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Vivian M. van Breemen, Claudia Schwarz, Dennis Vink

Risk retention in the European securitization market: skimmed by the skin-in-the-game methods?

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Abstract

We empirically investigated the impact of regulatory risk retention methods on credit ratings and pricing at issuance using a sample of European securitization tranches issued in the period 2011-2021. European regulation is based on the assumption that all risk retention methods homogenously align incentives and interests between originators and investors. We investigated the impact of these methods on the pricing of securitization tranches and found that investors adjust the risk premium at issuance for tranches based on different risk retention methods. We also found that credit ratings (discrepancy) differed depending on the risk retention method used. Finally, we gained a deeper insight into the risk retention methods chosen over time and concluded that originators take deal complexity and capital relief characteristics into consideration when selecting a specific method.

Keywords: risk retention rule, primary issuance spread, credit ratings.

JEL classifications: G12, G21, G24, G28.

Non-technical Summary

In response to the Global Financial Crisis, in which the securitization market played a significant part, regulators implemented several rules and regulations for securitization transactions. One prime example is the risk retention rule implemented in European regulation, which seeks to create a better alignment of interests held by originators and investors by forcing originators to hold (at least) 5% of *skin-in-the-game* in securitization transactions. There is, however, a certain amount of flexibility as this rule allows the originator to select one of several regulatory risk retention methods to hold their portion of *skin-in-the-game* without differentiating between the methods in terms of incentive alignment. This seems surprising, given that these methods differ in terms of risk and return profiles for both the retainer and the investor as well as in terms of the way in which their incentives align.

In this paper, we investigate the impact of the different European regulatory risk retention methods on the credit ratings and pricing of securitization tranches at the time of issuance. We do so by analyzing 2,157 securitization tranches that were issued in the European market between 2011 and 2021. We use several (ordered) logit and ordinary least squares regression models to investigate whether credit ratings and spreads of securitization tranches differ between the various regulatory risk retention methods. In addition, we use logit regressions to determine what factors influence the choice of originators for a specific method.

We find that investors adjust their pricing at issuance for tranches based on different risk retention methods, even after controlling for the credit rating. These findings suggest that unlike regulators, investors do not perceive the different retention methods as having equal risk. In addition, we find that credit rating agencies (CRAs) assign better credit ratings to securitizations using the first loss tranche (FLT) risk retention method. Furthermore, CRAs also experience rating disagreements depending on the tranche's risk retention method. Finally, we provide insight into the risk retention methods chosen over time. We find that originators are more likely to select the on-balance sheet method when a securitization is compliant with simple, transparent, and standardized criteria, while they are more likely to select the FLT method when a deal is less complex. Our results are of particular importance to regulators and supervisors and strongly point to the need for

a re-evaluation of the different risk retention methods and an answer to the question whether they should indeed be treated equally.

1. Introduction

In a securitization transaction, unlike in traditional lending where the lender owns and services the loans they originate, the ownership and risk of the loans are (partially) transferred to investors. Using this method, a potential conflict of interest may arise when the loan originators do not have enough *skin-in-the-game*, meaning that the vast majority (or all) of the risks are transferred to investors while the originator is barely exposed to any risk. If the originator has little *skin-in-the-game*, they might have lower incentives to carefully assess and monitor the risks of the loans that they originate with the sole purpose of securitizing them. In fact, critics argue that the cause, and intensity of, the Global Financial Crisis (GFC) that began in 2007 is a direct result of a decline in originators' screening standards and lack of sufficient portfolio management that was fostered by the originate-to-distribute model of securitizations. Indeed, an extensive body of literature shows the relationship between default rates and whether or not a mortgage was securitized (cf. Demiroglu & James, 2015; Demyanyk & Van Hemert, 2009; Keys et al., 2010).

In response to the significant impact on the GFC created by developments in the securitization market, regulators implemented several rules and regulations for securitization transactions.[1] Regarding the screening and monitoring of incentives on the part of originators, securitization regulations in the European Union[2] (hereafter referred to as the Securitization Regulations) seek to raise the level of *skin-in-the-game* on the part of the originators of securities via the risk retention rule. This rule, which entered into force as of 2011 for new securitizations, is set out in Article 405 of the Capital Requirements Regulation (CRR)[3] for securitizations issued before 2019. Securitizations issued after this period should comply with the Securitization Regulations. The rules state that the originator, sponsor, or original lender (originator) should, at all times, retain a material net economic interest of no less than 5% in the securitization transaction. The

[1] Cf. Regulation (EU) No 462/2013 of the European Parliament and of the Council of 21 May 2013 amending Regulation (EC) No 1060/2009 on CRAs.

[2] Regulation (EU) No 2017/2402 of the European Parliament and of the Council of 12 December 2017 laying down a general framework for securitization and creating a specific framework for simple, transparent, and standardized securitization, and amending Directives 2009/65/EC, 2009/138/EC and 2011/61/EU and Regulations (EC) No 1060/2009 and (EU) No 648/2012.

[3] Article 405 of Regulation (EU) No 575/2013 Retained interest of the issuer.

purpose is to create a better alignment of the interests held by the originator and the investor by incentivizing originators to 'do their jobs better', for example by improving their screening and monitoring standards.

The rule allows the originator to select one of the different regulatory risk retention methods to hold their portion of *skin-in-the-game*. This means that the intention behind all methods is to align the incentive on both the originator and the investor in an equal manner. The four regulatory risk retention methods analyzed in this paper work as follows. First, there is what is known as the first loss tranche (FLT) method, where a portion of the equity tranche, corresponding to at least 5% of the total nominal value of the securitized exposures, is retained. Second, there is the first loss exposure (FLE) method, where at least 5% of the credit risk at the level of every securitized exposure is retained. Third, we distinguish the vertical slice (VES) method, where the originator retains a portion of each tranche of a minimum 5%. Finally, we have the on-balance sheet (OBS) method, where the originator keeps a randomly selected portion of the exposures of at least 5% of the nominal value from the envisaged asset pool in their books.

The starting point of our study was the fact that the European risk retention rules do not distinguish between the degree to which a particular risk retention method aligns the incentive between the originator and the investor. Hence, all methods are treated by regulation as optimizing the incentive in an equal manner, and the originator is free to use whatever option suits best. This seems surprising, given that these methods differ in terms of risk and return profiles for both the retainer and the investor as well as in terms of the way in which their incentives align, as is also highlighted in previous literature (cf. Bektić & Hachenberg, 2021; Kiff & Kisser, 2014; Malekan & Dionne, 2014). This led us to formulate three research questions. First, as it is not the investor but the originator who has the freedom to select one of the risk retention methods, we investigated whether or not investors perceive these methods to be equally risky. We did so by analyzing if investors differentiate in their pricing (measured by issuance spread) between the different risk retention methods. Second, we explored whether investors were informed, via the credit rating, about the differences in risk profiles of securitizations with the different retention methods. We scrutinized the credit rating methodologies, and we also analyzed the credit ratings (and their discrepancy) of securitization tranches based on different risk retention methods. Finally, as it is up to the originator to choose a particular method, we attempted to assess the motives of originators for selecting a specific risk

retention method. We did so by analyzing whether capital relief motives or deal characteristics influence the likelihood of originators choosing a specific method.

With the help of a unique dataset of European securitization transactions that were issued and sold between 2011 and 2021, we present the following results. *First*, we show that investors differentiate between the different risk retention methods when pricing securitization tranches at the time of issuance, even when controlling for the inherent risks as proxied by the rating. Taking the FLT method as the base case, we demonstrate that investors reduce the spread at issuance when the tranche retainer has applied the VES or OBS methods. *Second*, credit rating methodologies do not seem to explicitly model the risk retention method when doing their credit risk assessment of securitizations. However, we find that CRAs assign worse ratings, on average, for tranches that have the VES method, compared to the base method FLT. This suggests that securitizations with the VES method have, on average, a higher degree of credit risk. We also find that CRAs experience more rating disagreements when rating securitizations with the FLT method. *Finally*, we show that originators are more likely to select the OBS method, compared to FLT, when a securitization is compliant with simple, transparent, and standardized (STS) criteria. For VES, however, we do not find such relation. We also conclude that other deal characteristics seem to influence the choice of originators to select a method. For example, we find that originators prefer the FLT method when a deal is less complex.

The contribution of our study is manifold. First, to the best of our knowledge, we are the first to assess the impact of four different risk retention methods on the pricing of European securitization tranches. We thus contribute to studies that examine the effectiveness of the risk retention rule (cf. Agarwal et al., 2021; Chouliara & Martino, 2021) and the very few studies that touch upon the form of risk retention (cf. Bektić & Hachenberg, 2021; Malekan & Dionne, 2014) and the pricing of securitizations (e.g., Fabozzi et al., 2022). These studies show that differences in risk perception exist between the FLT and VES methods. The salient feature of our study is that, unlike previous studies, we compare not only the FLT and VES methods, but also the OBS and FLE methods. We also provide new insights into the considerations of originators when choosing a particular method. Overall, we provide insights for regulators and supervisors on the effectiveness of the current regulatory framework for securitization transactions.

The remainder of our paper is structured as follows. Section 2 reviews the related literature and regulation. Section 3 describes the data used. Section 4 sets forth the

empirical strategy and the results of our first research question. Section 5 deals with our second research question, and Section 6 considers our third research question. Finally, Section 7 presents our concluding remarks, recommendations and suggestions for further research.

2. Risk retention in securitizations

2.1 Regulatory risk retention methods

At the initiative of G20 leaders during the Pittsburgh Summit held in September 2009, it was determined that the securitization sponsors or originators should retain part of the credit risk of the underlying asset, with the purpose of ensuring a strong alignment of interests between the issuers and the investors of the securitization (EBA, 2014b). The International Organization of Securities (IOSCO) drew a similar conclusion in their September 2009 report on 'Unregulated Financial Markets and Products' (IOSCO, 2009). This organization also stressed that it is vital to phrase such retention requirements in the greatest possible detail in order to make sure that the interests of all parties are properly aligned. The goal of such risk retention rules is to incentivize originators, issuers, and investors to apply accurate quality screenings, improve underwriting standards, and appropriately monitor the underlying credit risks (EBA, 2014b).

As a result, the risk retention rule was introduced for new securitizations in 2011. Article 405 of the Capital Requirements Regulation (CRR)[4] sets forth the risk retention rules for securitizations issued before 1 January 2019, and all securitizations issued after that date should follow the Securitization Regulations.[5] The requirements relating to the risk retention pursuant to Article 6(7) of Regulation (EU) 2017/2402 are specified in the EBA final draft regulatory technical standards.[6] According to this rule, a material net economic interest of no less than 5% should be retained at all times by the tranche

[4] Article 405 of Regulation (EU) No 575/2013 Retained interest of the issuer.

[5] Regulation (EU) No 2017/2402 of the European Parliament and of the Council of 12 December 2017 laying down a general framework for securitization and creating a specific framework for simple, transparent, and standardized securitization, and amending Directives 2009/65/EC, 2009/138/EC and 2011/61/EU and Regulations (EC) No 1060/2009 and (EU) No 648/2012.

[6] EBA final draft regulatory technical standards - Specifying the requirements for originators, sponsors, original lenders and servicers relating to risk retention pursuant to Article 6(7) of Regulation (EU) 2017/2402 as amended by Regulation (EU) 2021/557.

retainer. The retainer should officially document this and share the information with the investor. The regulation also prohibits the originator or the sponsor from directly or indirectly hedging or otherwise transferring the risks of the securitization. Also, it sets out additional disclosure requirements with which the sponsors and originators need to comply, such as due diligence requirements. In applying the risk retention rule, the retainers should follow *one* of the five risk retention methods as set forth by regulation. Hence, it is not allowed to use a combination of risk retention methods, and one is also not allowed to change the method during the term of the transaction. *The CRR and Securitization Regulations allow the following five methods to be used as risk retention methods:*

1. ***Vertical Slice (VES)****: a retention of no less than 5% of the nominal value of each of the tranches sold or transferred to investors.*
2. ***On-balance Sheet (OBS)****: a retention of randomly selected exposures equivalent to not less than 5% of the nominal value of the securitized exposures.*
3. ***First Loss Tranche (FLT)****: the retention of the equity tranche and, if necessary, other tranches that have the same or a more severe risk profile than those transferred or sold to investors and that are not maturing any earlier, so that the retention equals in total no less than 5 % of the nominal value of the securitized exposures.*
4. ***First Loss Exposure (FLE)****: the retention of the FLE of not less than 5% of every securitized exposure. It needs to be applied so that the credit risk retained is always subordinated to the credit risk that has been securitized in relation to those same exposures. The retention may also be fulfilled by the sale of the tranches at a discounted value of the underlying exposures of not less than 5%.*
5. ***Pari Passu Share / Revolving Exposure****: a retention of the originator's interest of not less than 5% of the nominal value of each of the securitized exposures.*[7]

With the OBS method, the retainer keeps a portion of the underlying pool of residential mortgages backing the securitization transaction, which is randomly

[7] We do not focus on this method in our study because revolving securitization is mostly applicable to revolving master trust structures, and the number of transactions is too low for statistical analysis.

selected.[8] With the VES and FLT methods, the retainer holds part of the risk using the securitization structure. The securitization structure is created by different layers of tranches that each have their own risk profile. With the FLT method, the (first) tranche with the highest risk profile (non-investment grade) is retained, while with the VES method a small portion of all tranches in the deal is retained. The FLT is often referred to as the horizontal part, as the retainer literally holds a horizontal slice of the transaction. Conversely, with the VES the upright portion is retained, referred to as the vertical part.

The European Banking Authority EBA (2014b) explored the possibility of adding a sixth retention method that allows a combination of the VES method and the FLT method, a so-called 'L-shape' form of retention. However, the Authority concluded that, apart from the five forms of risk retention already available, no other form should be considered. The current methods are deemed sufficient, and by providing more options it might well be that the chosen form is not as effective in aligning interests and reducing risks. EBA also concluded that the 'L-shape' retention option that was explored would add to the complexity of measuring the net economic interest. In the United States, on the other hand, an L-shape form of retention is allowed by regulation.

2.2 **Related literature**

Since the introduction of the risk retention rule, a rather limited but nevertheless growing body of literature has been developed. Interestingly, the results of empirical evidence reported in the literature are rather mixed. On the one hand, there is evidence (e.g., Vanasco, 2017) that the FLT method is best for aligning the interests between the tranche retainer and investor. For example, Kiff and Kisser (2014) and Malekan and Dionne (2014) argue that the VES method, compared to the FLT, is not optimal for aligning the incentive between the originator and investors. These studies favor the FLT method and argue that this method stimulates better screening and monitoring efforts by the retainer. Likewise, Hibbeln and Osterkamp (2020) find that investors demand a

[8] The selection procedure needs to ensure that the exposures retained are random, for example by including appropriate quantitative and qualitative factors such as vintage, product, geography, origination date, maturity date, property type, industry sector, and outstanding loan balance.

significantly lower portion of risk premium when the FLT method is used, compared to the VES method.

On the other hand, Bektić and Hachenberg (2021), for example, hypothesize that with the FLT (horizontal) method, the interests of the originator and the investor are not necessarily aligned. With the FLT method, the tranche retainer bears (part of the) risk of the first loss tranche. The researchers argue, however, that besides the subordinated performance fee, the tranche retainer also benefits from an excess cash flow in the securitization. This might create an incentive for the tranche retainer to buy riskier collateral in order to optimize their own profits. However, Bektić and Hachenberg report no significant results between the retention methods (horizontal vs. vertical) and collateralized loan obligations (CLO) spreads. In line with Bektić and Hachenberg, Tavakoli (2008) also sees a clear conflict of interest when the originator retains the equity cash flows. She explains that there is a risk of moral hazard: the manager gains from high spread income of the portfolio when losses exceed the manager's initial equity investment. Besides this, the equity owner has the power to refinance and call the transaction when spreads are tightening. Kaptan (2011), on the other hand, argues that an optimal alignment between retainer and investor can only be achieved when an incentive-maximizing retention structure is introduced. He suggests that higher default rates should correspond with higher risk retention, as this will incentivize tranche retainers to demonstrate better screening and monitoring efforts.

To summarize, the regulatory risk retention rule does not distinguish between the degree to which each risk retention method aligns the incentives on the part of the originator and the investor. However, empirical evidence reported in the literature shows that differences do in fact exist between the risk profiles of the various risk retention methods. Nevertheless, findings are rather mixed. Some scholars find that the FLT method is best for aligning the interests of the retainer and the investor, while others argue that the VES method is more suitable for aligning interests. This mixed empirical evidence, combined with the very limited number of studies on the OBS and FLE methods, creates a unique setting for us to empirically scrutinize the effectiveness of the risk retention rule.

2.3 Risk retention and incentives alignment

The purpose of the risk retention rule is defined as follows:

"*The purpose of the requirement to retain a material net economic interest is to align the interests between two sets of parties in a securitisation: the sell-side parties that transfer the credit risk of the securitised exposures, and the investors that assume or purchase the credit risk.*" – EBA (2022)

There are two different sets of actions carried out by the originator of a securitization where incentives play a role in influencing the risk for investors. Firstly, before issuing a deal the originator decides which loans are to be securitized and how the deal will be structured. Secondly, there are the actions and behavior of originators when they monitor and manage the loans after the deal is issued.

We shall start by looking at the possible incentives before issuing a deal. As the retainer takes the first losses when the FLT method is followed, the incentives to securitize junk may be limited, and thus the FLT could also be seen as a signal for the market expressing confidence in the quality of the pool of the retainer. Following this line of reasoning, it might well be that originators are more likely to use the FLT method when the overall credit risk of the securitization is relatively low and when the securitization is less complex (i.e. less risky). Hence, we expect to find lower overall credit risk and lower deal complexity for deals with the FLT (and FLE) method than for deals with the VES and OBS methods.

Next, we shall explore the incentive after issuing the deal, namely the incentive to monitor and manage the loan book on the basis of theoretical considerations and simulated return per loss rates of both the retained part and the part sold to investors (see Appendix I for an example). Per construction, the risk profile for the retainer and the investor is mathematically identical for the VES method, as the retainer holds a portion of each tranche in the securitization (see Figure I(a), Appendix I). If we assume that the pool is sufficiently diversified and the retention part was truly randomly selected with the OBS method, one might argue that this method would lead to similar loss rates and thus similar returns for the two market participants. Our example confirms these

considerations (see Figure I(b), Appendix I).[9] With the FLE method, the tranche retainer sells the tranche at a discount. Due to the waterfall payment structure of securitizations, this means that the return function for the retainer exhibits kinks. The very first losses up to 5% of the equity tranche are borne solely by the retainer, and the subsequent losses are incurred by the investor up to the point where the equity tranche is 'eaten up'. If losses exceed the size of the equity tranche, the subsequent losses are borne again solely by the retainer up to 5% of the next tranche, and so on. Thus, the return profiles for the retainer and the investor differ substantially (see Figure I(c), Appendix I for an example). With the FLT method, the retainer holds 5% of the securitization all in the equity tranche. If the equity tranche is larger than 5% of the total securitization, the first losses are shared between the retainer and the investor, given that they rank *pari passu*. However, as the retainer only holds part of the equity tranche, their returns are 'eaten up' rather quickly when losses occur. If losses exceed the equity tranche, the retainer has lost 100% of the value of their retention amount, while losses for the investor are still rather limited (see Figure I(d), Appendix I). This suggests that the retainer takes the bulk of the first losses, but has no incentive to monitor and manage the loan pool (e.g., manage arrears, forbearances, foreclosures, seizure of assets) in an optimal manner once the retainer assumes that total losses will exceed the size of the equity tranche anyway.

In sum, considering the expected returns, incentives alignment between retainer and investor is perfect for VES. Incentives are closely aligned for OBS, but alignment is rather divergent for FLE and highly divergent for FLT. These conclusions as well as previous reports in the literature have led us to empirically scrutinize whether the different risk retention methods do indeed align the interests between the two sets of parties in a securitization in an equal manner. We argue that the different risk retention methods allowed by regulation do not contribute to identical risk profiles and incentives and that, as a result, they are likely to impact the pricing of securitization tranches at issuance. Hence, due to the substantial difference in return profiles for the retainer and the investor, we expect to find a significantly higher risk premium demanded by investors for tranches where the FLT and FLE methods are used compared to tranches where the VES and OBS methods are applied after controlling for credit risk via the rating.

[9] Minor differences may arise due to the difference between the coupons paid on the tranches versus the interest income received.

3. Sample construction

The primary data source for this study is *Bloomberg*. From *Bloomberg*, we obtained the full collection of 5,234 securitization tranches that were issued and sold in the European Union between 2011 and 2021. The cut-off date is 2011, as this is the year in which the rule came into force. In order to avoid problems with a possible misclassification of deals, we eliminated tranches with missing credit rating information (1,142 tranches), incomplete deals (8 tranches), and those without information on the risk retention method (1,927 tranches). The remaining 2,157 tranches (41%), with a total value of €957 billion, formed our *full tranche-level sample*. An overview of all the variables and their definitions are provided in Table 1; the summary statistics of our variables are listed in Table 2.

A securitization is an investment product that is backed by a pool of assets. Naturally, the securitization relies on the performance of these assets. The underlying collateral of the asset pool can vary in terms of type, for example corporate loans, mortgage loans, or student loans. In our study, we included the full spectrum of securitization types, ranging from asset-backed securities (ABS), residential mortgage-backed securities (RMBS), and commercial mortgage-backed securities (CMBS) to collateralized loan obligations (CLO). The majority of tranches in our sample are ABS (45.48%), followed by RMBS (39.45%), CMBS (7.56%), and CLO (7.51%), see Panel C in Table 2. In our sample, 48.45% of the tranches used the FLT method and 34.08% the VES method. The OBS method was used in 14.97% of the cases, and only on a few occasions (2.50%) the FLE method was used. A somewhat similar distribution is obtained when the number of deals is considered (see Figure 1 and Panel B in Table 2). We were also interested in the level of experience on the part of the originator when it comes to securitizing assets. We assumed that originators who have issued more securitizations than others (in terms of the number of tranches) would be more experienced, powerful, and knowledgeable than those with less experience in securitizing. A small majority of tranches in our sample (54.29%) was originated by an originator who is ranked amongst the top 10% largest (in terms of the number of tranches issued). The remaining tranches (45.71%) were originated by the non-top 10% originators, see Figure 2 and Panel D in Table 2.

The tranches in our sample received at least one credit rating from Moody's, S&P, Fitch, DBRS, or KBRA. In our sample, we find a similar portion of tranches rated by DBRS (32.80%), Moody's (28.01%), S&P (20.27%), and Fitch (17.62%). A negligible number of

tranches (1.30%) were rated by KBRA, see Panel E in Table 2. The majority of tranches (77.61%) in our sample received two credit ratings at issuance, see Panel G in Table 2. Only 13.54% received one credit rating. Three credit ratings were assigned to just 8.39% of tranches, and a small number of tranches (0.46%) received four credit ratings at issuance. Of the tranches that received more than one credit rating, the majority received identical credit ratings (47.29%), see Panel F in Table 2. For the remaining tranches we observed rating discrepancies: 25.20% of the tranches in our sample received a rating at issuance with a difference of one notch, 14.62% with two notches, 6.77% with three notches, and 6.14% with more than three notches. Finally, we were interested in the primary issuance spread, as this represents the risk premium demanded by investors for securitization tranches. The mean spread at issuance was found to be highest for the VES method (170.63 bp), followed by the FLT method (152.1 bps) and the OBS method (134.4). For the FLE method we observed a relative low mean spread at issuance (104.1 bps), see Panel H in Table 2.

<INSERT TABLE 1 ABOUT HERE>

<INSERT TABLE 2 ABOUT HERE>

<INSERT FIGURE 1 ABOUT HERE>

<INSERT FIGURE 2 ABOUT HERE>

4. Risk retention methods and spread at issuance

In this section, we shall try to answer our first research question by investigating whether investors consider the risk retention methods in pricing the tranche beyond the credit rating. We used ordinary least square regressions with the issuance *Spread* (in basis points above the benchmark) as the dependent variable. The spread equals the quoted margin between the benchmark rate agreed upon at the date of pricing and the coupon of the initial spread, measured in basis points (bps). We used *Risk Retention Methods* as the key independent variable, a categorical variable indicating the regulatory risk retention method of the securitization. We report values for *VES, OBS,* and *FLE* only, as the *FLT* is the omitted variable.[10] For this analysis, we created a specific sample so as

[10] We use the first loss tranche method as the baseline, as this method is used the most in our sample.

to be able to precisely measure pricing at issuance. First, we excluded all fixed-rate securities in our sample (325 tranches): for fixed-rate tranches it is necessary to determine the appropriate benchmark yield curve for each tranche in the sample, if we want to have an issuance spread measure that is comparable with those of the floating-rate tranches. To avoid this problem, we restricted our sample to floating-rate tranches only. Second, we excluded all securities that were issued at a price different from par (228 tranches). Securities can be sold above or below par at issuance, and therefore the par spreads are not naturally equal to the primary issuance spread (Hu & Cantor, 2006). To make sure that the quoted margin between the benchmark rate agreed upon at the date of pricing and the coupon of the initial yield represents the spread, we only included tranches that were issued exactly at par. The remaining 354 tranches constituted our *pricing subsample* used to address our first research question.

We used several variables to control for security-specific factors. We controlled for *Subordination Level*, representing the percent of protection from losses for each tranche in the capital structure. As this measure is not readily available in *Bloomberg,* we manually calculated the ratio of all tranches subordinated to the tranche in question divided by the total face value of the deal. This measure indicates the level of cushioning in the capital structure of a securitization deal against credit losses that a specific tranche could suffer (cf. Vink et al., 2021). *No. of Tranches* represents the total number of tranches in the securitization of which the security is part. *Log Tranche Value* and *Log Transaction Value* are the natural logarithms of the tranche and transaction value at issuance, measured in euros. These characteristics are important for capturing the underlying risks of the securitization: larger deals, with more underlying tranches and a higher number of underlying loans, make it more challenging and difficult to capture potential risks and returns (cf. Furfine, 2014). We also controlled for *Rating Discrepancy*, which stands for the numerical difference between credit ratings of different CRAs and which exist only when the tranche is rated unequally by different CRAs. We measured rating discrepancy as the numerical difference in notches that results from subtracting a numerical equivalent of the highest credit ratings assigned at issue from the numerical equivalent of the lowest credit ratings assigned at issue. For example, the indicator is one if Moody's assigns a rating that is one notch higher (e.g., AAA) than the rating assigned by S&P (e.g., AA) for the same tranche. This indicator shows possible misalignments between credit risk assessments given by different CRAs for the same tranche. Hence, a higher

discrepancy might indicate higher uncertainty and thus higher risks for investors. We also assessed whether specific attributes of the originator influence the choice for a particular risk retention method. One attribute is the originator's experience in securitizing, which is proxied by *Frequent Originator.* This is a manually calculated dummy variable indicating one if the tranche's originator ranks amongst the top 10% largest originators, measured by the number of tranches contributed to the total number of securities issued in the EU (2011-2021); otherwise, the variable is zero. In addition, we also controlled for the type of market-wide *Benchmark Rate* used, the Euro Interbank Offered Rate (EURIBOR) at the date of issuance for the tranches in our sample (e.g., EURIBOR 3-months). Next, we controlled for *Security Type*, the different types of underlying assets in the securitization, ranging from ABS, RMBS, and CMBS to CLO. We also controlled for the risk embedded in the securitization structure via *Credit Rating*, which represents the average credit rating for the tranche as provided by Moody's, S&P, Fitch, DBRS, and KBRA. We converted the ratings into a numerical value by setting 1 for Aaa, 2 for Aa2, 3 for Aa2, and so on.[11] The specification of our first model is defined as follows:

$$\begin{aligned} Spread_{j(t)} = {} & \beta_0 + \beta_1 Risk\ Retention\ Methods_{i(t)} + \beta_2 Subordination\ Level_{j(t)} \\ & + \beta_3 No.of\ Tranches_{i(t)} + \beta_4 Log\ Tranche\ Value_{j(t)} \\ & + \beta_5\ Log\ Transaction\ Value_{i(t)} + \beta_6 Rating\ Discrepancy_{j(t)} \\ & + \beta_7\ Frequent\ Originator_{i(t)} + \beta_8\ Benchmark\ Rate_{i(t)} \\ & + Credit\ Rating, Year, and\ Security\ Type\ Controls_{ij(t)} + \varepsilon_{ij(t)} \end{aligned} \quad [1]$$

where $\varepsilon_{ij(t)}$ is the idiosyncratic error term. The data vary by year (t), deal (i), and security (j). Because the error terms have systematic heterogeneity in our estimation, we used a heteroskedasticity-consistent covariance matrix as suggested by White (1980).[12]

The results of our first regression model, Equation (1), are provided in Tables 3 and 4. Column (5) in Table 3 shows that for tranches priced on the basis of the *VES* method,

[11] We use Moody's credit rating scale as an example, but we converted the different credit rating scales of all CRAs in our sample (Moody's, S&P, Fitch, DBRS, and KBRA).

[12] Due to data limitations, we were unable to control either for the inherent risk of the securitization pool or for the risk retention level.

investors tend to reduce their issuance spread, compared to the *FLT* method, with a coefficient of -27.45 (*t*-stat= -2.40), which is significant at the 5% level. Hence, tranches priced on the basis of the VES method on average receive a spread at issuance that is remarkably lower, with 27.45 basis points, than those priced based on the FLT method. Similarly, for the *OBS* risk retention method, compared to the *FLT* method, investors reduce the spread at issuance, with a coefficient of -36.08 (*t*-stat= -4.61), see Column (5). This means that investors also demand a significantly lower issuance spread, with an average 36.08 basis points, for tranches priced with the OBS method, relative to the FLT method. We find consistent results that are significant at the 1% level for both variables when we remove our controls in Columns (1) to (4). For FLE we do not find consistent (highly) significant results throughout Columns (1) to (5). Hence, it appears that investors look beyond the credit rating and adjust their issuance spread when the originator applies the VES and OBS methods to retain *skin-in-the-game*. We find no highly significant impact on pricing for the FLE method. So, it appears that while controlling for the credit rating, investors find the VES and OBS methods less risky and potentially better methods for aligning the interests between the originator and investor.[13]

As a next step, the analysis represented in Table 3 was repeated and depicted in Table 4, but now the sample was split between tranches originated by frequent originators, see Columns (1) and (2), and tranches originated by infrequent originators, see Columns (3) and (4). We found a number of remarkable results. Here, investors seem to adjust their pricing for the different risk retention methods only for frequent originators. In Column (2) we show that investors lower their spread, with a coefficient of -45.91 (*t*-stat= -3.00), when the tranche retainer applied the VES method. This indicates that tranches priced on the basis of the VES method that are issued by a frequent originator receive, on average, a 45.91 basis points lower issuance spread than tranches priced with the FLT method that are issued by frequent originators. We find consistent results for the OBS method, where investors reduce their issuance spread, with a coefficient of -34.23 (*t*-stat= -3.28), compared to the FLT method. Consistent with results listed in Table 3, we find no significant results for the FLE method. Interestingly, when we consider the tranches that

[13] In Column (3) in Table I, Appendix II, we repeat the analysis of Table 3 by including the following additional control variables for robustness purposes: *STS Compliant*, *Single Originator*, *GDP Growth Rate,* and *Country of Risk*. We show that results in Table 3 remain robust when several additional controls are included in our model.

were originated by infrequent originators, see columns (3) and (4), we find no significant results at all for our risk retention method variables. This suggests that investors do not adjust their spread at issuance for any of the different risk retention methods when the tranche originator does not securitize on a frequent basis (measured by the number of tranches issued). It might well be that less experienced originators still need to build up a reputation in the securitization market and therefore demonstrate stricter scrutiny when they screen and monitor assets.

In sum, we find that investors do not value the different risk retention methods as equally risky. Taking the ratings into account, we find that spreads seem to be highest for FLT, given that the coefficients for VES and OBS (and in part for FLE) are significantly negative. This result is in line with our expectations. The loss and return profile of the OBS and VES methods seem to (mathematically) align the interests between the retainer and investor the best over time, while the least alignment seems to be achieved for the FLT method (see Section 2.3 and Appendix I).

Overall, we can conclude that investors do not perceive the different risk retention methods as having an equal risk profile and that they therefore adjust their price of securitization tranches at issuance accordingly. This is highly remarkable for the following reason. The risk retention rule was introduced to create a better alignment of interests between investors and originators. As regulation does not differentiate between the methods, all methods prescribed by regulation should fulfill this purpose to the same degree. However, we show that investors do not value all methods as equally risky, indicating that one method might be better than the other in aligning incentives between investors and originators. This suggests that the risk retention rule is not optimally constructed.

<INSERT TABLE 3 ABOUT HERE>

<INSERT TABLE 4 ABOUT HERE>

5. Credit Ratings and Risk Retention Methods

On the basis of our findings, we concluded that investors do not value the different risk retention methods as having equal risk. The question remains, however, if and if so, how investors were informed by CRAs about these risks via the credit rating assigned to

a security. To address our second research question, we first assessed whether CRAs consider the type of risk retention method at all when they assess the credit risk of a security. To explore whether CRAs consider the different regulatory risk retention methods in their credit rating models, we reviewed their credit rating methodologies and met with a number of major credit rating agencies. From our review, it seems that current rating methodologies do not consider the different risk retention methods as an explicit input factor. In fact, it appears that the credit rating represents the riskiness of the *overall* credit risk of the tranche, rather than the risk retention method itself being seen as creating higher risks for investors. This supports the interpretation of our results as presented in Section 4 that investors price the risks stemming from the misaligned incentives that result from the different retention methods, as the credit rating controls for the inherent credit risk of the tranches.

We then analyzed the credit ratings of securitization tranches priced on the basis of different risk retention methods to assess differences in inherent credit risk. If differences in credit ratings could be observed, it can be assumed that originators use a specific retention method for different inherent risks of the securitization. As alluded to in Section 2.3, we expected that the FLT method would be selected to signal confidence in the securitization and thus should have better ratings.[14] Finally, we investigated whether CRAs find it more or less difficult to consistently rate securitizations with a specific method.

5.1 Credit risk of the securitization

We were interested to see if the overall credit risk of a tranche is, on average, similar for securitization tranches priced on the basis of different risk retention methods. We analyzed the impact of the different risk retention methods on the credit ratings at the time of issuance. Using our *full tranche-level sample*, we applied ordered logit regressions with *Credit Rating* as the dependent variable. We calculated the average credit rating received by Moody's, S&P, Fitch, DBRS, and KBRA for the tranche at time of issuance. Our key independent variable was *Risk Retention Methods*, a categorical variable denoting the four different risk retention methods in our sample, namely the *VES*, *OBS*, *FLT*, and *FLE* methods. In addition, we used several variables to control for security-specific factors.

[14] CRA confirmed this assumption based on their discussions with originators.

We controlled for security-design characteristics such as *No. of Tranches*, *Log Tranche Value*, *Log Transaction Value*, and *Subordination*. We also controlled for the size of the originator by including *Frequent Originator* and for the rating differences between CRAs by including *Rating Discrepancy*. Lastly, we controlled for the *Year* in which the security was issued and the *Security Type*. Our second model is defined as follows:

$$
\begin{aligned}
Credit\ Rating_{j(t)} = \\
\beta_0 + \beta_1 Risk\ Retention\ Methods_{i(t)} + \beta_2 Subordination\ Level_{j(t)} \\
+ \beta_3 No.of\ Tranches_{i(t)} + \beta_4 Log\ Tranche\ Value_{j(t)} \\
+ \beta_5\ Log\ Transaction\ Value_{i(t)} \\
+ \beta_6\ Frequent\ Originator_{i(t)} + \beta_7\ Rating\ Discrepancy_{j(t)} \\
+ \ Year\ and\ Security\ Type\ Controls_{ij(t)} + \varepsilon_{ij(t)}
\end{aligned}
\qquad [2]
$$

where $\varepsilon_{ij(t)}$ is the idiosyncratic error term. The data vary by year (t), deal (i), and security (j).

We then analyzed whether the credit ratings provided by CRAs differed for securitization tranches priced with different risk retention methods. The results of our ordered logit regressions are provided in Table 5, where *Credit Rating* is our dependent variable and the *Risk Retention Methods* our key independent variable. Column (1) presents the results of our model using the full tranche-level sample of all CRAs combined, and the results for each CRAs separately are given in Columns (2) to (5). The results for Moody's are reported in Column (2), those for S&P in Column (3), those for DBRS in Column (4), and those for Fitch in Column (5).[15]

The results in Column (1) in Table 5 show that the credit ratings, on average, are worse for tranches priced with the VES method than for tranches based on the FLT method. We find positive odds ratios of 0.69 (z-stat= 6.18) for the VES method, which is statistically significant at the 1% level. This indicates that, as expected, deals based on the VES method on average have more credit risk than deals based on the FLT method. In our robustness analysis (Column (1) in Table I, Appendix II), we repeated the analysis depicted in Table 5, but now included the following additional control variables: *STS*

[15] The number of observations for KBRA was too limited for statistical analyses.

Compliant, *Single Originator*, *GDP Growth Rate,* and *Country of Risk*. We found that the results as listed in Table 5 remained robust.

We observed similar results when we compared the credit ratings of each CRA separately. The results show that Moody's (Column 2), S&P (Column 3), and DBRS (Column 4) all assign a worse rating, on average, for tranches priced with the VES method, compared to the FLT method. This result is consistent with the figures listed in Column (1). We find positive odds ratios of 0.53 (z-stat= 3.40) for Moody's, 1.27 (z-stat= 6.54) for S&P, and 0.38 (z-stat= 2.83) for DBRS, all of which are significant at the 1% significance level. However, we do not find any significant result for Fitch (Column 5). The results also show that Moody's and S&P assign worse ratings, on average, for tranches based on the FLE method compared to tranches based on the FLT method, with odds of` 1.17 and 1.46, significant at the 5 and 1 percent levels, respectively. However, the results for the FLE method should be interpreted with caution as only a relatively small percentage (2.50%) of tranches in our sample used the FLE method. In sum, we find that CRAs assign, on average, worse ratings for securitization deals based on the VES method. This suggests that these securitizations carry a higher overall risk (in terms of credit risk for the investor) than those priced on the basis of the FLT method. This seems to confirm that originators are more likely to use the FLT method when they have greater confidence in the overall deal (i.e. less risk), as they would otherwise run a high risk to suffer via the first losses.

5.2 **Rating discrepancy**

Finally, considering tranches priced on the basis of different risk retention methods, we sought to analyze whether there is a disagreement between the credit rating provided by different CRAs (i.e. rating discrepancy or split ratings). Rating discrepancy arises when two or more CRAs report different credit ratings for the same tranche at issuance (e.g., when a tranche received an AAA rating from Moody's and an AA rating from S&P).[16] We therefore only included those tranches in our regression model that received two or more

[16] Rating discrepancy can also be a result of CRAs assigning better ratings as a strategy to win business from their competitors (cf. Van Breemen et al., 2023).

credit ratings at issuance.[17] By eliminating all single-rated tranches (292 tranches), we obtained our *multiple-rated subsample* that consists of 1,865 tranches. We used ordered logit regressions with *Rating Discrepancy* as the dependent variable to investigate whether there is a disagreement between the credit ratings provided by different CRAs (i.e. rating discrepancy). Our key independent variable is the categorical variable *Risk Retention Methods*. In line with our previous models, we controlled for several security-design characteristics (*No. of Tranches*, *Log Tranche Value*, *Log Transaction Value,* and *Subordination*), *Frequent Originator*, *Credit Rating*, *Year,* and *Security Type.* The specification of our third model is defined as follows:

$$\begin{aligned} Rating\ Discrepancy_{j(t)} \\ &= \beta_0 + \beta_1 Risk\ Retention\ Methods_{i(t)} + \beta_2 Subordination\ Level_{j(t)} \\ &+ \beta_3 No.of\ Tranches_{i(t)} + \beta_4 Log\ Tranche\ Value_{j(t)} \\ &+ \beta_5\ Log\ Transaction\ Value_{i(t)} + \beta_6\ Frequent\ Originator_{i(t)} \\ &+ Credit\ Rating, Year, and\ Security\ Type\ Controls_{ij(t)} + \varepsilon_{ij(t)} \end{aligned} \quad [3]$$

where $\varepsilon_{ij(t)}$ is the idiosyncratic error term. The data vary by year (t), deal (i), and security (j).

The results of our ordered logit regressions are listed in Table 6. Columns (1) to (5) include control variables, where Column (5) presents our full model including all our controls. Column (5) in Table 6 shows that rating discrepancy is lower for tranches priced with the VES and FLE methods, compared to the FLT method. For example, we find negative odds ratios of -0.52 (z-stat= -3.74) for the *VES* method, which is statistically significant at the 1% level. This indicates that CRAs are more likely to report ratings that are the same for the VES method compared with the FLT method. Similarly, we find a negative and highly significant coefficient for *FLE*, with odds of -1.05 (z-stat= -3.43). For the *OBS* method, on the other hand, we find no significant results at all, see Column (5). When we exclude our control variables in Columns (1) to (4), our results remain robust.

[17] If the tranche received more than two credit ratings, we measured rating discrepancy by taking the highest and lowest credit rating. If we only include dual-rated tranches in our sample, we obtain similar results.

These results suggest that CRAs demonstrate less rating discrepancy for tranches based on the *VES* and *FLE* methods, relative to our base method *FLT*. So, apparently, CRAs find it more difficult to evaluate the credit risk of tranches based on the FLT method. In our robustness analysis (Column (2) in Table I, Appendix II), we repeated the analysis depicted in Table 6, but now included the following additional control variables: *STS Compliant*, *Single Originator*, *GDP Growth Rate,* and *Country of Risk*. We found that our results as depicted in Table 6 remained robust when we included several additional controls in our model.

To conclude, we found that credit ratings were worse, on average, for tranches based on the VES method than for tranches priced on the basis of the FLT method. We also found that rating disagreements amongst CRAs is less likely to occur, on average, for the VES and FLE methods than for the FLT method. Hence, tranches based on the FLT method seem to have better ratings (i.e. lower overall credit risk), on average. However, in their credit risk assessments, CRAs seem to misalign more often and report split ratings as a result.[18] As investors in the primary market take note of the assigned credit ratings before making their investment choices, they may consider the on average better rating of FLT transactions (see Table 5) but compensate for the additional risks that come with the FLT method by increasing the spread at issuance (see Table 3, Section 4). The additional risks associated with the FLT method might be the higher likelihood of insufficient portfolio management over time (Section 2.3) as well as the risks that come with the on average higher split ratings for FLT transactions (see Table 6). Indeed, the rating discrepancy is controlled for in our first model and shows a significant positive coefficient for the regressions of the spread at issuance.

<INSERT TABLE 5 ABOUT HERE>

<INSERT TABLE 6 ABOUT HERE>

6. Originators' choices of risk retention methods

As discussed in the previous sections, we discovered that investors deviate in their price at issuance for securitization tranches that are priced on the basis of different risk

[18] Major CRAs could not provide an explanation for the observed discrepancy. We leave it to future research to assess the underlying reasons for this observation.

retention methods (Section 4) and that the credit rating (discrepancy) differs for securitizations based on different methods (Section 5) due to varying levels of underlying credit risk. So, apparently, regulations offer originators a choice to pick a method to their liking, while investors and CRAs observe differences in terms of risk – either caused by the method itself or by differences in the overall credit risk of the security. This led to the question what might influence the choice of originators for a specific method. In this section, we shall address our third research question from two different perspectives. First, we investigate whether preferences for a method changed over time. Second, we investigate empirically whether the choice for a method is influenced by capital relief motives of the originator or by deal characteristics of the securitization.

6.1 Originators' preference over time

The risk retention rule came into force in 2011, but it took some time for originators to find a way to comply with the rule. Consequently, data on risk retention methods available in *Bloomberg* before 2014 are scarce. To describe data trends, we discarded the limited number of observations before 2014. Figure 3a shows the total issuance volumes and the number of deals in our sample. Interestingly, we find a significant increase in the number of newly issued securitizations from 2017 onwards. However, if we look at the issuance volumes, we observe a relatively stable trend. Figure 3b shows the number of deals over time sorted by risk retention method. We see a relatively stable trend for FLT, OBS, and FLE in the period 2014-2021. Interestingly, a significant increase can be observed in the number of tranches priced with the VES method after 2017.[19] Perhaps, with the Securitization Regulations coming into force on 1 January 2018, confidence in the securitization market has grown. Thus, we see a higher number of securitizations issued. In addition, we find more securitizations priced on the basis of the VES retention method, which could be linked to higher market confidence and thus a reduced need on the part of banks to signal confidence to the markets through choosing the FLT method. In the next section, we shall explore what might have caused this trend and what motivates originators to choose a particular method.

[19] Figure 3 lists the data without other filters, but a similar trend is observed if we use our final sample.

<INSERT FIGURE 3 ABOUT HERE>

6.2 Capital relief motives and deal characteristics

The reason for originators (mostly banks) to issue securitizations could be manifold. Similarly, the optimal structure of a securitization for the originator, including the risk retention method, may depend on various factors such as the capital position, funding profile, and taxes as well as business model considerations. Due to the lack of data on the internal cost of capital and funding calculations, the selection of a risk retention method cannot be statistically linked to a specific securitization motive. Still, some considerations might give an indication of the strategies used by banks to select a specific risk retention method. These considerations are not necessarily directly linked to fulfilling the purpose of the risk retention rule (i.e. aligning incentives between investors and originators), but they rather focus on a specific method's potential benefits for *the originator*, something that consequently influences their choice for a particular method. For example, when banks (i.e. originators) are under a capital constraint or seek to maximize capital relief for other reasons, maximum capital relief is obtained by derecognizing the underlying assets. Thus, a significant risk transfer needs to be undertaken, and the equity and mezzanine tranches need to be (partly) sold to comply with regulatory thresholds (see EBA, 2014a). The VES and OBS methods are the most appropriate risk retention methods to provide capital relief. In the VES (OBS) method, the originator retains a part of each tranche (a selection of loans) and has to hold capital based on the risk-weighted assets calculations for these parts (loans) only. For the FLT and FLE methods, on the other hand, the bank needs to deduct the entire retained part from its capital. In line with this, reports in the literature also state that the VES method appears to be most frequently used method if capital relief is aimed for (cf. HM Treasury, 2021). This could be another explanation for the rise in the number of securitizations that used the VES method after 2017 (see Figure 3b); securitizations compliant with the STS criteria can benefit from a more preferential treatment in capital requirements for securitization tranches (except for the equity tranche). As such, if banks were to seek capital relief, the VES (and OBS) method is even more attractive when combined with STS compliance. However, the capital relief from being STS compliant for the originator is rather small compared to the capital relief from retaining VES vs keeping the equity piece.

To explore the impact of the Securitization Regulations and/or STS compliance on the originator's choice empirically, we applied several logit regressions. We used deal-level data for this analysis as a risk retention method is assigned to the entire securitization deal, meaning that all tranches in the deal were subjected to the same method. We used three different dependent variables: *'VES vs. FLT'*, *'OBS vs. FLT'*, and *'FLE vs. FLT'*. These are dummy variables indicating 0 if the deal is based on the FLT method and 1 if the other method was used (e.g., for *VES vs. FLT*, 1 indicates deals with the VES method and 0 deals with the FLT method). To determine whether deals that are STS compliant are more likely to be based on the VES or the OBS method, we constructed a dummy variable '*STS Compliant'* that equals 1 if the deal was compliant with STS criteria at the time of issuance, and 0 otherwise. In addition, we were interested to see if other deal characteristics influenced the originator's choice for a specific method. For example, to examine deal complexity[20], we included the '*No. of Tranches*' and *'Log Transaction Size'*. Also, to consider the overall credit risk of a deal, we included dummies for the highest *'Credit Rating'* of the deal, where AAA is the omitted variable. We also included dummies to control for *'Security Type'*, with RMBS being the omitted variable. In addition, we controlled for '*Single Originator*', a dummy indicating 1 if the deal was originated by a single originator, and 0 if the deal was originated by multiple originators. We also controlled for *'Frequent Originator'* and used '*GDP Growth Rate'* to control for the annual percentage growth rate of GDP in the country where the securitized assets are located. To check whether the introduction of the Securitization Regulations played a role, we controlled for the *'Year'* in which the security was issued Finally, we controlled for the country in which the securitization's assets are located (*'Country of Risk'*).

The specification of our fourth model is defined as follows:

$$
\begin{aligned}
&FLT\ vs.\ Other\ (VES, OBS, FLE)_{i(t)} \\
&\quad = \beta_0 + \beta_1 STS\ Compliant_{i(t)} + \beta_2 No.of\ Tranches_{i(t)} \\
&\quad + \beta_3 Log\ Transaction\ Size_{i(t)} + \beta_4 Frequent\ Originator_{i(t)} \\
&\quad + \beta_5\ Single\ Originator_{i(t)} + \beta_6\ GDP\ Growth\ Rate_{i(t)} + \beta_7\ Credit\ Rating_{i(t)} \\
&\quad + \beta_8\ Security\ Type_{i(t)} + Year\ and\ Country\ Contols + \varepsilon_{i(t)}
\end{aligned}
\qquad [4]
$$

[20] Larger deals with more tranches typically have more diverse underlying collateral and geographic dispersions, making it more complex to determine potential risks and returns.

where $\varepsilon_{i(t)}$ is the idiosyncratic error term. The data vary by year (t) and deal (i).

The results of our logit regressions, Equation (4), are presented in Table 7. Column (1) lists the sample of all deals based on either the VES or the FLT retention method in the period 2011-2021. Column (2) lists the results for all deals based on either the OBS or the FLT retention method between 2011-2021. Column (3) includes those deals priced with OBS or VES that were issued after the introduction of the Securitization Regulations (2018-2021). Finally, Column (4) presents all deals based on either the FLE or the FLT retention method in the period 2011 to 2021.[21]

Firstly, we analyzed the impact of STS compliant deals on the likelihood of an originator's selecting a specific method. We started by looking at deals based on the VES or FLT methods, listed in Column (1) in Table 7. Surprisingly, when we consider our key variable of interest, *STS Compliant*, we find no significant likelihood between deals that are STS compliant and the selection of the VES method. This suggests that, contrary to expectations, there is no relation between more preferential treatment in capital requirements for STS compliant deals and the likelihood of an originator's choosing VES over FLT. However, if we consider deals based on the OBS method, listed in Column (2), we find positive significant results (at the 5% level): a one standard deviation increase in *STS Compliant* increases the odds, with 1.05 (z-stat= 2.43), of seeing a deal based on the OBS method, compared to the FLT method. If we reduce our sample to OBS and FLT deals issued after the introduction of the Securitization Regulations in 2018, we find even higher odds (1.96) of seeing the OBS method when a deal is STS compliant, see Column (3) in Table 7. If we look at the deals priced with the FLE method, we find no significant results for our *STS Compliant* variable.

Next, we investigated whether other deal characteristics influenced the originator's decision to choose one method over the other. We again started by analyzing deals with the VES and the FLT methods as included in Column (1) in Table 7. Column (1) shows that the odds ratio of *No. of Tranches* is positive and significant at the 1% level. We find similar positive significant results for our other complexity measure, *Log Transaction Size*, albeit at the 5% level. This indicates that for more complex deals, originators are

[21] In unreported tests, we obtained similar results for VES and FLT deals (Column 1) and for FLE and FLT deals (Column 4) when only deals were included that were issued after the introduction of the Securitization Regulations in 2018. These results are available upon request.

more likely to choose the VES method over the FLT method. We find that the same is true for the OBS method, see Columns (2) and (3), and for the FLE method, see Column (4). Hence, it would seem that originators prefer the FLT method over all the other methods when deals are less complex. A possible explanation could be that originators use the FLT method to signal confidence with respect to the level of risk associated with the deal. In line with this, we find that the likelihood of the VES method being selected is higher for deals with more overall credit risk, as denoted by the credit rating (cf. Section 5). For the OBS (Columns 2-3) and FLE (Column 4) methods we do not find a clear pattern when the credit ratings are considered.

Finally, we analyzed whether the type of security led originators to prefer one method over the other. We found that they do. Column (1) in Table 7 shows that odds are higher for CMBS deals, compared to RMBS, for selecting the VES method, with odds of 3.35 (z-stat= 4.56). We also find higher odds for ABS deals, compared to RMBS, to be based on the VES method, compared to the FLT method, with odds of 1.02 (z-stat= 3.42). We find similar positive and highly significant results for deals priced with the OBS method in Columns (2) and (3). When we compare the security type of deals based on the FLE method to those priced on the basis of FLT, we find no significant results. The year dummies reveal positive and significant coefficients for years after 2017 with regard to choosing VES over FLT.

To summarize, FLT was found to be the method that originators preferred the most over time. However, we did observe an increased preference for the VES method after the introduction of the Securitization Regulations on 1 January 2018, which may be caused by increased confidence in the securitization market. This confidence would stimulate more originators to issues securitizations using VES, which increases their capital relief. Although one would expect that the increased selection of VES is also related to the introduction of the STS criteria (as part of the Securitization Regulations) that allows for more preferential treatments in capital requirements in the VES (and OBS) method, we did not find a significant relation between tranches that are STS compliant and the growing preference on the part of originators for VES. However, for the OBS method we did find a significant relation: originators are more likely to choose the OBS method (over the FLT method) when a deal is STS compliant. In addition, we found that other deal characteristics influence the originator's choice for a particular method, such as deal complexity (measured by *No. of Tranches* and *Log Transaction Size*) and the credit

riskiness of the securitization. This suggests that originators base their choice on factors that go beyond the alignment of incentives, such as capital relief benefits for the originator or the complexity of a deal.[22]

<INSERT TABLE 7 ABOUT HERE>

7. Conclusion

In this paper, we investigated the impact of the different European regulatory risk retention methods on the credit ratings and pricing of securitization tranches at the time of issuance. The risk retention rule that came into force as of 2011 for European securitization transactions is aimed to better align the interests between originators and investors. The current regulatory framework allows originators to use several methods to retain (at least) 5% of the securitization transaction. Currently, regulations treat these methods in an equal manner (there is no differentiation), and it is up to the retainer which method to apply. It means that these regulations assume that the different methods align the incentive of the originator and investors in an equal manner. We demonstrated that this idea deserves modification. With the help of a large sample of European securitizations originated and sold between 2011 and 2021, we showed that investors adjust their pricing at issuance for tranches priced on the basis of different risk retention methods even after controlling for the credit rating. They demand lower spreads at issuance for tranches priced on the basis of the VES and the OBS methods, compared to the FLT method. This means that, apparently, investors do not see these methods as being fully interchangeable, even though regulations consider them to be fully interchangeable. One would expect that investors would be informed about these risks via the credit rating attached to a security, but it appears that CRAs do not explicitly model the risk retention method concerned when they assign credit ratings for securitization tranches. Based on our results, we suggest that the different risk profiles associated with the various regulatory risk retention methods should be taken into consideration by rating agencies and investors.

[22] In unreported tests, we have included aggregate liquidity factors (i.e. bank's loan to deposit ratios and Euribor 3-month interest rates) in Equation (4) to assess whether they influence the choice of originators to select one method over the other. We did not find any highly significant results.

Our results are also of importance to regulators and supervisors. They point to the need for a re-evaluation of the different risk retention methods and the need to determine whether they should indeed be treated equally. As each of the different retention methods serves a different purpose for the originating banks (e.g., capital relief, liquidity provision, tax relief, or a combination thereof), we do not propose to reduce regulatory risk retention rules to a single method, but suggest further research to determine the optimal design of the retention methods so that similar levels of incentives alignment can be achieved. Meanwhile, we recommend regulators and supervisors to tighten supervision on screening and monitoring efforts and standards, in particular for the FLT method. In addition, regulators and supervisors could actively engage with originators to better understand their motives for selecting a particular method.

Future research could assess the inherent risks of the underlying pools in relation to the chosen risk retention method using loan level data. Another avenue for future research would be the development of a theoretical model that takes into account the various payment structures used by retainers and investors for the different methods. We also recommend exploring additional reasons why banks select a particular risk retention method, for example by looking at their balance sheet information and business model to further explore how bank capitalization influences the originator's choice for a risk retention method.

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Table 1. Brief description of all the variables

Variable	Description	Source
Spread	Spread at the date of issuance of the respective securitization tranche, noted in basis points above its benchmark.	*Bloomberg*
Rating Discrepancy	Notches difference that results from calculating the numerical difference in credit rating of Moody's, S&P, Fitch, DBRS, and KBRA, in case the tranche received multiple ratings.	*Own calculations*
Risk Retention Methods	The method to determine the 5% material net economic interest, which includes the *VES*, *OBS*, *FLT,* or *FLE* method.	*Bloomberg*
Subordination Level	Level of internal credit enhancement supporting the security within a securitization, measured as the ratio of all tranches subordinated to the tranche in question divided by the total face value of the securitization.	*Own calculations*
No. of Tranches	Total number of tranches in the securitization of which the security is part.	*Bloomberg*
Log Tranche Value	The natural logarithm of the tranche value at issuance, measured in Euro.	*Bloomberg*
Log Transaction Value	The natural logarithm of the transaction value of the deal at issuance, measured in Euro.	*Bloomberg*
Benchmark Rate	The market-wide benchmark type used for the security at issuance (i.e. EURIBOR 3-months).	*Bloomberg*
Frequent Originator	A dummy that equals 1 if the tranche's originator ranks among the top 10% largest originators, measured by the number of tranches contributed to the total number of securities issued in the EU (2011-2021), and 0 otherwise.	*Own calculations*
STS Compliant	A dummy that equals 1 if the securitization is compliant with the STS criteria at the time of issuance, and 0 otherwise.	*Bloomberg*
Single Originator	A dummy indicating 1 if the deal is originated by a single originator, and 0 if the deal is originated by multiple originators.	*Bloomberg*
GDP Growth Rate	The annual percentage growth rate of GDP in the country where the securitized assets are located.	*European Central Bank*
Credit Rating	Average credit rating of Moody's, S&P, Fitch, DBRS, and KBRA converted into a numerical value by setting 1 for Aaa, 2 for Aa1, 3 for Aa2, and so on.	*Bloomberg*
Security Type	Indicates the type of underlying assets of the securitization of which the security is part, ranging from ABS, RMBS, and CMBS to CLOs.	*Bloomberg*
Year	Date at which the security is issued.	*Bloomberg*
Country of Risk	The country to which the (majority of the) securitization's risks are exposed to.	*Bloomberg*

Table 2. Summary Statistics

This table reports the summary statistics of securitization tranches issued from 2011 to 2021. '*Rating Discrepancy*' represents the notches difference that results from calculating the numerical difference in credit rating provided by Moody's, S&P, Fitch, DBRS, and KBRA. '*Risk Retention Methods*' is a categorical variable indicating the form in which the 5% material net economic interest is obtained, which includes the '*VES*', '*OBS*', '*FLT',* or '*FLE*' method. '*Subordination Level*' represents the level of internal credit enhancement supporting the security within a securitization, measured as the ratio of all tranches subordinated to the tranche in question divided by the total value of the securitization. '*No. of Tranches*' is the total number of tranches in the securitization of which the security is part. *'Log Tranche Value'* is the natural logarithm of the tranche value at issuance, measured in Euro. '*Log Transaction Value*' is the natural logarithm of the transaction value of the deal at issuance, measured in Euro. *'Frequent Originator*' is a dummy that equals 1 if the tranche's originator ranks among the top 10% measured by the number of tranches contributed to the total number of securities issued in the EU (2011-2021), and 0 otherwise. '*Credit Rating*' represents the average credit rating provided by Moody's, S&P, Fitch, DBRS, and KBRA. We converted the ratings into a numerical value by setting 1 for Aaa, 2 for Aa2, 3 for Aa2, and so on. '*Security Type'* represents the type of securitization of which the tranche is part, ranging from ABS, RMBS, and CMBS to CLOs. '*Year'* represents the year in which the security is issued. '*Spread'* is the quoted margin between the benchmark rate and the coupon of the initial spread, in basis points. '*Benchmark Rate'* is the market-wide benchmark type used for the security at issuance.

Panel A: Overall Summary Statistics of Securitization Tranches

Variable	N	Mean	Median	Std	P25	P75
Rating Discrepancy	2157	0.91	0.00	1.34	0.00	1.00
Risk Retention Methods	2157	2.19	3.00	0.94	1.00	3.00
Subordination Level (in %)	2157	0.26	0.15	0.28	0.06	0.34
No. of Tranches	2157	5.31	5.00	2.80	3.00	7.00
Tranche Value (in mio)	2157	444	70,8	1150	20	440
Log Tranche Value	2157	18.32	18.10	1.86	16.81	19.90
Tranche Value (in mio)	2157	1110	629	1720	361	1070
Log Transaction Value	2157	20.32	20.26	0.95	19.71	20.80
Frequent Originator	2157	0.54	1.00	0.50	0.00	1.00
Credit Rating	2157	5.92	5.00	4.57	2.00	9.00
Security Type	2157	2.10	2.00	1.07	1.00	3.00
Year	2157	2018.01	2018	2.28	2016	2020
Spread (in bps)	354	153.51	117.5	124.67	65	200
Benchmark rate	354	3.77	4.00	0.48	3.00	4.00

Panel B: Risk Retention Methods

	No. of Tranches		***No. of Deals***	
	Freq.	Percent	Freq.	Percent
FLT	1045	48.45	520	61.47
VES	735	34.08	186	21.99
OBS	323	14.97	120	14.18
FLE	54	2.5	20	2.36
Total	2157	100	846	100

Panel C: Security Type *(No. of Tranches)*

	Freq.	Percent
ABS	981	45.48
RMBS	851	39.45
CMBS	163	7.56
CLO	162	7.51
Total	2157	100

Panel D: Risk Retention Methods sorted by (in)frequent originator (no. of tranches)

	FLT	*VES*	*OBS*	*FLE*	*Total*
Frequent Originator	500	427	213	31	1171
Infrequent Originator	545	308	110	23	986
Total	1045	735	323	54	2157

Panel E: Credit Rating Agencies

	Freq.	Percent
Moody's	1183	28.01
S&P	856	20.27
Fitch	744	17.62
DBRS	1385	32.80
KBRA	55	1.30
Total	4223	100

Panel F: Rating Discrepancy *(multiple-rated tranches only)*

Rating notches difference	Freq.	Percent
0	880	47.29
1	469	25.20
2	272	14.62
3	126	6.77
4	69	3.71
5	23	1.24
6	13	0.70
7	7	0.38
8	2	0.11
Total	1861	100

Panel G: Number of Ratings

	Freq.	Percent
1	292	13.54
2	1674	77.61
3	181	8.39
4	10	0.46
	2157	100

Panel H: Spread at issuance (in bps)

	VES	*OBS*	*FLT*	*FLE*	*Total*
Mean Spread (in bps)	170.63	134.4	152.1	104.1	153.51
Observations	108	52	182	12	354

Table 3. Ordinary least squares regressions of Risk Retention Methods on Spread at Issuance (floating-rate tranches only)

This table reports ordinary least squares regressions of the risk retention measures with regard to the spread at issuance, controlled for security-design characteristics as well as credit rating and year and security type controls. '*Spread*' is the quoted margin between the benchmark rate and the coupon of the initial spread, in basis points. '*Risk Retention Methods*' is a categorical variable indicating the form in which the 5% material net economic interest is obtained, which includes the '*VES*', '*OBS*', '*FLT*', or '*FLE*' method. The FLT method is the omitted variable. All other control variables are defined in Table 2. White (1980) heteroskedasticity-adjusted t-statistics are reported in parentheses, and (*), (**), (***) denote significance levels of 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
VES	-53.18***	-51.64***	-49.68***	-43.68***	-27.45**
	(-5.35)	(-4.70)	(-4.62)	(-4.50)	(-2.40)
OBS	-45.30***	-46.42***	-41.45***	-39.33***	-36.08***
	(-5.16)	(-4.52)	(-4.24)	(-5.07)	(-4.61)
FLE	-38.59***	-28.69*	-39.54**	-11.91	-6.85
	(-3.46)	(-1.88)	(-2.56)	(-0.89)	(-0.48)
Subordination Level				-12.52	-19.87
				(-0.93)	(-1.44)
No. of Tranches				-2.130	-2.28
				(-0.96)	(-1.08)
Log Tranche Value				-27.97***	-25.45***
				(-7.53)	(-6.77)
Log Transaction Value				28.15***	28.71***
				(5.54)	(5.84)
Rating Discrepancy				18.67***	17.55***
				(6.01)	(5.63)
Benchmark Rate				15.82	15.30
				(1.22)	(1.15)
Frequent Originator					27.07***
					(3.25)
Credit Rating	Y	Y	Y	Y	Y
Year	N	Y	Y	Y	Y
Security Type	N	N	Y	Y	Y
Observations	354	354	354	354	354
R-squared	0.703	0.707	0.725	0.804	0.811
Adjusted R-squared	0.686	0.680	0.697	0.780	0.787

Table 4. Ordinary least squares regressions of Risk Retention Methods on Spread at Issuance (floating-rate tranches only, sorted by originators' size)

This table reports ordinary least squares regressions of the risk retention measures with regard to the spread at issuance, controlled for security-design characteristics as well as credit rating and year and security type controls. '*Spread*' is the quoted margin between the benchmark rate and the coupon of the initial spread, in basis points. '*Risk Retention Methods*' is a categorical variable indicating the form in which the 5% material net economic interest is obtained, which includes the '*VES*', '*OBS*', '*FLT*', or '*FLE*' method. The FLT method is the omitted variable. All other control variables are defined in Table 2. White (1980) heteroskedasticity-adjusted t-statistics are reported in parentheses, and (*), (**), (***) denote significance levels of 10%, 5%, and 1%, respectively.

	Frequent Originator		*Infrequent Originator*	
	(1)	(2)	(3)	(4)
VES	-73.65***	-45.91***	19.36	16.17
	(-4.46)	(-3.00)	(1.34)	(1.32)
OBS	-49.26***	-34.23***	-7.70	-17.27
	(-4.16)	(-3.28)	(-0.76)	(-1.49)
FLE	-42.34	19.90	-12.95	-9.21
	(-1.35)	(0.62)	(-0.82)	(-0.84)
Subordination Level		-74.56***		-13.00
		(-3.27)		(-0.72)
No. of Tranches		-7.41*		3.03
		(-1.92)		(1.50)
Log Tranche Value		-28.93***		-10.75**
		(-5.12)		(-2.01)
Log Transaction Value		37.47***		1.81
		(6.31)		(0.29)
Rating Discrepancy		17.15***		3.10
		(5.19)		(0.52)
Benchmark Rate		9.40		-1.28
		(0.56)		(-0.09)
Credit Rating	Y	Y	Y	Y
Year	Y	Y	Y	Y
Security Type	Y	Y	Y	Y
Observations	224	224	130	130
R-squared	0.782	0.873	0.902	0.922
Adjusted R-squared	0.747	0.847	0.874	0.893

Table 5. Ordered logit regressions of Risk Retention Methods on Credit Ratings (tranche-level analysis)

This table reports ordered logit regressions of the risk retention methods with regard to the credit rating at issuance, controlled for security-design characteristics as well as year and security type controls. '*Credit rating'* represents the average credit rating provided by Moody's, S&P, Fitch, DBRS, and KBRA, converted into a numerical value by setting 1 for Aaa, 2 for Aa1, 3 for Aa2, and so on. '*Risk Retention Methods*' is a categorical variable indicating the form in which the 5% material net economic interest is obtained, which includes the '*VES*', '*OBS*', '*FLT*', or '*FLE'* method. The FLT method is the omitted variable. All other control variables are defined in Table 2. Z-statistics are reported in parentheses, and (*), (**), (***) denote significance levels of 10%, 5%, and 1%, respectively.

	Full sample	*Moody's*	*S&P*	*DBRS*	*Fitch*
	(1)	(2)	(3)	(4)	(5)
VES	0.69***	0.53***	1.27***	0.38***	0.30
	(6.18)	(3.40)	(6.54)	(2.83)	(1.37)
OBS	-0.2	-0.11	-0.02	-0.15	-0.45**
	(-1.63)	(-0.71)	(-0.07)	(-0.91)	(-2.12)
FLE	0.45*	1.17**	1.46***	0.02	-0.03
	(1.74)	(2.26)	(3.48)	(0.09)	(-0.07)
Subordination Level	-0.35**	-0.39*	0.21	-0.84***	-0.17
	(-2.39)	(-1.93)	(0.84)	(-4.39)	(-0.65)
No. of Tranches	-0.08***	-0.05*	-0.04	-0.13***	0.00
	(-4.06)	(-1.90)	(-1.12)	(-5.18)	(0.01)
Log Tranche Value	-0.94***	-0.89***	-1.09***	-0.92***	-0.96***
	(-26.79)	(-19.27)	(-17.36)	(-20.00)	(-14.58)
Log Transaction Value	0.72***	0.78***	0.61***	0.73***	0.75***
	(12.22)	(9.33)	(6.61)	(9.99)	(6.72)
Frequent Originator	-0.43***	-0.49***	-0.38***	-0.25**	-0.417**
	(-5.13)	(-4.20)	(-2.61)	(-2.42)	(-2.49)
Rating Discrepancy	0.27***	0.29***	0.27***	0.24***	0.51***
	(9.17)	(7.41)	(5.32)	(5.57)	(9.55)
Year	Y	Y	Y	Y	Y
Security Type	Y	Y	Y	Y	Y
Observations	2,157	1,183	856	1,385	744
Pseudo R2	0.121	0.124	0.179	0.100	0.178

Table 6. Ordered logit regressions of Risk Retention Methods on Rating Discrepancy (tranche-level analysis)

This table reports ordered logit regressions of the risk retention methods with regard to the rating discrepancy at issuance, controlled for security-design characteristics as well as credit rating, year, and security type controls. '*Rating Discrepancy'* represents the notches difference that results from calculating the numerical difference in credit rating provided by Moody's, S&P, Fitch, DBRS, and KBRA. '*Risk Retention Methods*' is a categorical variable indicating the form in which the 5% material net economic interest is obtained, which includes the '*VES*', '*OBS*', '*FLT*', or '*FLE'* method. The FLT method is the omitted variable. All other control variables are defined in Table 2. Z-statistics are reported in parentheses, and (*), (**), (***) denote significance levels of 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
VES	-0.35***	-0.43***	-0.32***	-0.50***	-0.52***
	(-3.12)	(-3.65)	(-2.58)	(-3.64)	(-3.74)
OBS	-0.12	-0.14	-0.05	-0.17	-0.18
	(-0.77)	(-0.91)	(-0.30)	(-1.05)	(-1.13)
FLE	-0.80***	-0.85***	-0.86***	-1.04***	-1.05***
	(-2.71)	(-2.84)	(-2.86)	(-3.40)	(-3.43)
Subordination Level				-0.33*	-0.35*
				(-1.71)	(-1.79)
No. of Tranches				0.06**	0.06**
				(2.16)	(2.26)
Log Tranche Value				-0.11**	-0.10**
				(-2.45)	(-2.23)
Log Transaction Value				0.39***	0.37***
				(4.88)	(4.50)
Frequent Originator					0.10
					(0.95)
Credit Rating	Y	Y	Y	Y	Y
Year	N	Y	Y	Y	Y
Security Type	N	N	Y	Y	Y
Observations	1,865	1,865	1,865	1,865	1,865
Pseudo R-squared	0.188	0.192	0.195	0.202	0.202

Table 7. Logit regressions of Risk Retention Methods on STS Compliance (deal-level analysis)

This table reports logit regressions of the risk retention methods with regard to STS compliance at issuance, controlled for credit rating, security type, year, and country controls. *'VES vs. FLT'* is a dummy indicating 1 if the VES method is used and 0 if the FLT method is used. *'OBS vs. FLT'* is a dummy indicating 1 if the OBS method is used and 0 if the FLT method is used. *'FLE vs. FLT'* is a dummy indicating 1 if the FLE method is used and 0 if the FLT method is used. '*STS Compliant'* is a dummy that equals 1 if the deal is compliant with STS criteria at the time of issuance, and 0 otherwise. '*No. of Tranches'* is the total number of tranches in the securitization of which the security is part. '*Log Transaction Value*' is the natural logarithm of the transaction value of the deal at issuance, measured in Euro. '*GDP Growth Rate*' is the annual percentage growth rate of GDP in the country where the securitized assets are located. *'Frequent Originator'* is a dummy that equals 1 if the tranche's originator ranks among the top 10% measured by the number of tranches contributed to the total number of securities issued in the EU (2011-2021), and 0 otherwise. '*Single Originator*' is a dummy indicating 1 if the deal is originated by a single originator, and 0 if originated by multiple originators. '*Credit Rating*' represents the highest credit rating provided for the deal by Moody's, S&P, Fitch, DBRS, and KBRA. We converted the ratings into a numerical value by setting 1 for Aaa, 2 for Aa2, 3 for Aa2, and so on. '*Security Type'* represents the type of securitization of the deal, ranging from ABS, RMBS, and CMBS to CLO. '*Year'* represents the year in which the deal is issued. '*Country of Risk*' is the country where the securitization's assets are located. Z-statistics are reported in parentheses, and (*), (**), (***) denote significance levels of 10%, 5%, and 1%, respectively.

	VES vs. FLT	***OBS vs. FLT***		***FLE vs. FLT***
	2011-2021	*2011-2021*	*2018 Onwards*	*2011-2021*
	(1)	(2)	(3)	(4)
STS Compliant	-0.14	1.05**	1.96***	-1.57
	(-0.46)	(2.43)	(3.36)	(-0.76)
No. of Tranches	0.23***	0.23***	0.72***	0.50***
	(3.92)	(2.95)	(4.27)	(2.80)
Log Transaction Size	0.29**	0.20*	0.49**	0.02
	(2.10)	(1.71)	(2.06)	(0.05)
GDP Growth Rate	-0.03	-0.001	-0.07	-0.45
	(-0.69)	(-0.01)	(-0.77)	(-1.27)
Frequent Originator	0.42	1.39***	1.61***	-0.70
	(1.62)	(4.42)	(3.29)	(-1.06)
Single Originator	-0.24	-0.025	2.46*	1.20
	(-0.67)	(-0.05)	(1.65)	(1.30)
ABS	1.02***	1.37***	2.49***	-0.06
	(3.42)	(3.61)	(3.47)	(-0.08)
CLO	-0.97*	-0.43	-0.14	-1.26
	(-1.73)	(-0.65)	(-0.12)	(-1.25)
CMBS	3.35***	1.69	0.28	
	(4.56)	(1.48)	(0.15)	
Year	Y	Y	Y	Y
Ratings	Y	Y	Y	Y
Country of Risk	Y	Y	Y	Y
Observations	703	606	302	318
Pseudo R-squared	0.37	0.26	0.43	0.33

Figure 1. Risk retention methods (% of total sample)

This figure illustrates the percentage of tranches in our final sample with the FLT, VES, OBS, and FLE method. 'VES' stands for vertical slice, 'OBS' for on-balance sheet, 'FLT' for first loss tranche, and 'FLE' for first loss exposure.

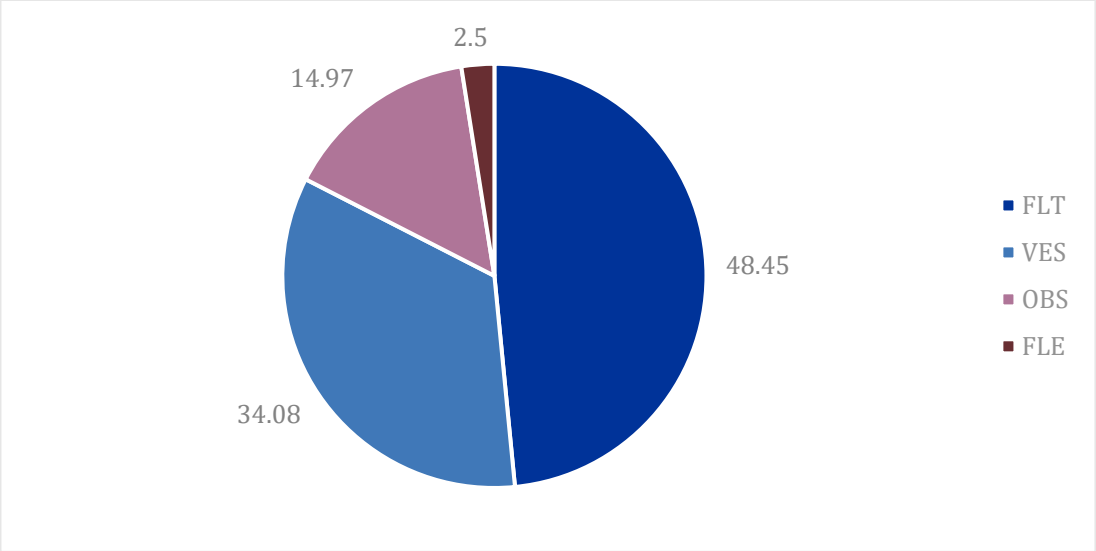


Figure 2. Risk retention methods sorted by frequent vs. infrequent originator (no. of tranches)

This figure illustrates the number of tranches in our final sample that were originated by frequent and infrequent originators, for each of the risk retention methods. 'VES' stands for vertical slice, 'OBS' for on-balance sheet, 'FLT' for first loss tranche, and 'FLE' for first loss exposure.

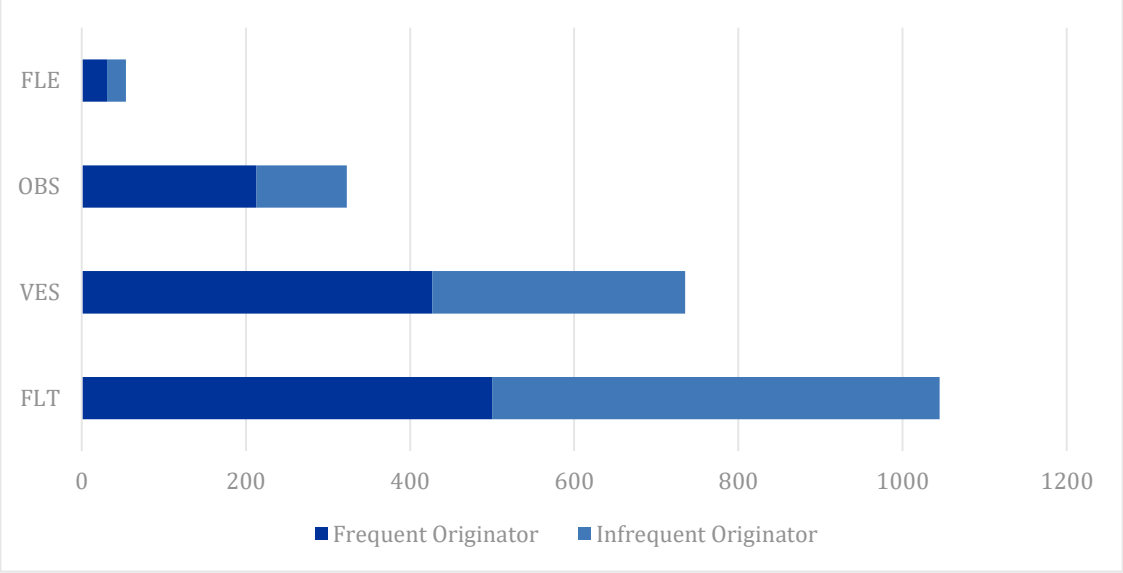
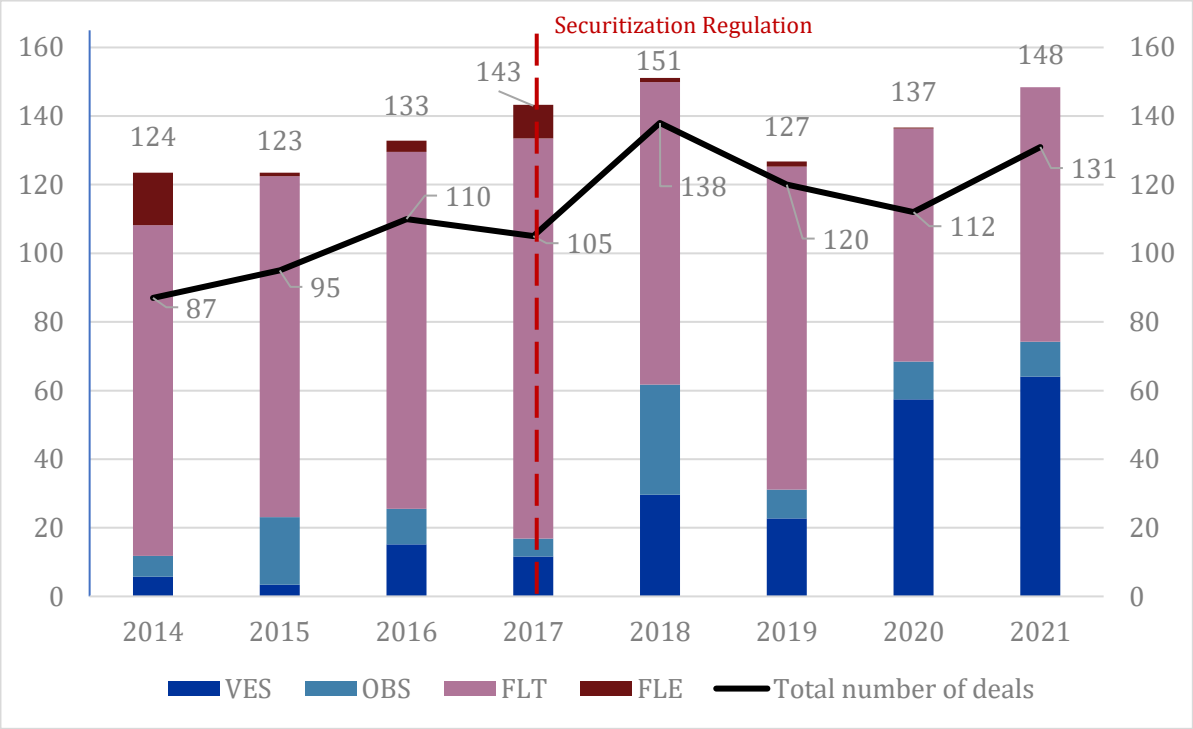


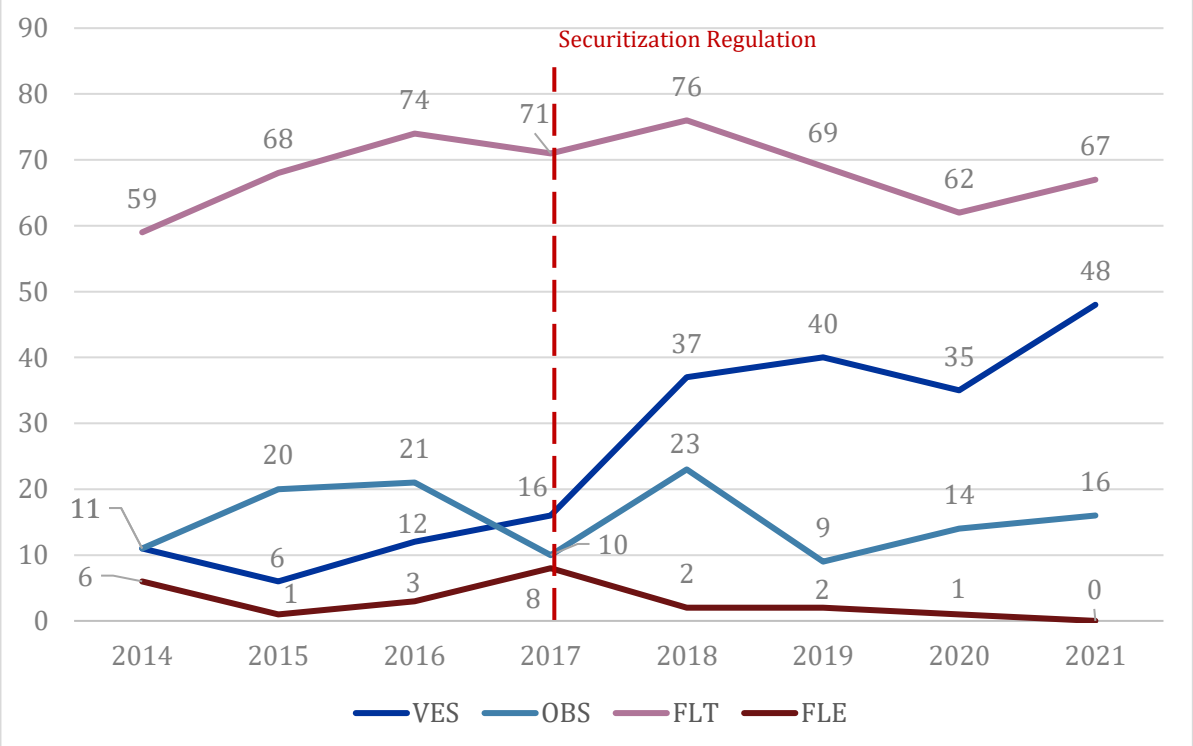
Figure 3. Risk Retention Methods over Time

This figure illustrates the number of deals that were issued between 2014 and 2021. Panel A shows the volume and number of deals over time in our dataset for deals with available information on the risk retention method. Panel B shows the number of deals over time sorted by risk retention method. 'VES' stands for vertical slice, 'OBS' for on-balance sheet, 'FLT' for first loss tranche, and 'FLE' for first loss exposure.

Panel A – Total issuance volumes (bln) and number of deals per year



Panel B – Number of deals sorted by risk retention methods and year



Appendices

Appendix I. Alignment of returns of retainers and investors: an example

To illustrate the alignment between the investor and the retainer, we present an example from Figure I of returns for the retainer and the investor along the total loss distribution for different retention methods. The results are simulated using a hypothetical securitization, but the overall conclusions also hold for other specifications and can be generalized. We consider the retainer to be the originator and we assume that two types of stakeholders (originator and investor) hold the entire set of assets. The loan pool is sufficiently diversified to assume that idiosyncratic risk is negligible. In our example, we also assume a risk-free rate of zero in a world of 2 points in time (t=0 when the retention method is chosen and investments are made; t=1 when losses are realized and payoffs are distributed). Losses refer to the total losses (i.e. default rate times loss at default), and the risk retention of the retainer is equal to 5% of the total securitization.

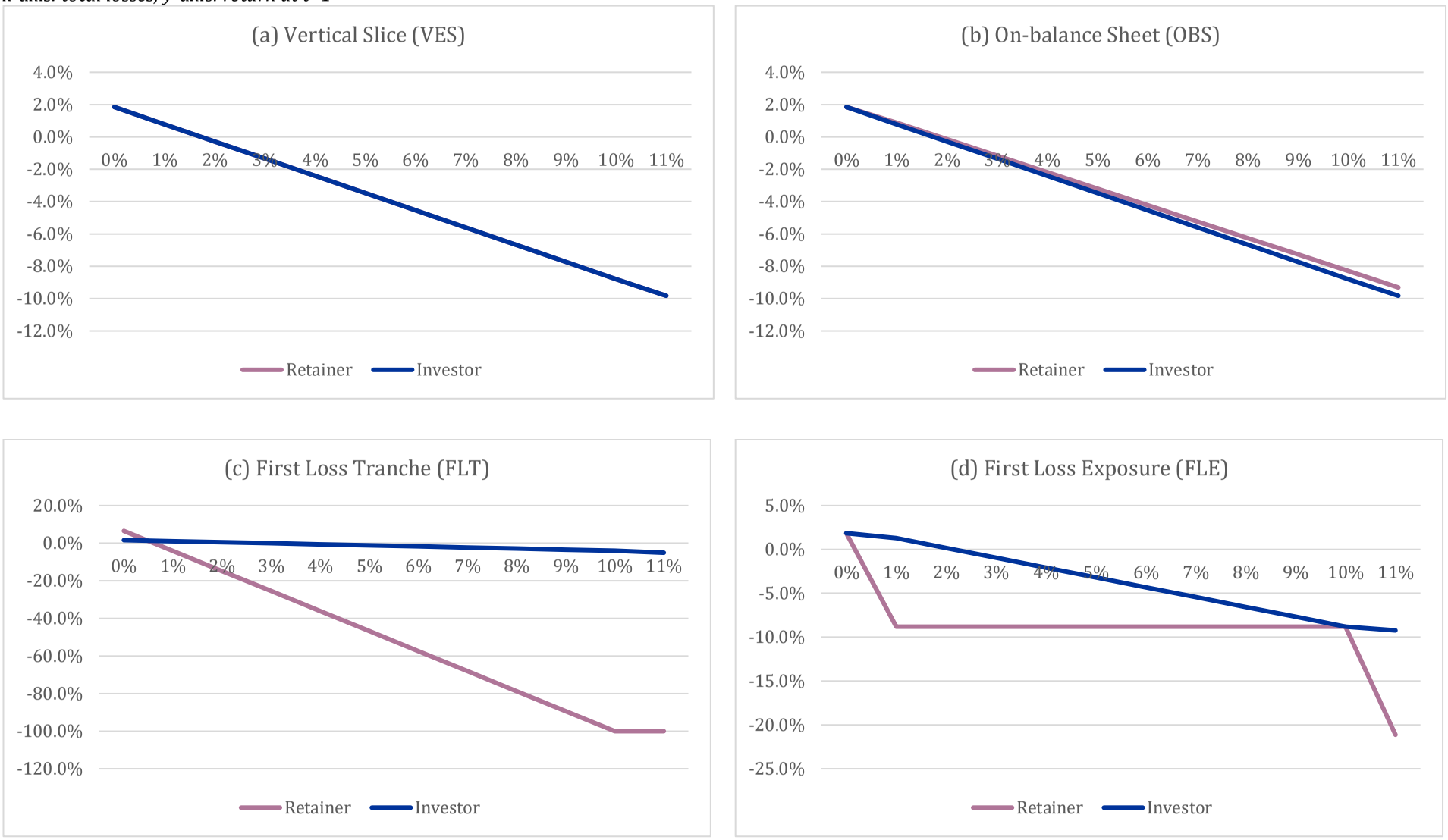
In this example, the following applies. **FLT:** the retainer holds 5%, all invested in the equity tranche; **FLE:** the retainer sells the papers at a value of 95% and the 5% discount is refunded to them when the discounted sale amount is not entirely absorbed by losses; **VES:** the retainer holds 5% of each of the tranches; **OBS:** the retainer chooses a truly randomly selected portion of 5% of the pool of loans that is kept on their books. The risk profile of the retained loans is assumed to be identical to the risk profile of the loans securitized, and thus total losses are assumed to be equal. Interest income on the loans is assumed to be 1.9% (matching the weighted average return of the securitization tranches).

The securitization is structured as follows:

	Size	Coupon
Equity tranche	10%	6.5%
Mezzanine 1	12%	2.7%
Mezzanine 2	16%	1.9%
Mezzanine 3	20%	1.4%
Senior	42%	0.7%

Figure I. Return function along the total loss distribution of the retainer and the investor, sorted by risk retention methods

x-axis: total losses; y-axis: return at t=1



Appendix II. **Robustness Analyses**

Table I. Robustness Analyses

This table reports robustness analyses of the risk retention methods with regard to our three key independent variables: *Credit Rating*, *Rating Discrepancy,* and *Spread*. Column 1 lists ordered logit regressions of the risk retention methods on the credit rating at issuance (similar to Table 4). Column (2) lists ordered logit regressions of the risk retention methods on the rating discrepancy at issuance (similar to Table 6). Column (3) lists ordinary least squares regressions of the risk retention measures on spread at issuance (similar to Table 8). The following additional controls are included for robustness purposes: *'STS Compliant'*, *'Single Originator'*, *'GDP Growth Rate'*, '*Country of Risk*' and *'Originator'*. *'Originator*' represents the originator of the securitization tranches. All other variables are defined in Tables 2 and 3. (*), (**), (***) denote significance levels of 10%, 5% and 1%, respectively.

	Credit Rating	*Rating Discrepancy*	*Spread*
	(1)	(2)	(3)
VES	0.59***	-0.55***	-33.51***
	(5.15)	(-3.79)	(-2.66)
OBS	-0.03	-0.23	-33.93***
	(-0.20)	(-1.37)	(-4.11)
FLE	0.42	-1.06***	-3.07
	(1.59)	(-3.43)	(-0.19)
Subordination Level	-0.62***	-0.25	-32.40**
	(-4.03)	(-1.27)	(-2.25)
No. of Tranches	-0.12***	0.07**	-2.70
	(-5.63)	(2.51)	(-1.27)
Log Tranche Value	-1.05***	-0.07	-25.97***
	(-28.19)	(-1.40)	(-7.07)
Log Transaction Value	0.82***	0.34***	30.20***
	(13.02)	(3.94)	(5.17)
Frequent Originator	-0.42***	0.10	32.89***
	(-4.48)	(0.85)	(2.99)
Rating Discrepancy	0.29***		17.88***
	(9.37)		(5.76)
Benchmark Rate			25.97*
			(1.76)
STS Compliant	-1.11***	0.51***	0.41
	(-8.98)	(3.23)	(0.04)
Single Originator	0.82***	0.08	-40.70***
	(4.70)	(0.36)	(-3.23)
GDP Growth Rate	0.02	-0.01	1.21
	(1.35)	(-0.54)	(1.24)
Credit Rating	Y	Y	Y
Year	Y	Y	Y
Security type	Y	Y	Y
Country of Risk	Y	Y	Y
Originator	Y	Y	Y
Observations	2,153	1,861	354
Pseudo R-squared	0.140	0.208	
Adjusted R-squared			0.791

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Vivian M. van Breemen
European Central Bank, Frankfurt am Main, Germany; Nyenrode Business Universiteit, Breukelen, The Netherlands;
email: vivian.van_breemen@ecb.europa.eu, v.vanbreemen@my.nyenrode.nl

Claudia Schwarz
European Central Bank, Frankfurt am Main, Germany; email: claudia.schwarz@ecb.europa.eu

Dennis Vink
Nyenrode Business Universiteit, Breukelen, The Netherlands; email: d.vink@nyenrode.nl

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

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