3.78)	2.29*** (4.29)	2.30** (2.94)	1.62** (2.11)	0.80 (1.04)	0.15 (0.33)	0.46 (0.84)	-1.77 (-1.05)
Log transaction size	-6.84 (-1.54)	-3.64 (-0.75)	-12.20** (-1.57)	7.86 (0.82)	6.65** (2.49)	7.41 (1.49)	7.54 (1.49)	19.54 (1.54)
Number of tranches	-4.08 (-1.13)	-7.95** (-2.18)	-1.68 (-0.27)	-8.08 (-0.84)	4.12* (1.92)	2.07 (0.67)	3.01 (0.90)	-1.68 (-0.26)
Number of banks	2.02** (2.31)	3.36*** (3.39)	2.28** (2.00)	0.67 (0.52)	0.39 (0.39)	0.50 (0.37)	0.10 (0.07)	-3.58 (-1.48)
Bank reputation	-10.05 (-0.80)	-3.18 (-0.23)	11.81 (0.37)	36.19 (1.28)	29.36* (2.37)	13.49 (0.87)	20.63 (1.37)	-7.37 (-0.23)
Country risk	11.3**	13.9**	19.3**	22.7**	13.5**	9.16**	9.25**	16.1*

	8 (4.76)	9 (5.51)	9 (2.91)	2 (3.01)	4 (4.84)	(2.13)	(2.04)	5 (2.50)	
Creditor rigths	2.94 (1.34)	0.17 (0.07)	-21.61 (-1.72)	-2.38 (-0.48)	9.64 (1.68)	-0.28 (-0.04)	-6.14 (-0.79)	-2.15 (-0.08)	
Enforcement	-0.62 (-0.33)	1.57 (0.76)	-0.63 (-0.07)	5.57 (1.42)	1.13 (0.65)	0.82 (0.29)	1.46 (0.51)	2.66 (0.32)	
Financial crisis	93.85 (2.64)	109.81 (2.78)	57.98 (0.39)	137.85 (1.09)	31.69 (1.01)	55.64 (1.08)	48.97 (0.91)	63.83 (1.22)	
Sovereign crisis	104.55 (2.36)	117.36 (2.31)	57.14 (0.36)	320.25 (2.77)	60.50 (1.15)	102.02 (1.89)	99.83 (1.79)	-101.72 (-1.15)	
Volatility	2.76 (4.13)	2.36 (3.13)	5.29 (2.82)	-0.24 (-0.13)	0.40 (0.76)	-0.19 (-0.21)	0.03 (0.03)	-0.42 (-0.38)	
EUSA5y-Libor3M	-0.27 (-3.08)	-0.41 (-4.36)	-0.24 (-1.28)	-0.20 (-1.03)	-0.08 (-0.50)	-0.29 (-1.94)	-0.28 (-1.84)	-0.22 (-0.69)	
Switcher	18.24 (1.73)	17.62 (1.49)		-19.20 (-0.79)	-1.13 (-0.07)	-3.77 (-0.15)		-23.46 (-0.61)	
Log total assets	-84.87 (-10.73)	-91.17 (-11.26)	-136.16 (-4.20)	-63.99 (-3.68)	-2.96 (-0.94)	-1.07 (-0.18)	-0.32 (-0.05)	12.64 (0.74)	
Total debt to total assets	0.54 (2.00)	0.91 (3.56)	-1.25 (-0.95)	0.81 (1.63)					
Fixed assets to total assets	-0.42 (-2.41)	-0.59 (-3.08)	2.25 (3.41)	-0.21 (-0.46)					
Market to book	-0.07 (-2.40)	0.08 (1.85)	0.13 (0.90)	0.09 (0.91)					
Return on assets	-3.08 (-	-4.79 (-	-8.04 (-	-2.30 (-	-3.48 (-	7.87 (0.70	-10.01 (-	22.13 (1.67	

	3.63)	7.08)	1.81)	2.14)	0.49)	)	0.72)	)
Loan ratio					-0.39 (-1.14)	-0.31 (-0.48)	-1.39 * (-1.73)	2.66 (1.06)
Liquid assets to deposits & ST funding					-0.40 (-1.51)	-0.37 (-0.90)	-1.31 ** (-2.38)	1.19 (1.34)
Capital adequacy ratio					-0.50 (-0.48)	-0.62 (-0.33)	-2.80 (-1.14)	0.59 (0.19)
Non-performing loans ratio					-0.45 (-0.35)	3.33 ** (2.41)	-0.29 (-0.17)	3.21 (1.49)
Z-score		-8.13 ** (-2.00)	-33.20 (-1.41)	-15.45 * (-1.96)		0.07 (0.24)	0.23 (0.57)	-0.68 (-0.91)
Industry fixed effects	Yes	Yes	Yes	Yes	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	3,657	2,712	461	375	3,868	667	642	189
Adjusted R^2	0.46	0.51	0.60	0.38	0.35	0.41	0.41	0.51

Table 9 presents the results of an OLS regression analysis of the determinants of transactions' weighted average spreads (WAS) for the samples in Table 8. ABS, MBS and CDO are dummy variables. In models [12] and [15], we matched 60 nonfinancial firms that use ABS with 299 non-users and 47 banks that use ABS and MBS with 142 non-users, respectively. For a definition of the remaining 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 10: Originating firms' credit risk around the implementation of an AS transaction

Panel A: Nonfinancial firms			
	Level at	**Change vis-à-vis t-1**	
	t-1	***t***	***t+1***
AS originating firms' mean			
Z-score	2.842	-0.806 *	-0.896 *
		(0.098)	(0.098)
Difference between AS originating firms and matched firms			
	Mean		
	t-1	***t***	***t+1***
Z-score	0.957	-0.685	-0.700
	(0.141)	(0.157)	(0.208)
Panel B: Financial firms			
	Level at	**Change vis-à-vis t-1**	
	t-1	***t***	***t+1***
AS originating firms' mean			
Z-score	3.243	3.280	3.073
		(0.390)	(0.357)
Difference between AS originating firms and matched firms			
	Mean		
	t-1	***t***	***t+1***
Z-score	-0.199	0.256	-4.596
	(0.485)	(0.961)	(0.537)

Table 10 presents an event study of changes in Z-score around the closing of an AS transaction. *t* is the closing year and the table shows the Z-score of AS originating firms' mean – unadjusted sample mean – as of one year before the AS transaction, and differences *vis-à-vist-1* during the year of (*t*) and the year after (*t+1*) the closing. Sample means for the difference between the AS originating firms' value and the contemporaneous mean for a set of matched firms are also presented. Each originating firm is matched with no more than five firms in the same year, industry, and in the same total asset decile with the closest Z-score. We only consider an AS user the first time it appears in our sample; i.e., if an originating firm closes more than one AS transaction during our sampling period, we only consider the first transaction. The sample includes (*i*) 60 nonfinancial firms that use ABS and 299 non-users – Panel A –; and (*ii*) 47 banks that use ABS and MBS and 142 non-users – Panel B –, with information on Z-score. p-values are reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. For a definition of Z-score, see Table 3.

Appendix A: Distribution of tranches by firm type and year

Year	Asset securitization						Corporate bonds					
	Financial firms			Nonfinancial firms			Financial firms			Nonfinancial firms		
	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	475	62,795.08	1.79	70	10,032.31	4.48	973	185,206.25	3.59	280	156,880.63	4.50
2001	628	107,530.36	3.06	90	27,118.71	12.11	835	174,[illegible]72.9[illegible]	3.37	312	185,162.40	5.31
2002	708	114,129.89	3.25	61	21,089.67	9.42	955	165,[illegible]63.[illegible]0	3.21	242	113,013.46	3.24
2003	985	162,348.89	4.62	106	28,115.35	12.55	1,645	[illegible]21,204.37	4.29	322	152,664.33	4.38
2004	1,003	185,715.07	5.28	63	18,182.06	8.12	2,23[illegible]	297,936.11	5.77	253	95,210.05	2.73
2005	1,323	268,484.17	7.64	130	31,296.27	13.97	2,[illegible]22	503,146.59	9.75	249	93,369.16	2.68
2006	2,298	416,764.84	11.85	119	34,692.69	15.49	2,32[illegible]	535,063.08	10.37	319	154,866.44	4.44
2007	1,915	395,984.03	11.26	90	19,872.66	8.8[illegible]	2,587	459,201.00	8.90	242	121,232.21	3.48
2008	1,028	628,603.56	17.88	17	5,534.19	[illegible].47	856	312,341.71	6.05	288	141,856.42	4.07
2009	621	338,551.93	9.63	7	1,691.34	0.76	908	490,891.82	9.51	552	318,228.20	9.13
2010	360	223,097.00	6.35	4	1,650.0[illegible]	0.74	889	333,415.42	6.46	455	179,405.89	5.15
2011	434	153,913.05	4.38	6	1,684.[illegible]2	0.75	724	255,952.49	4.96	527	178,381.14	5.12
2012	391	122,575.56	3.49	24	4,9[illegible]1.22	2.20	857	264,526.18	5.13	848	325,778.11	9.34
2013	315	56,944.19	1.62	[illegible]	4,727.42	2.11	559	211,736.10	4.10	845	284,069.53	8.15
2014	401	61,405.71	1.75	33	6,534.58	2.92	512	254,085.66	4.92	928	308,250.74	8.84
2015	481	78,754.09	2.24	[illegible]5	4,208.98	1.88	631	243,676.79	4.72	737	297,508.53	8.53
2016	679	138,009.57	[illegible].93	9	2,584.61	1.15	572	251,629.83	4.88	757	380,695.74	10.92
Total	**14,045**	######### #	**100.[illegible]**	**877**	**223,946.48**	**100.00**	**20,286**	######### #	**100.00**	**8,156**	######### #	**100.00**

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

Appendix B: Descriptive statistics for AS and CB samples

Panel A: Continuous variables

Variable of interest	Asset securitization						Corporate bonds					
	Number	Mean	Median	Std. Dev.	Min	Max	Number	Mean	Median	Std. Dev.	Min	Max
Contractual characteristics												
Credit spread (bps)	9,217	125.6	77.5	141.6	-159.8	822.2	15,308	173.4	122.0	167.8	-164.1	825.0
WAS (bps)	1,867	78.3	57.6	83.1	-110.3	775.4	13,129	169.7	118.4	167.1	-162.5	825.0
Rating [1-22 weak]	8,509	4.5	3	4.1	1	21	12,806	6.2	6	3.4	1	21
Maturity (years)	9,217	26.7	24.2	18.4	0.2	99.0	15,308	7.8	6.0	6.7	0.7	99.0
Transaction size (€ Million)	9,217	1,387.4	686.0	2,161.4	5.0	27,728.0	15,308	668.6	354.9	1,034.4	4.75	17,630.4
Tranche size (€ Million)	9,217	279.8	60.0	682.0	0.1	22,298.0	15,308	442.1	300.0	499.4	0.9	15,427.5
Number of tranches	9,217	6.0	5	3.9	1	26	15,308	1.5	1	2.1	1	21
Tranche rank	9,217	3.4	3	2.7	1	26	15,308	1.2	1	0.8	1	21
Number of banks	9,217	2.5	2	2.0	1	17	15,308	4.2	3	3.9	1	38
Bank reputation [1-25 best]	9,217	10.9	8	10.1	1	25	15,308	11.1	6	10.3	1	25
Management fee	171	22.5	14.0	23.5	0.5	100	1,205	25.3	22.5	20.1	0.5	200
Gross spread (bps)	1,088	34.2	20.0	39.4	0.0	350	3,936	60.9	35.0	59.8	0.0	512.5
Macroeconomic factors												
Country risk [1-22 weak]	9,217	1.7	1.0	1.8	1	20	15,308	2.1	1	2.3	1	21
Volatility	9,217	18.9	15.6	10.0	9.9	80.7	15,308	19.8	17.5	8.7	9.9	80.7
EUSA5y-Libor3M (bps)	9,217	64.7	60.8	55.7	-108.2	208.0	15,308	80.1	71.9	57.4	-108.2	214.4
Creditor rights	9,217	2.6	2.0	1.2	0	4	15,308	2.3	2	1.3	0	4
Enforcement	9,217	44.8	46.8	3.7	34.2	49.3	15,308	45.1	46.8	3.4	34.2	49.9
Financial firms' characteristics												
Total assets (€ Million)	462	679,000.0	449,000.0	714,000.0	1,704.2	3,810,000.0	3,406.0	704,000.0	365,000.0	788,000.0	1,787.9	3,810,000.0
Loan ratio	462	58.1%	61.9%	19.6	0.8%	92.8%	3,406	49.7%	52.0%	17.6	2.6%	93.9%

Liquid assets to dep. & ST fund.	462	33.80%	27.5%	29.4	0.4%	205.4%	3,406	46.3%	45.6%	26.2	0.4%	125.5%
Capital adequacy ratio	462	13.0%	12.5%	2.7	8.2%	27.0%	3,406	14.3%	13.5%	3.8	8.0%	54.7%
Return on assets	462	0.7%	0.8%	0.7	-6.7%	3.1%	3,406	0.4%	0.3%	0.8	-11.9%	8.0%
Non-performing loans ratio	462	3.1%	2.1%	4.1	0.1%	50.6%	3,406	4.0%	3.3%	3.6	0.1%	54.6%
Z-score	187	2.2	1.2	12.3	-64.6	130.6	480	4.4	2.2	10.3	-12.4	86.3
Nonfinancial firms' characteristics												
Total assets (€ Million)	87	77,610.0	13,239.9	176,765.8	58,856.0	1,014,319.0	3,570	46,958.1	21,277.9	64,056.5	3,816.0	824,256.0
Debt to total assets	87	40.9%	43.3%	19.2	10.6%	85.6%	3,570	34.9%	34.5%	24.4	0.1%	138.4%
Fixed assets to total assets	87	39.9%	29.2%	31.5	0.1%	96.6%	3,570	37.3%	33.8%	23.6	0.1%	99.1%
Market to book	87	97.5%	75.6%	173.6	5.8%	1,648.5%	3,570	95.1%	77.5%	122.9	0.1%	2,439.8%
Return on assets	87	4.1%	4.0%	2.9	3.1%	16.2%	3,570	5.3%	4.7%	7.0	-103.1%	75.3%
Z-score	41	1.6	1.1	1.5	0.7	8.2	2,671	1.9	1.5	1.8	-3.9	26.3

Panel B: Dummy variables

Variable of interest	Asset securitization			Corporate bonds		
	Number	% of total	Std. Dev.	Number	% of total	Std. Dev.
Rated	9,217	92.3%	0.27	15,308	83.7%	0.37
Subordinated	9,217	45.9%	0.49	15,308	8.5%	0.28
Currency risk	9,217	25.7%	0.44	15,308	30.3%	0.46
Fixed rate	9,217	11.8%	0.32	15,308	82.7%	0.38
Rating discordance	9,217	6.1%	0.24	15,308	14.7%	0.35
Callable	9,217	53.3%	0.50	15,308	22.6%	0.42
Financial institutions	9,217	93.8%	0.24	15,308	55.0%	0.49

This table presents the descriptive statistics of AS and CB samples issued during the 2000-2016 period in Europe. Information on the characteristics of bond issuances was obtained from DCM Analytics and Datastream. For a definition of the variables, see Table 2.

Appendix C: The impact of the financial crisis on pricing characteristics of ABS, MBS, CDO, and CB tranches

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

Variable of interest	ABS				MBS				CDO				Corporate Bonds			
	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	1,162	104.3	64.0	-7.35 ***	3,061	85.2	60.1	-13.87 ***	1,661	142.3	89.1	-19.63 ***	6,295	83.7	52.3	-71.19 ***
crisis	1,358	126.7	101.4		1,461	142.9	109.9		514	308.7	256.9		9,013	236.0	180.6	
Rating [1-22 weak]																
pre-crisis	1,081	4.7	4	6.94 ***	2,956	4.5	3	7.32 ***	1,536	4.9	3.0	-3.98 ***	5,399	5.2	5.0	-32.83 ***
crisis	1,189	3.7	1		1,256	3.8	1		501	5.9	6.0		7,407	7.0	7.0	
Tranche rank																
pre-crisis	1,162	2.5	2	6.53 ***	3,061	4.1	3	10.34 ***	1,661	3.8	3	-4.95 ***	6,295	1.2	1	-14.09 ***
crisis	1,358	2.1	2		1,461	3.1	2		514	4.4	4		9,013	1.3	1	
Maturity (years)																
pre-crisis	1,162	19.5	15.9	11.36 ***	3,061	13.0	34.2	-12.50 ***	1,661	21.7	15.8	10.31 ***	6,295	7.9	6.0	2.32 **
crisis	1,358	14.3	9.1		1,461	40.9	39.9		514	14.8	13.1		9,013	7.8	6.0	
Transaction size (€ million)																
pre-crisis	1,162	1,008.5	732.6	7.56 ***	3,061	2,013.4	1,069.2	1.30	1,661	503.4	369.0	-5.38 ***	6,295	567.9	300.0	-13.54 ***
crisis	1,358	741.8	594.2		1,461	2,284.1	1,020.0		514	529.8	410.2		9,013	738.9	430.0	
Number of tranches																
pre-crisis	1,162	4.2	4	9.56 ***	3,061	7.6	6	14.18 ***	1,661	6.6	7.0	-10.61 ***	6,295	1.4	1.0	-19.17 ***
crisis	1,358	3.4	3		1,461	5.4	5		514	7.6	8.0		9,013	1.5	1.0	
Number of banks																

pre-crisis	1,162	2.7	2	8.43	**	3,061	3.2	2	14.41	**	1,661	1.7	1.0	11.07	**	6,295	4.3	3.0	0.23	
crisis	1,358	2.3	2		*	1,461	2.2	2		*	514	1.1	1.0		*	9,013	4.2	3.0		
Country risk [1-22 weak]																				
pre-crisis	1,162	1.5	1	-5.72	**	3,061	1.3	1	-18.44	**	1,661	1.2	1.0	-30.61	**	6,295	1.5	1.0	-24.6	**
crisis	1,358	2.5	1		*	1,461	1.9	1		*	514	3.1	2.0		*	9,013	2.5	1.0	2	*

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

	ABS				MBS				CDO				Corporate Bonds			
Variable of interest	**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	1,162	263	22.6%	0.065	3,061	154	5.0%	0.154	1,661	245	14.8%	0.313	6,295	4,691	74.5%	0.0000 #
crisis	1,358	297	21.9%		1,461	59	4.0%		514	66	12.8%		9,013	7,974	88.5%	
Currency risk																
pre-crisis	1,162	162	13.9%	0.021 #	3,061	100	32.8%	0.000 #	1,661	606	36.5%	0.000 #	6,295	1,975	31.4%	0.012 #
crisis	1,358	148	10.9%		1,461	172	11.8%		514	275	53.5%		9,013	2,657	29.5%	
U.K. borrowers																
pre-crisis	1,162	288	24.8%	0.000 #	3,061	1,199	39.2%	0.974	1,661	547	32.9%	0.000 #	6,295	1,124	17.9%	0.000 #
crisis	1,358	202	14.9%		1,461	571	39.1%		514	276	53.7%		9,013	1,995	22.1%	
Financial institutions																
pre-crisis	1,162	882	75.9%	0.000 #	3,061	3,061	100.0%	-	1,661	1,661	100.0%	-	6,295	4,212	66.9%	0.000 #
crisis	1,358	1,283	94.5%		1,461	1,461	100.0%		514	514	100.0%		9,013	4,214	46.8%	

This table reports statistics for AS and CB tranches 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.

Appendix D: Top 10 switchers

Panel A: Top 10 switchers in the 2000-2016 period - financial firms

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 CDO deals	CDO deal amount [€ Million]	Number of CB deals	CB deal amount [€ Million]
Banco Santander, S.A.	181	76	80,533.30	84	222,871.70	10	11,947.60	334	211,081.70
Lloyds Banking Group plc	106	19	25,051.70	54	285,119.20	4	4,343.20	258	196,420.20
UniCredit, SpA	102	25	31,001.80	30	53,020.20	10	12,846.90	367	130,263.60
Royal Bank of Scotland plc	100	21	15,415.70	50	145,093.80	14	11,996.20	203	161,065.50
Deutsche Bank AG	99	7	5,274.20	43	54,22[illegible].9	23	16,463.00	405	192,242.90
Rabobank Nederland	95	2	2,007.10	46	56[illegible]3.7 0	4	944.20	816	250,008.70
Barclays plc	76	25	20,654.30	30	[illegible]30.10	14	36,433.30	142	128,352.50
BNP Paribas, S.A.	74	13	11,231.50	19	25,815.10	19	4,643.60	318	136,187.00
BBVA, S.A.	55	20	27,1[illegible]80	22	45,756.00	2	347.00	154	98,981.50
Banco de Sabadell, S.A.	44	17	13,124.10	28	35,034.00	6	2,700.00	68	44,666.00

Panel B: Top 10 switchers in the 2000-2016 period - nonfinancial firms

Issuer/issuer parent	Industry	Number of switches | AS *versus* CB	Number of ABS deals	ABS deal amount [€ Million]	Number of CB deals	CB deal amount [€ Million]
Groupe PSA, S.A.	Machinery and Equipment	16	8	8,168.70	16	9,840.00
Renault, S.A.	Machinery and Equipment	12	6	6,335.50	19	6,282.50
Bayerische Motoren Werke AG	Machinery and Equipment	10	5	3,251.90	105	62,605.60
Électricité de France, S.A.	Utilities	10	5	2,137.50	63	72,262.40
Volkswagen AG	Machinery and Equipment	10	5	4,473.00	40	30,665.30
Energias de Portugal, S.A.	Utilities	7	4	2,303.60	13	8,356.80
Vonovia SE	Real Estate	5	5	9,272.00	10	9,806.30
Anglian Water Group plc	Utilities	4	5	4,585.00	12	3,473.90
Daimler AG	Machinery and Equipment	4	2	2,876.30	206	243,475.20

J. Sainsbury plc	Retail Trade	3	6	3,821.70	5	2,282.20

A COMPARATIVE ANALYSIS OF EX ANTE CREDIT SPREADS: STRUCTURED FINANCE VERSUS STRAIGHT DEBT FINANCE

Highlights

- Investors rely on other contractual, macroeconomic, and firms' characteristics beyond credit ratings when pricing structured finance and corporate bonds
- CDO tranches have higher credit spreads than similarly rated corporate bonds
- Investors are not compensated for facing higher systematic risk in ABS and MBS
- Asset securitization transactions are mechanisms for reducing the cost of funding