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Simple is simply not enough—features versus labels of complex financial securities

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Abstract

We examine how design features and labels of complex financial securities affect pricing and performance. Hence, we utilize the security design features required by the European Union’s Securitization Regulation and the optional STS label (“Simple, Transparent, and Standardized”). Based on a unique dataset of European securitizations with 31 million quarterly loan observations, we find that investors hardly consider the features but rely on the existence of the label, although the latter has no performance-increasing effect. Our results reveal that investors neglect a proper risk assessment and misinterpret the easily accessible label as a signal of superior performance.

Keywords Asset-backed securities · EU securitization regulation · Simple, transparent, standardized (STS) · Loan performance · Complex securities

JEL Classification D82 · G01 · G18 · G21

1 Introduction

The high complexity of some financial products like Asset-Backed Securities (ABS) has led to severe problems such as adverse selection and moral hazard, and ultimately to the financial crisis. While tightened regulatory requirements addressing security design features seem beneficial in mitigating these issues, investors might be inclined to rely on aggregated, easily accessible labels signaling a high quality. Empirically, existing studies have predominantly focused on analyzing the consequences of individual design features, such as risk retention (Ashcraft et al., 2019), specific categories of design features, such as complexity (Ghent et al., 2019), or quality labels, such as AAA ratings (Chen et al., 2020; Möhlmann, 2012). However,

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a joint consideration, which relevance design features on the one hand and quality labels on the other hand have for the pricing of complex financial securities, is missing. Thus, it remains uncertain to what extent investors prioritize detailed, albeit time- and cost-intensive, information for evaluating the quality of financial products. Alternatively, it is unclear to what extent they lean towards easily accessible information, leading prices to be driven more by the presence of quality labels rather than detailed features. Similarly, concrete evidence on how the performance of complex financial products can be explained by features versus labels is lacking. In light of these considerations, our primary objective is to investigate the impact of design features and quality labels on both the pricing and performance of complex financial products. In light of these considerations, our primary objective is to shed light on the following research question: *How do design features versus quality labels affect the pricing and the performance of complex financial products?*

To address this research question, we leverage the regulatory framework known as the “European Union’s Securitization Regulation” (EUSR) framework, enacted in January 2019. This framework aims to reduce asymmetric information of securitizations and restore trust in the EU securitization market. The EUSR framework introduced, first, tightened minimum requirements regarding the features of the security design, where “features” refer to attributes of financial securities, encompassing criteria and procedures related to the securitization structure and involved parties. Second, it introduced the optional STS label (“Simple, Transparent, and Standardized”), which indicates higher standards regarding the securitizations’ simplicity, transparency, and standardization, to facilitate investors’ risk assessment (EC, 2015). Within the context of the EUSR framework, our investigation focuses on understanding how the design features and labels of complex financial securities impact both (I) the pricing of these securities and (II) the performance of securitized loans. As a crucial case study, we analyze residential mortgage-backed securities (RMBS), representing a significant example of highly intricate financial instruments. A typical RMBS deal comprises around 20,000 underlying mortgage loans, with investor prospectuses explaining the deal’s structure in documents ranging from 250 to 450 pages. Thus, even if RMBS deals address institutional investors, the immense complexity makes a proper risk assessment a very difficult and expensive task.

Our analyses are grounded in a dataset comprising over 31 million quarterly loan-level observations from 186 RMBS deals. Additionally, we utilize hand-collected data encompassing 48 features of the security design, derived directly from the regulatory text. Our key findings reveal that the STS label has a substantial impact on tranche prices, especially for AAA tranches. Conversely, we observe no positive impact resulting from improvements in the securitization features. Furthermore, our analysis furnishes evidence indicating that the pricing cannot be justified solely by the performance of underlying loans. The implications of these results extend to regulators, investors, and originators. Regulators contemplating the adoption of concepts like STS (e.g., in the US) can leverage these findings to assess and formulate effective regulatory policies. We find that introducing the regulatory STS label induces the problem of investors relying too much on the quality signal again—similar to AAA-ratings for Asset-Backed Securities (ABS) before the subprime crisis (Coval et al., 2009a, b; Mählmann, 2012)—instead of analyzing financial

products' riskiness, which is particularly pronounced for risk-averse investors of AAA tranches. This finding starkly contradicts the regulatory authorities' intention to facilitate the risk assessment for investors, as the STS label induces a reliance on quality signals rather than a thorough analysis of financial products' riskiness. It is crucial to emphasize that investors should prioritize analyzing the design that shapes the incentive structure within deals, rather than relying on simplistic quality signals such as the STS label. However, originators currently mainly benefit from receiving the STS label and not from complying with better design features because the label induces lower financing costs.

To be more specific, based on various regression models—e.g., two-way fixed effects, logistic, and instrumental variables regressions—we find that particularly AAA investors seem to focus simply on the STS design label, whereas the actual performance of STS deals is not improved. Although the EUSR improves loan performance, the spreads of deals containing obligatory features increase, indicating inappropriate pricing by investors. STS-labeled deals benefit from substantially reduced spreads; we provide evidence that receiving the STS label—and not the superior security design of STS deals—explains this spread reduction. We show that even complying with all features is irrelevant for pricing, but only the label assignment has a spread reduction effect. Supporting this result, we find a within-tranche spreads' decline of 13% at the time of receiving the label—although the information about the design features has already been available in the investor prospectus. This corresponds to a value of the STS label of € 2.3 million per annum for an average tranche.

The EU's introduction of the STS label was intended to facilitate investors' risk assessment instead of directly relying on the STS label as a quality signal of the underlying exposures. However, our results reveal that investment decisions are not driven by the deal's security design features but mainly by the design label. To identify the relevant features of the security design, we collect the requirements concerning the design features stated throughout the regulatory text. These features comprise the *EUSR features*, which are obligatory for all EU securitizations issued after 2018, such as risk retention and the prohibition of cherry picking, and additional *STS features* for obtaining the STS label. While complying with the STS features is optional, an STS deal must fulfill all these additional features, e.g., the true sale of the assets, providing historical performance data, and hedging interest rate and currency risk. We assess the deals' compliance with each EUSR and STS feature—totaling 48—before and after the regulation's effective date.

Since the regulation recently entered into force, literature regarding the EUSR and the STS concept is scarce. We contribute to the more general literature on security design, quality labels of financial securities, and the optimal design of regulations. First, regarding the design of financial securities, the theoretical literature suggests that poor security design and subsequent informational differences between securitization parties can induce exploiting informational advantages (Leland and Pyle, 1977; Boot and Thakor, 1993; DeMarzo and Duffie, 1999; DeMarzo, 2005). The literature on the design of financial securities focuses particularly on risk retention, which is one of the required EUSR features, and complexity. Retention harmonizes originators' and investors' interest and induces increased loan and tranche

performance as well as lowers credit spreads (DeMarzo, 2005; Hartman-Glaser et al., 2012; Chemla and Hennessy, 2014; Guo and Wu, 2014; Begley and Purnanandam, 2017; Hartman-Glaser, 2017; Vanasco, 2017; Hébert, 2018; Ashcraft et al., 2019; Flynn et al., 2020; Agarwal et al., 2021; Hibbeln and Osterkamp, 2024). Furthermore, originators use complexity to obfuscate the securitizations' quality, as more complex securitizations have a lower quality which is not reflected in ABS pricing (Furfine, 2014; Ghent et al., 2019; Griffin et al., 2014). Thus, it seems promising that "simplicity" features are required in the STS framework. More generally, studies addressing the market's complexity for funds and retail financial products provide evidence for strategic complexity, leading investors to misprice these financial products, which, in turn, incentivizes financial engineers to exploit their informational advantage (Stoimenov and Wilkens, 2005; Carlin et al., 2009; Carlin and Manso, 2010; Henderson and Pearson, 2011; Gennaioli et al., 2012; Sato, 2014; Ammann et al., 2017; Celerier and Vallee, 2017; DeHaan et al., 2021). We contribute to the literature by evaluating the effect of a feature score based on 48 features induced by the EUSR/STS framework instead of focusing on one individual design feature, and we show that investors seem to ignore these detailed design features when pricing complex financial securities but rather focus on the easily accessible label.

A second strand of literature focuses on quality labels of financial securities. Particularly for complex financial securities, investors have an incentive to focus on aggregated information and rely on labels as a quality signal to reduce asymmetric information. The investors' reliance on credit ratings of securitizations before the financial crisis—particularly for "AAA" products—exemplifies the overdependence on such quality measures. Studies suggest that investors outsource parts of their risk analysis to rating agencies and shirk on their due diligence when investing in tranches from complex securities. A stronger reliance on labels for more complex securities implies that labels are more valuable if investors face complexity (Adelino, 2009; Griffin and Tang, 2012; Mählmann, 2012; Chen et al., 2020). For investment funds, investors consider quality measures and react disproportionately positively to funds labeled as high-quality while punishing funds whose quality label decreases below the top one-third category, with the effect seeming less pronounced for institutional investors. Therefore, their reaction, measured by flows into the funds, is driven only by changes in the quality measure and not by the underlying fund performance (Blake and Morey, 2000; DelGuercio and Tkac, 2008; Ammann et al., 2018). These findings are supported by studies on funds as well as structured and retail financial products, which add that investor groups tend to neglect certain risks and are less attentive to details (Arnold et al., 2021; Ferman, 2015; Gennaioli et al., 2012). We contribute to this field of literature by showing that complex financial securities pricing is mostly influenced by the label and not by the incentive structure established by the features. Institutional investors react positively to the quality label by demanding lower spreads while punishing non-labelled deals with significantly higher spreads, regardless of security design and loan performance. These findings reveal that introducing a quality label can entice investors to focus on a label and neglect a proper risk analysis despite the availability of extensive information on complex financial securities. This also highlights the danger that investors

might rely too heavily on easily accessible information, similar to “AAA-ratings” for securitizations before the financial crisis.

A third strand of literature addresses the broad topic of the optimal design of regulations for financial products. The literature on securitization highlights the potential adverse effects of introducing regulations and reveals that market forces might be more beneficial in achieving welfare gains (Keys et al., 2009; Martin and Parigi, 2013). Focusing on the benefits of transparency as a regulatory tool, studies have revealed that mandating enhanced disclosure might lead unsophisticated investors to be disadvantaged (Pagano and Volpin, 2012; Balakrishnan et al., 2021). However, empirical studies of regulatory transparency initiatives show that the reduction of asymmetric information improves loan and pool performance (Ertan et al., 2017; Klein et al., 2020). Chen et al. (2020) emphasized the significance of stronger risk management by investors. Studies focusing on consumer protection measures reveal that while, generally, policies mandating transparency, standardization, and competition are beneficial, transparency measures might discourage private learning (Gabaix and Laibson, 2006; Carlin and Manso, 2010; Bertrand and Morse, 2011; Inderst and Ottaviani, 2012; Agarwal et al., 2015, 2020). Literature on the general effect of regulations on financial products reveals that transparency measures induce decreased informativeness of security prices. Mandating investors to strengthen their risk management can mitigate the issue of bounded rationality (Banerjee et al., 2017; Schwarcz, 2014). Furthermore, costly monitoring incentivizes small investors to free ride on monitoring efforts of large shareholders (Maug, 1998; Stoughton and Zechner, 1998). Research on consumer protection and consumer behavior includes consumers’ cognitive limitations and biases, which can reduce the effectiveness of regulatory transparency initiatives. Furthermore, a lack of consumer trust, in general, can cause consumers to avoid specific financial products (Campbell, 2006, 2016; Lusardi and Mitchell, 2007; Guiso et al., 2008; Choi et al., 2009; Christelis et al., 2010; Bertrand and Morse, 2011). We contribute to this literature field by providing evidence that introducing extensive transparency measures, combined with a publicly available quality measure, can disincentivize consumers and institutional investors to conduct a risk analysis and, moreover, foster investors’ reliance on pricing decisions made by other investors. This can lead institutional investors to misprice complex financial securities and thereby reduce the effectiveness of regulation.

2 Hypotheses

In order to illuminate the influence of design features versus quality labels on the pricing and performance of complex financial products, we formulate several testable hypotheses by leveraging the European securitization regulation. The aggregate effect of the EUSR mandates enhanced design features, anticipated to diminish asymmetric information. Consequently, investors are expected to reward this improvement with reduced risk premiums across all tranches subject to the regulation. Furthermore, investors perceive the easily accessible STS label as a reliable quality signal. Consequently, it is expected that the credit spread of STS tranches will decrease. Thus, we formulate hypothesis H1a&b:

H1a The improved design features of STS tranches lead to a reduced credit spread.

H1b The quality labels of STS tranches lead to a reduced credit spread.

However, for EUSR tranches, which on average have improved design features but no STS label as a quality signal, two opposing effects might influence the spreads. While, on one hand, we anticipate a decrease in the spreads of EUSR tranches if the reduction of asymmetric information is predominant (albeit to a lesser extent than for STS, given the modest nature of the features' improvement), on the other hand, investors might interpret the decision not to issue an STS deal as a negative signal. Given the uncertainty ex-ante about which effect prevails, we formulate hypothesis H2a&b to address the opposing influences.

H2a The impact of improved features dominates—the credit spread of EUSR tranches decrease.

H2b The impact of the missing quality signal dominates—the credit spread of EUSR tranches increase.

In addition, asymmetric information is of different importance to different investors. Tranches with a high credit rating, especially AAA tranches, exhibit relatively stable credit spreads over time and are less responsive to new information compared to equity or mezzanine tranches. As a result, investors in AAA tranches, such as credit institutions and insurance companies, are inclined to allocate less effort toward reducing asymmetric information through extensive risk analysis. They are more likely to rely on simpler measures, characterized by low information processing costs, such as a quality label. This leads to hypothesis H3:

H3 The spread-reducing effect of the STS quality label is more pronounced for investors with low risk appetite.

The pricing of STS and EUSR tranches could not only be influenced by the information derived from the features and the label but also by different capital requirements due to the EUSR, which are particularly relevant for credit institutions and insurance companies; these financial institutions account for approximately one third of investments into EU securitizations. Nevertheless, our expectation is that the spread-reducing effect of the STS label is only partially attributed to reduced capital requirements. Accordingly, we test hypothesis H4:

H4 The spread-reducing effect of the STS quality label is only partially explained by reduced capital requirements.

Next, we focus on the performance of securitized loans by investigating whether the improved features of complex financial securities and their labels affect loan performance. Ex-ante, the aggregate effect of the EU securitization regulation on loan

performance is unclear. The EU asserts in the preamble of the regulation that its primary objective is not to diminish pool risk but rather to address risks stemming from suboptimal security designs. However, the mandated enhancements in security design are intended to alleviate asymmetric information by aligning the incentives of originators and investors. This alignment is expected to prompt more rigorous screening and monitoring by originators, leading to superior loan performance. Consequently, we propose the following hypothesis:

H5 Loan performance is superior for deals affected by the regulation.

If an enhanced performance is observed for such deals, it is reasonable to conclude that this improvement is primarily attributed to enhanced design features. However, if investors demand higher spreads for deals lacking the STS quality label (see H2b), it may suggest that they hold private information about lower loan quality in EUSR deals. Therefore, the additional risk premiums for EUSR tranches might serve as compensation for the potential inferior loan quality. If this holds true, the performance of EUSR loans should be significantly worse than STS loans and pre-EUSR loans. Nonetheless, we anticipate that enhanced design features will positively influence performance, regardless of whether the deal is classified as an STS or EUSR deal. Consequently, we posit that the label does not exert a significant effect on performance beyond capturing the improvements in features:

H6a Improved design features lead to a better loan performance of STS deals.

H6b Improved design features lead to a better loan performance of EUSR deals.

3 Institutional background and data

3.1 Institutional background

Following the global financial crisis, the issue volumes in the EU securitization market declined from its peak in 2008 by around 89% until 2013 and remained at a low level, while the issue volumes of mortgages recovered (see Fig. 1). During this period, the Basel III framework of 2010 constituted the first regulatory concept to approach shortcomings in securitization markets (BCBS, 2010). The EU introduced securitization-related regulatory changes with Capital Requirements Directives (CRD) II in 2010 and III in 2011, mandating risk retention, disclosure requirements, and rules to recognize significant risk transfers (EU, 2009, 2010, 2013). Under the umbrella of CRD IV, the regulation on capital requirements (CRR) extended these requirements in 2014 (EU, 2013). Simultaneous to these regulations, the European Central Bank (ECB) introduced the ABS loan-level initiative in 2013, in which the ECB established centralized and standardized disclosure of loan-level data for securitizations accepted as collateral in Eurosystem credit operations (EBA, 2015). With the launch of the ABS purchase program (ABSPP) in 2014 and the publication of

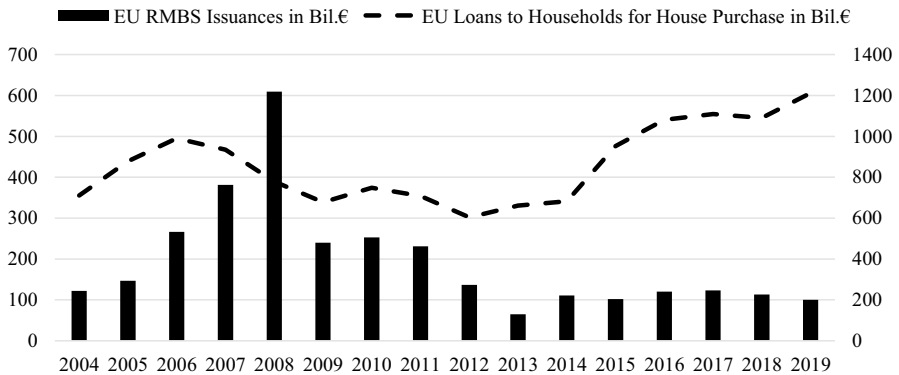


Fig. 1 The freezing and subsequent low levels of EU (incl. UK) RMBS issue volumes as a result of the global financial crisis 2007/08, relative to the issue volumes of loans to households for house purchases in the EU (Eurozone countries and the UK). The divergence in trends, beginning in 2013, highlights that despite the growth in residential mortgage lending and the availability of loans, related securitization activity remained at a low level. This development underlines the importance of reviving the EU securitization market. EU RMBS issue volumes decreased in 2019 due to initial uncertainty surrounding the entry into force of the EUSR (AFME, 2020; ECB, 2020; SIFMA, 2017)

guiding principles on ECB eligible securitization in 2015, the ECB extended collateral requirements beyond regulatory criteria to facilitate high-quality securitizations (ECB, 2014a, 2015). In 2014 and 2015, the European Banking Authority (EBA) and the Basel Committee on Banking Supervision (BCBS) put the concept of simple, transparent, and standardized securitizations up for discussion (EBA, 2014, 2015; BCBS and IOSCO, 2015). The EBA's proposed STS concept and the final version of the EUSR were adopted in December 2017 and implemented on January 1, 2019 (EU, 2017a). In 2018, the EBA finalized its guidelines on STS criteria, providing market participants with a unified and consistent source of interpretations on requirements stated in the EUSR (EBA, 2018). Figure 2 presents the timeline of the main events.

The EU's objectives for introducing the EUSR were to revitalize its securitization market as part of the European Commission's "Investment Plan for Europe" (EU, 2017a), which highlights the importance of securitizations for the overall EU financial market. Therefore, the EU aims to (I) mitigate asymmetric information, (II) reduce deal complexity, (III) facilitate the investors' risk assessment, and (IV) avoid regulatory arbitrage between its member states: (I) Asymmetric information shall be mitigated by not only requiring transparency in the form of centralized and periodic disclosure of deal-, pool-, and loan-level information and sanctioning non-compliance but also addressing transaction-specific issues, including pool composition and loan-selection. Additional measures include aligning incentives between parties by obliging the originators to retain a material interest in the securitizations. This harmonization of interests is supported by demanding clear responsibilities for originators, sponsors, servicers, and investors. Extended credit granting criteria are defined to ensure the quality of the underlying securitized assets and avoid the originate-to-distribute model's recurrence. (II) Complex securitization structures shall be

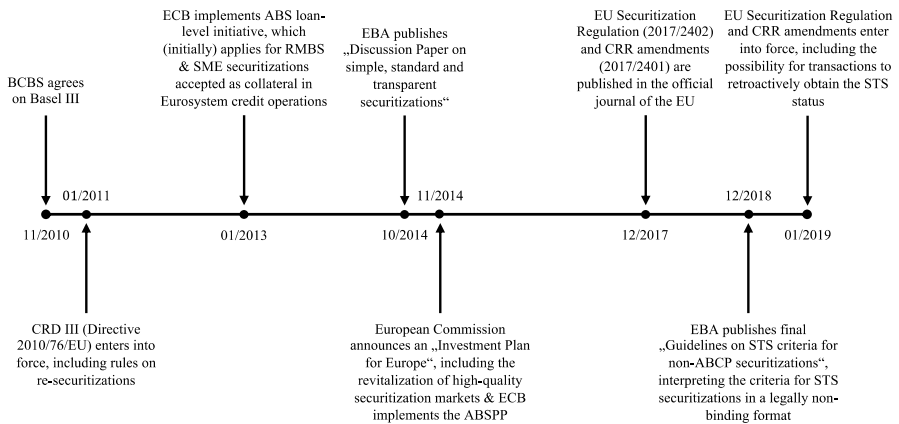


Fig. 2 The timeline of important regulatory-related events on securitizations in the EU after the financial crisis

reduced in the EU by a general ban on re-securitizations and the exclusion of synthetic securitizations from the STS status. (III) The aim of reducing deal complexity and asymmetric information is to facilitate investors' risk assessment of securitizations. (IV) The EU designed the EUSR as an EU-wide mandatory framework to avoid arbitrage among member states (EU, 2017a). We provide a collection of the essential security design features of the EUSR minimum requirements and optional STS requirements in Appendix 1 (EU, 2017a).

Some of the collected security design features were introduced already before the EUSR; either in 2014 on a mandatory basis for all EU securitizations within the CRR or from 2014 on a voluntary basis via the eligibility criteria of securitizations for the ECB's ABSPP. Mandatory minimum features arising from the CRR include the requirement for originators to retain a material net economic interest in a securitization, known as risk retention, which forms part of the EUSR's minimum requirements. The ECB extended the CRR's requirements by including features that are currently mandatory under the EUSR's minimum requirements, e.g., origination in ordinary course, as well as features that are optional under the STS requirements, e.g., no exposures in default and no derivatives as underlying risk positions. Origination in ordinary course designates the originators' duty to only securitize receivables that were originated based on the originators' standard credit granting criteria. The aim is to avoid the originate-to-distribute model, in which originators grant loans on the basis of below standard credit granting criteria because they intend to sell these at a later stage. No exposures in default and the prohibition to include derivatives as underlying exposures mandates originators to include only performing loans into securitizations and shall ensure that investors are able to conduct a proper risk assessment. Securitizing derivatives and/or defaulted loans complicates the investors' risk analysis and due diligence. The EUSR introduced features beyond the ones included in the CRR and ECB's eligibility criteria. In its minimum requirements the EUSR introduces a prohibition of cherry picking and the required verification of borrower information for residential mortgages. While cherry picking refers to the

intentional selection of low quality loans into securitizations, the verification of borrower information refers to the avoidance of loans that were originated on the basis of poor information (EBA, 2018; ECB, 2015; ECB, 2014a, b; EU, 2013).

The regulation affects originators of securitizations mainly by mandating minimum (EUSR) and extended (STS) features. On the one hand, while some features do not require great effort to be implemented by originators, e.g., transparency requirements, others are described by market participants as complex, unclear or associated with significant implementation and maintenance costs, e.g., homogeneity of underlying assets. On the other hand, the STS label allows originators to profit from a wider investor base and to improve their reputation and market positioning (EBA et al., 2021).

Besides regulating the originating entities, the EUSR focuses on increasing investors' demand for high-quality securitizations by mitigating asymmetric information and, therefore, the search costs of the investors, especially with the STS label as a quality signal, but also by introducing a preferential prudential treatment of STS labelled securitizations. Furthermore, the regulation mandates investors to conduct a thorough due diligence before investing in securitization tranches and reveals that the STS label is *not* a substitute for investors' risk assessment.

The impact of the EUSR on the main investor groups of EU securitizations differs according to their regulatory regime, which can be broadly divided into the regimes for, firstly, fund managers, asset managers and further investment companies, secondly, credit institutions and, thirdly, insurance companies. Thereby, fund managers, asset managers and further investment companies account for 45–62% of investments into EU securitizations, while credit institutions and insurance companies account for 26–33% and 2–4% respectively. Additionally, central banks and supranational institutions act as investors in the EU RMBS market, making up 6–15% of investments into EU securitizations (DZ Bank, 2016, 2017, 2018, 2019, 2020).

Fund managers, asset managers and further investment companies do not have to adhere to regulatory capital requirements when investing in securitizations and are, primarily, impacted by the EUSR's due diligence requirements (EU, 2011, 2017a). These lead to a more thorough risk assessment to be performed by this group of investors. Their low level of regulatory pressure might leave them to have a higher risk appetite and a lower incentive to invest into AAA securitizations. For credit institutions the EUSR includes an amendment to the CRR of 2013, which adjusts capital requirements for investments into securitizations. These are considerably lower for STS labelled compared to non-STS securitizations (EU, 2013, 2017b). A further amendment in relation to the EUSR introduces adjustments for the eligibility of securitizations for inclusion to the calculation of the liquidity coverage ratio (LCR). Only the most senior tranche of a securitization that meets a number of security design features can qualify as a high-quality liquid asset (HQLA) and, therefore, be included in the calculation of a credit institution's LCR (EU, 2014a, 2018a). Consequently, EU credit institutions might have a regulatory induced incentive to invest into STS labelled securitizations and, particularly, into the most senior tranche of an STS labelled deal. Furthermore, the higher level of regulatory pressure could induce a reduced risk appetite of EU credit institutions. Due diligence requirements for credit institutions are only slightly increased. For insurance companies the EUSR

includes an amendment of capital requirements that are, also, considerably lower for STS labelled securitizations, while due diligence requirements remain similar (EU, 2014b, 2018b). Regarding central banks and supranational institutions, especially the ECB is investing into securitizations via the ABSPP. Thereby, the ECB follows its own criteria for the Eurosystem eligibility of securitizations, which allow for the purchase of both STS labelled and non-STS securitizations (ECB, 2015).

Our analyses are based on European data since the EUSR and the STS label are only established in the EU. However, our investigations are also more generally relevant for designing complex financial securities, as we disentangle the effect of labeling complex securities and the features required to receive the label. Since the EU and the BCBS discuss the STS label, non-EU regulators can leverage our analysis and decide whether to implement certain design features or labels, such as the STS label, into their regulatory landscape. Because of the predominance of the US securitization market, we briefly discuss differences in the corresponding EU and US regulations. The first key difference is the US government's strong support for securitizations, which does not exist in the EU (EC, 2015; SIFMA, 2017). The general response to the financial crisis in the form of a gradual introduction of several regulatory initiatives between 2010 and 2019 is similar; the EU implemented aspects of the global voluntary Basel framework in the CRD frameworks, whereas the US signed the Dodd–Frank Act (DFA) in July 2010, which determines regulatory objectives to be implemented in the following years (SEC, 2014). The main topics addressed in both the US and the EU include risk retention and disclosure requirements (SEC, 2014; US Congress, 2019). The EU introduced mandatory risk retention ahead of the US, while the US was quicker to introduce a comprehensive regime on asset-level disclosure (US Congress, 2010; SEC, 2019; US Office of the Federal Register, 2019). However, in general, the current EU's regulatory requirements for securitizations are more extensive than in the US.

3.2 Sample selection and variable measurement

Our sample consists of more than 31 million quarterly loan-level observations of around 3.9 million loans, which are securitized in 186 private-label RMBS deals issued in the EU between 01/2015 and 12/2019. We track the loan-level data from the respective deal issuance until 02/2020. We restrict the sample to this period since it begins after the launch of the ECB's ABSPP in 2014, which impacts securitization pricing, and ends before the SARS-CoV-2 pandemic, which influences pricing and loan performance. European RMBS represents a relatively safe asset class known to have low default rates in the asset pool. RMBS constitute the largest asset class in the EU securitization market with an issue volume of € 100.3 billion and a market share of 46% in 2019 (AFME, 2020). Hence, we focus on this market because of its importance and homogeneity in the underlying assets.

Summarizing our empirical investigations, we first scrutinize the overall effect of the EUSR on tranches' spreads. Second, we investigate the importance of design features versus receiving the label for the tranches' spreads. Therefore, we generate the variable *Features*, which measure the number of STS features a deal contains.

We extract these features from the deals' documents and use the variable *Features* to identify the differences in security designs. Third, we turn from tranche pricing to loan performance by analyzing the EUSR's overall effect on loan performance. Finally, we compare the importance of features and the label for loan performance.

As the first set of variables, we generate indicators for deals issued under the new regulatory regime. The indicator variable *EUSR* takes the value of 1 if the corresponding deal is issued after 12/2018 under the EUSR. The indicator variable *STS* takes the value of 1 if the corresponding deal is an STS deal. Notably, the STS label is awarded on the deal level, implying that all tranches of an STS (EUSR) deal are STS (EUSR) tranches. All STS deals are also EUSR deals because the STS concept contains only additional features. Deals issued in the pre-EUSR period can also receive the STS label after 12/2018. Deals issued in the pre-EUSR period that fulfill the EUSR minimum criteria are EUSR compliant from January 2019, while deals issued in pre-EUSR period that do not fulfill the EUSR minimum criteria are subject to grandfathering provisions and do not have to fulfill the EUSR minimum criteria, as long as they do not issue new securities (EU, 2017a).

The variable *Features* measures the quality of the deal's security design and reflects the number of STS features (including the mandatory EUSR features) a specific deal contains. To assess the *Features*, we manually check whether the deal fulfills the required features listed in Appendix 1 and generate indicator variables for compliance with each of them based on the deal's documents. We calculate the variable *Features* as the sum of all indicators. The variable takes values between 0 (if a deal fulfills no features) and 48 (if a deal fulfills all STS features). In our sample all deals that fulfill the 48 STS features and, as a consequence, qualify for the STS label, are awarded with the label but sometimes with some time delay.

We measure loan performance with indicator variables for a loan becoming non-performing (*NPL*) or defaulted (*Default*) and derive these variables from the EDW variables *Account Status* and *Default or Foreclosure*. As loan-level control variables, we consider the following loan characteristics: *Interest Rate* (in %), *Time To Maturity* (in months) and *Loan To Value* (LTV) (in %) as measures of credit risk, and *Loan Balance* (in T€) as a proxy for risk concentration (Ghent and Valkanov, 2016). We winsorize the loan-level control variables on the 0.5%-level to account for outliers.

To analyze the pricing of the RMBS tranches, the dependent variable is the (log-transformed) daily secondary market *Spread* of a tranche (in bp), and we control for tranche- and deal-level characteristics at issuance. We use the tranches' *Subordination Level* (in %) as a measure of credit enhancement, the *Weighted Average Life* (WAL) (in years) as a measure of the time to maturity, the *Deal Size* (in million €) and the *Number of Tranches* as measures of deal complexity, and the *Tranche Size* (in million €) as a measure of tranche liquidity. We also control for the tranches' rating and the sovereign rating of the country in which the collateral is located; for both, we collect the rating of DBRS, Fitch, Moody's and S&P, unify rating scales to values ranging from 1 (AAA) to 8 (CC) and generate the average rating.

Table 1 Distribution of tranche- and loan-level observations over time

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|--|-----------|-----------|------------|------------|------------|------------|------------|
| <i>Panel A: Tranche-level observations</i> | | | | | | | |
| Pre-EUSR issue | 3108 | 16,492 | 41,172 | 83,744 | 133,277 | 142,489 | 142,479 |
| Post-EUSR issue | | | | | | | |
| Non-STIS | 0 | 0 | 0 | 0 | 1959 | 2905 | 2905 |
| STIS | 0 | 0 | 0 | 0 | 3260 | 4778 | 4778 |
| Total | 3108 | 16,492 | 41,172 | 83,744 | 138,496 | 150,162 | 150,162 |
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| <i>Panel B: Loan-level observations</i> | | | | | | | |
| Pre-EUSR issue | 1,784,980 | 6,173,791 | 12,916,402 | 21,577,050 | 29,443,316 | 29,970,983 | 29,970,983 |
| Post-EUSR issue | | | | | | | |
| Non-STIS | 0 | 0 | 0 | 0 | 219,920 | 325,964 | 325,964 |
| STIS | 0 | 0 | 0 | 0 | 889,559 | 908,469 | 908,469 |
| Total | 1,784,980 | 6,173,791 | 12,916,402 | 21,710,100 | 30,552,795 | 31,205,416 | 31,205,416 |

The number of the tranche-level (Panel A) and loan-level observations (Panel B) in the dataset for the outstanding deals issued before or after the EUSR, where the post-EUSR issues are either non-STIS or STIS. The numbers are increasing as we can track the issued tranches and securitized loans over time. We identify STIS deals with the ESMA list of STIS notifications. Note that all deals issued after 2018 are EUSR deals. We provide all variable definitions in Appendix 2

3.3 Data description

Our dataset stems from five different sources. The source of the loan-level data is the European Data Warehouse (EDW), which is the leading European securitization repository established during the ECB's loan-level initiative. We receive the secondary market spreads from IHS Markit, and the tranche- and deal-level data for spreads' analyses are provided by Concept ABS. We identify STIS deals using the European Securities and Markets Authority (ESMA) list of STIS notifications. For the scoring variables, we manually extract information from deals' prospectuses and documents.

We observe approximately 498,000 loans, with 1.2 million loan-quarter observations from 37 EUSR deals. Altogether, our STIS subsample consists of about 350,000 loans, with approximately 900,000 quarterly loan observations from 22 deals. We observe that originators who opted for issuing STIS deals in the EUSR period issued only STIS and no non-STIS deals. The average originator issued 2.55 deals in our sample. Table 1 shows the sample composition over the sample period.

Similar to Ertan et al. (2017), we exclude very small mortgages with original balances under € 1000 and potentially erroneous loans with a current balance higher than the original balance. We also exclude loans with missing values in relevant variables and redeemed or repurchased loans. We exploit the variance in the performance variables Default and NPL for our investigations, even though loans have relatively low probabilities of becoming non-performing or default due to the personal

Table 2 Descriptive statistics of the loan-level sample

| | N | Mean | SD | Min | q50 | Max |
|--|------------|-------|------|------|------|------|
| <i>Panel A: Descriptive statistics</i> | | | | | | |
| Dependent variables | | | | | | |
| NPL (0/1) | 31,205,416 | 0.94% | | | | |
| Default (0/1) | 31,205,299 | 0.11% | | | | |
| Variables of interest | | | | | | |
| EUSR Loan (0/1) | 3,954,018 | 13% | | | | |
| STS Loan (0/1) | 3,954,018 | 9% | | | | |
| EUSR Loan obs. (0/1) | 31,205,416 | 3.9% | | | | |
| STS Loan obs. (0/1) | 31,205,416 | 2.9% | | | | |
| Control variables | | | | | | |
| Interest rate (%) | 31,205,416 | 2.8 | 1.2 | 0.2 | 2.6 | 6 |
| Loan balance (€ thousand) | 31,205,416 | 88.4 | 73.5 | 1 | 73.2 | 450 |
| Loan to Value (%) | 31,205,416 | 63.9 | 28.2 | 2.7 | 66.4 | 149 |
| Time to Maturity (months) | 31,205,416 | 206.7 | 98.7 | 9 | 207 | 465 |
| | Overall | 2015 | 2016 | 2017 | 2018 | 2019 |
| <i>Panel B: Distribution of the average number of features over time</i> | | | | | | |
| Avg. Features | 32.4 | 28.5 | 29.6 | 29.6 | 33.3 | 42.5 |
| Pre-EUSR | 29.4 | | | | | |
| Post-EUSR/Non-STs | 36.3 | | | | | |
| Post-EUSR/STS | 48 | | | | | |

Panel A of this table presents the summary statistics of our dependent and control variables, as well as of our explanatory variables on the loan level. We winsorize the loan-level control variables on the 0.5%-level. N refers to the number of loans or quarterly loan observations. Panel B provides the distribution of the average number of features the deals fulfill. We provide all variable definitions in Appendix 2

liability of many European mortgage debtors and the relatively stable economic state during the sample period. Regarding our explanatory variables *EUSR* and *STS*, the sample averages show that 13% (9%) are EUSR loans (STS loans). The variable *Features* is calculated for 162 of 186 deals since we do not have access to the required documents for the remaining deals. The average number of features is 32.4 out of 48. Table 2 provides an overview of the score distribution. The descriptive statistics show that the originators did not significantly improve the security design until the introduction of the EUSR. Table 2 shows the descriptive statistics of the loan-level control variables. The *Interest Rate* is, on average, 2.8%, the mean *Loan Balance* is about € 88,000, the mean *Time To Maturity* is 17 years, and the mean *LTV* is approximately 64%, indicating that the average mortgages are safe.

The second part of the sample consists of 150,162 daily tranche-level observations of 308 European floating rate RMBS tranches, stemming from Concept ABS and IHS Markit. For loan-level data, the sample includes deals issued between 2015 and 2019, and we track secondary market spreads until 02/2020. The predominant tranche rating is AAA (30% of the observations), most observations are tranches issued in 2018 (27%), and most of the collateral is located in the Netherlands and

Table 3 Composition of the tranche-level sample

| | Obs | Percentage | | Obs | Percentage |
|----------------------|-----|------------|------------------------------|-----|------------|
| <i>Year</i> | | | <i>Country of collateral</i> | | |
| 2015 | 50 | 16.23 | Belgium | 10 | 3.25 |
| 2016 | 54 | 17.53 | France | 31 | 10.06 |
| 2017 | 63 | 20.45 | Germany | 6 | 1.95 |
| 2018 | 83 | 26.95 | Ireland | 54 | 17.53 |
| 2019 | 58 | 18.83 | Italy | 25 | 8.12 |
| <i>Credit rating</i> | | | Spain | 18 | 5.84 |
| AAA | 93 | 30.19 | Netherlands | 164 | 53.25 |
| AA | 73 | 23.70 | | | |
| A | 55 | 17.86 | | | |
| BBB | 34 | 11.04 | | | |
| BB | 19 | 6.17 | | | |
| B | 9 | 2.92 | | | |
| CCC | 1 | 0.32 | | | |
| NR | 24 | 7.79 | | | |

The tranche-level sample comprises 308 European floating rate tranches issued between 2015 and 2019. We report the distribution of tranches across years and ratings as well as summary statistics of country of collateral, which is the reference for the control variable sovereign rating. We provide all variable definitions in Appendix 2

Ireland (71%). Table 3 provides an overview of the tranche-level data based on the subsample of deals we can match between our data sources. Table 4 shows the descriptive statistics of the tranche-level variables. The dependent variable in the tranche-level data, the tranche's secondary market *Spread*, has a mean of 136 bp and a maximum value of 2140 bp. Our explanatory variables are the indicator variables *EUSR* and *STS* and the number of *Features*. Regarding the control variables, the average *Subordination Level* is 10.9%, and the *WAL* ranges from 1.2 to 27 years. The average *Deal Volume* is € 979.7 million, with an average deal of 5 tranches. The most complex deal consists of 11 tranches, and the largest has a *Deal Volume* of € 10 billion.

4 The impact of design features and labels on tranche pricing

4.1 The regulation's effect on the pricing of securitizations

We begin our analyses by investigating the capital market-orientated research questions: How do the improved features of complex financial products affect the securitizations pricing? What is the impact of the simple quality label on the tranches' credit spreads? To answer these research questions, we start by testing hypotheses H1a/b (“*The improved design features (quality label) of STS tranches lead to a reduced credit spread*”) and H2a/b (“*The impact of improved features (the missing quality signal) dominates—the credit spread of EUSR tranches decrease (increase).*”

Table 4 Descriptive statistics of the tranche-level sample

| | N | Mean | SD | Min | q50 | Max |
|------------------------------|---------|--------|-------|-------|-------|--------|
| <i>Dependent variable</i> | | | | | | |
| Spread (bps) | 150,162 | 136.14 | 139.9 | 1.5 | 90 | 2140 |
| <i>Variables of interest</i> | | | | | | |
| EUSR deal (0/1) | 308 | 19% | | | | |
| STS deal (0/1) | 308 | 12% | | | | |
| EUSR obs. (0/1) | 150,162 | 5.1% | | | | |
| STS obs. (0/1) | 150,162 | 3.2% | | | | |
| <i>Control variables</i> | | | | | | |
| Subordination Level (%) | 308 | 10.9 | 10 | 0 | 8 | 99 |
| WAL (years) | 308 | 5.3 | 2.8 | 1.2 | 5 | 27 |
| Vol. Tranche (€ million) | 308 | 385.7 | 836.9 | 2.5 | 43.8 | 6650 |
| Vol. Deal (€ million) | 308 | 979.7 | 1164 | 149.9 | 608.4 | 10,000 |
| No. Tranches | 308 | 5.2 | 1.9 | 1 | 5 | 11 |

Summary statistics of 308 RMBS floating rate tranches issued between 2015 and 2019. It presents the summary statistics of our dependent and control variables, as well as of our explanatory variables on tranche level. N refers to the number of tranches or daily tranche observations. We provide all variable definitions in Appendix 2

We run the following two-way fixed effects regression on tranche-level data to examine this:

$$\log \text{Spread}_{i,t} = \beta_0 + \beta_1 \cdot \text{EUSR}_{i,t} + \beta_2 \cdot \text{EUSR} \times \text{STS}_{i,t} + \delta \cdot \text{Controls}_{i,t} + \psi_o + \psi_t + \psi_{o \times t} + \varepsilon_{i,t} \quad (1)$$

The dependent variable is the log-transformed secondary market *Spread* of tranche i at time t . The coefficients of *EUSR* and *EUSR* \times *STS* present the relative difference of tranche spreads in comparison to pre-EUSR issues observed at the same time for a given originator. We control for the *Subordination Level*, *Size* and *WAL* of a tranche, and the *Deal Size* and *Number of Tranches* at issuance. We also control for the sovereign rating of the country where the collateral is located and the tranche's issuance rating as linear variables. We implement trading day fixed effects ψ_t to account for the ABSPP and other macroeconomic factors. Additionally, we control for unobservable differences in (time-dependent) originator characteristics using originator fixed effects ψ_o and originator-year fixed effects $\psi_{o \times t}$. Simultaneously, these variables incorporate country fixed effects since the originators only securitize loans from a single country in our sample. All variable definitions are provided in Appendix 2. We cluster standard errors on the deal level.

The results are presented in Table 5. In column (1), we consider the full sample. The tranche spreads of EUSR tranches are around three times higher than for non-EUSR tranches, which is in line with the hypothesis that the impact of the missing quality signal is dominating (H2b). STS tranches, however, have 43% lower spreads than EUSR tranches, which is line with hypothesis H1, even if we cannot differentiate whether the effect is driven by improved design features or the quality

Table 5 Pricing EUSR and STS tranches

| Subsample | All (1) | Non-AAA (2) | AAA (3) | All (4) | Non-AAA (5) |
|-----------------------------------|---------------------|--------------------|------------------|---------------------|--------------------|
| Dep. variable | Log Spread | Log Spread | Log Spread | Log Spread | Log Spread |
| EUSR | 1.148*** (6.682) | 1.398*** (6.390) | 1.124** (2.655) | 0.961*** (5.900) | 1.345*** (6.484) |
| EUSR × STS | −0.581** (−3.338) | −0.311* (−2.041) | −1.036* (−2.439) | −0.323+ (−1.670) | −0.093 (−0.649) |
| Log Vol. Tranche | −0.358*** (−10.842) | −0.212*** (−5.442) | −0.215 (−1.560) | −0.360*** (−10.592) | −0.215*** (−5.657) |
| Log Vol. Deal | 0.475*** (7.088) | 0.342* (5.018) | 0.274+ (1.751) | 0.479*** (7.131) | 0.355*** (4.954) |
| Subordination Level | −0.007 (−1.497) | −0.022* (−2.947) | −0.012* (−1.932) | −0.007 (−1.538) | −0.023* (−2.971) |
| No. Tranches | −0.053 (−1.373) | 0.042* (1.996) | −0.086* (−2.196) | −0.052 (−1.370) | 0.036+ (1.680) |
| WAL | 0.039** (2.864) | 0.012 (0.957) | 0.135*** (4.689) | 0.039** (2.816) | 0.012 (0.938) |
| I _A Cap. Req. <0 | | | | 0.253* (2.133) | 0.178 (1.115) |
| I _A Cap. Req. <0 × STS | | | | −0.412+ (−1.879) | −0.405+ (−1.802) |
| Observations | 150,162 | 97,643 | 52,519 | 150,162 | 97,643 |
| Adjusted R ² | 0.857 | 0.799 | 0.730 | 0.857 | 0.799 |
| Controls | | | | | |
| Sovereign rating | Yes | Yes | Yes | Yes | Yes |
| Tranche rating | Yes | Yes | Yes | Yes | Yes |
| Fixed Effects | | | | | |
| Trading day | Yes | Yes | Yes | Yes | Yes |
| Originator | Yes | Yes | Yes | Yes | Yes |
| Originator × Year | Yes | Yes | Yes | Yes | Yes |
| Clustered SE | Deal | Deal | Deal | Deal | Deal |

The estimates of two-way fixed effects regressions with the log transformation of spreads as dependent variable (see Eq. 1). The coefficients of *EUSR* (*EUSR* × *STS*) represent the relative change in spreads compared to non-EUSR tranches (non-STS tranches). We include the tranche-level control variables, ratings and trading day, originator, and originator × year fixed effects in all regressions. In column (1), we consider all observations, and in columns (2) and (3), we split the sample into non-AAA tranches and AAA tranches. In columns (4) and (5), we additionally study whether shrinking capital requirements due to the EUSR have an effect on spreads for Non-STS or STS tranches. We provide all variable definitions in Appendix 2. Standard errors are clustered at the deal level. *t* statistics are presented in parentheses. Statistical significance is denoted as follows: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

label. These values correspond to an absolute spread increase of 125 bps for EUSR tranches, whereas this effect is reduced for STS tranches by 59 bps. Considering the average sample size of an RMBS tranche (€ 386 million), this translates into an annual additional risk premium of € 4.8 million for EUSR tranches, which is a surprising finding since the security design of these deals is improved compared to pre-EUSR issues. Issuing STS deals instead decreases this risk premium by € 2.3 million per annum.

In columns (2) and (3), we split the sample into non-AAA and AAA tranches to test hypothesis H3 (*“The spread-reducing effect of the STS quality label is more pronounced for investors with low risk appetite”*). While the spread-increasing effect for EUSR tranches is similar for non-AAA tranches and AAA tranches, the spread-reducing effect of STS tranches almost triples for AAA tranches. Thus, in line with hypothesis 3, particularly AAA investors seem to heavily rely on the new STS label.

In columns (4) and (5), we test hypothesis H4 (*“The spread-reducing effect of the STS quality label is only partially explained by reduced capital requirements”*). Capital requirements increase for all AAA tranches but for non-AAA tranches, we have to differentiate based on the rating and whether the security is an STS tranche. We identify all tranches with reduced capital requirements due to the EUSR (non-STS and STS) and implement an indicator variable for reduced capital requirements ($I_{\Delta \text{Cap. Req.} < 0}$). To analyze potentially different effects for non-STS and STS tranches, we additionally consider an interaction term with STS tranches.

Consistent with hypothesis H4, we find that the spread increase of (non-STS) EUSR tranches and the spread reduction of STS tranches cannot be explained by different capital requirements. For EUSR tranches, the spread increases not only for tranches with increased but also with reduced capital requirements. Conversely, the spread of STS tranches is lower than of EUSR tranches no matter of whether we compare tranches with increased or decreased capital requirements. Thus, the observed spread increase of EUSR tranches and the reduced spreads of STS tranches are not simply a consequence of different capital requirements.

Furthermore, by splitting the sample into non-AAA and AAA tranches, we account for credit institutions' potential high demand for LCR eligible tranches. Only the most senior tranche of a deal is eligible for use as a HQLA and these are predominantly rated AAA in our sample. We also consider investors' potential high demand for STS tranches and a resulting liquidity impact on spreads of STS tranches by investigating the development of the different tranches' liquidity which we proxy by secondary market bid-ask spreads. In the post-EUSR period, bid-ask spreads of STS tranches are not lower than of non-STS tranches. This demonstrates that there is no liquidity effect and, consequently, no related distortion in our analysis on the pricing of STS tranches. In conclusion, first, the regulation's impact on the originators' financing costs is substantial; second, investors demand a substantially higher risk premium for non-STS tranches, even if capital requirements are reduced; third, the low risk appetite of AAA investors incentivizes them to pay more attention to the STS label; and fourth, the spread reducing effect of STS tranches holds true regardless of whether or not the capital requirements are reduced.

4.2 Features or label—What does matter for pricing complex financial securities?

In the previous section, we investigated the regulation's overall effect. Next, we seek to disentangle the price effects of improved features (H1a) versus the design label (H1b), as the previous results could be due to three effects. First, the price differences could be explained by the increased demand for high-quality securitizations resulting from the STS label's quality signal. Here, the spread reduction effect of the STS label should be especially pronounced when a deal receives the label. Second, investors might seek tranches of deals with high-quality security design *features*, and given the existence of two different quality groups, they prefer to invest in STS tranches because they incorporate a high number of design features. Therefore, the spreads of EUSR tranches must increase significantly compared to STS tranches to attract any investments. Third, investors may have private information about the deals' riskiness and expected performance available. If their information reveals that EUSR deals are riskier than pre-EUSR and STS deals, our findings of higher spreads for EUSR tranches would be rationally explained by a worse quality.

We investigate these explanations in three steps: (I) We scrutinize the effect of receiving the STS label. We find a within-tranche spread reduction effect as soon as a deal receives the STS label, which underlines the importance of the STS label. (II) We analyze whether investors consider a high-quality security design measured by the number of fulfilled *Features*. We point out that investors rely on the label rather than investigating the design features, which is consistent with hypothesis H1b. (III) To rule out that the label is an indicator for improved loan performance (and investors may have private information on such an improved performance—even if we do not find any indications in the observable variables), we investigate the regulation's effect on loan performance in Sect. 5. We show that loan performance is *increased* by EUSR regulation in general, but not particularly for STS deals; this contradicts investors having private information regarding the future adverse performance of EUSR deals. We conclude that although we do not find any evidence on a lower pool quality of non-STs deals, investors misappraise these deals irrespective of their underlying security design and misprice their pool risk because they erroneously assume that EUSR deals are of worse quality based on the missing STS label.

(I) To analyze the effect of receiving the STS label, we investigate the within-tranche change of the credit spread at the time of STS notification for the respective deal. For this purpose, we only consider the subsample of deals that received the STS label after issuance. The originator is solely responsible for complying with the STS features and sends a filled-in form, including detailed information on the deal, to ESMA, which reviews the application and confirms the compliance by including the deal in its list of STS deals. As the security design features of a deal are already determined at issuance, the only aspect that changes is the receipt of the STS label. This accounts for 93 tranches, and the median time between deal issuance and receiving the STS label is 14 days.

As we are interested in the within-tranche effect of receiving the STS label, we implement a two-way fixed effects model on tranche-level (Eq. 2). By including tranche fixed effects λ_i , we control for all time-constant tranche-specific characteristics in general and the security design *features* in particular. We include the indicator

Table 6 Pricing the label

| Subsample | All (1) | Non-AAA (2) | AAA (3) |
|-----------------------|------------------------------|-----------------|-------------------------------|
| Dep. variable | Log Spread | Log Spread | Log Spread |
| STS label | -0.138 ⁺ (-1.767) | -0.035 (-0.385) | -0.159 ^{**} (-2.750) |
| Observations | 150,162 | 97,643 | 52,519 |
| Adjusted within R^2 | 0.275 | 0.308 | 0.546 |
| Fixed effects | | | |
| Tranche | Yes | Yes | Yes |
| Trading Day | Yes | Yes | Yes |
| Clustered SE | Deal | Deal | Deal |

The estimates of two-way fixed effects regressions with the log transformation of spreads as dependent variable (see Eq. 2). The estimates of *STS Label* refer to the relative change in spreads when the respective deal, hence, the corresponding tranches receive the STS label. We include tranche and trading day fixed effects in all specifications. In column (1), we consider all observations, and in column (2) and (3), we split the sample in non-AAA tranches and AAA tranches. We provide all variable definitions in Appendix 2. Standard errors are clustered at the deal level. t statistics are presented in parentheses. Statistical significance is denoted as follows: ⁺ $p < 0.10$, ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$

variable *STS Label*, whose value changes from 0 to 1 on the day the deal receives the label. The coefficient of the *STS Label* shows the relative difference of the tranche's spread before and after receiving the STS label. We include trading day fixed effects ψ_t to control for time-variant macroeconomic factors:

$$\log \text{Spread}_{i,t} = \beta_1 \cdot \text{STS Label}_{i,t} + \lambda_i + \psi_t + \varepsilon_{i,t} \quad (2)$$

We present the results in Table 6 and find that the tranche's average spread after receiving the STS label is about 13% lower than before receiving the label. The effect of receiving the STS label is particularly pronounced for AAA tranches, which is in line with our previous results of risk averse AAA investors relying on the STS label. These results show that receiving the STS label has a substantial spread reduction effect, which cannot be attributed to an improved security design, as the deal features have already been fixed at issuance, which strongly supports H1b.

(II) Coming back to the larger sample including deals without a change from non-STs to STS, it remains unanswered whether the assigned label solely drives the results (H1b) or whether the improved security design (H1a) is additionally responsible for lower spreads (as STS deals comply concurrently with a higher number of features).

To differentiate between the effect of the label and the security design features, we first implement the regression displayed in Eq. 1 and add the variable *Features*. Furthermore, based on the interaction term $I_{\text{Features}=48} \times \text{STS}$, we can disentangle the potential spread reduction effect resulting from a high number of features (48 for

STS deals) from the STS label.¹ Second, we add a quadratic and a cubic term of the variable *Features* to investigate non-linear patterns in the effect of the security design and the indicator variable for complying with all features $I_{Features=48}$. This procedure allows us to investigate potential discontinuities at the jump from *Features* < 48 to *Features* = 48, which is technically a regression discontinuity design (RDD).² We estimate the models as described in Sect. 4.1 and present the results in Table 7. As we control for the originator and trading day (and originator \times time), the results refer to the differences between EUSR or STS tranches to non-EUSR tranches of a given originator at the same time. In all regressions, spreads are higher for EUSR tranches. Our results reveal that investors care about the STS label but not the underlying design features: In none of the considered model specifications, the features have a spread reduction effect, but only if a deal has the STS label—in addition to complying with all 48 features—the spread is substantially reduced. The effect holds true for the entire sample and separately for non-AAA and AAA tranches. This underlines that the label's previously identified spread reduction effect does not arise only because the respective deal complies with all features. Overall, these findings imply that instead of performing their risk assessment, which was intended by the regulation, investors rather rely on easily accessible information such as the STS label.

5 The impact of design features and labels on loan performance

5.1 The regulation's effect on loan performance

In this section, we investigate whether the improved features of complex financial securities and their labels affect loan performance. First, we exploit the EUSR to analyze the aggregate effect of the regulation on loan performance. Afterwards, we disentangle the effect of the label and design features in Sect. 5.2. Considering the regulation at large, we compare deals affected by the regulation with deals issued beforehand. According to hypothesis H5 (*“Loan performance is superior for deals affected by the regulation”*), the improved security design of deals affected by the EUSR aligns originators' and investors' incentives, which induces superior loan performance.

¹ Ideally, we would establish a model, in which we separately analyze the influence of all 48 distinct required features, but with such specifications come severe problems: Some features have no variance (e.g., Risk Retention, which is already obligatory from the start of our sample period) while others are highly correlated or only appear jointly (e.g., features 15 and 16 in Appendix 1: True Sale and No Severe Clawback Provisions). This makes it difficult to distinguish the individual variables' effect. Another problem is the resulting high number of indicator variables in combination with the necessary fixed effects. These considerations make statistical inference difficult and leads us to refrain from performing such analyses.

² In our sample all deals complying with the 48 Features receive the STS label.

Table 7 Design features and labels—what does matter for pricing?

| Subsample | All (1) | Non-AAA (2) | AAA (3) | All (4) | Non-AAA (5) | AAA (6) |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Dep. variable | Log Spread | Log Spread | Log Spread | Log Spread | Log Spread | Log Spread |
| EUR | 1.177*** (7.249) | 1.732*** (6.021) | 1.150*** (2.771) | 1.162*** (6.824) | 1.785*** (6.003) | 0.955** (2.186) |
| $I_{\text{Features}=48}$ | 0.364 (1.578) | 0.415 (1.619) | 0.337 (1.101) | 1.207 (0.497) | -0.956 (-0.316) | 3.644 (1.312) |
| $I_{\text{Features}=48} \times \text{STS}$ | -0.806*** (-3.792) | -0.618*** (-2.993) | -1.228*** (-2.802) | -0.782*** (-3.418) | -0.681*** (-2.878) | -1.330*** (-2.930) |
| Features ² | -0.009 (-0.583) | -0.007 (-0.413) | -0.009 (-0.470) | -0.303 (-0.350) | 0.197 (0.194) | -3.527 (-1.559) |
| Features ³ | | | | 0.011 (0.347) | -0.010 (-0.260) | 0.110 (1.518) |
| Observations | 150,162 | 97,643 | 52,519 | -0.000 (-0.351) | 0.000 (0.307) | -0.001 (-1.480) |
| Adjusted R^2 | 0.859 | 0.803 | 0.733 | 150,162 | 97,643 | 52,519 |
| Controls | | | | 0.859 | 0.804 | 0.736 |
| Tranche Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Sovereign Rating | Yes | Yes | Yes | Yes | Yes | Yes |
| Tranche Rating | Yes | Yes | Yes | Yes | Yes | Yes |
| Fixed Effects | | | | | | |
| Trading Day | Yes | Yes | Yes | Yes | Yes | Yes |
| Originator | Yes | Yes | Yes | Yes | Yes | Yes |
| Originator \times Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Clustered SE | Deal | Deal | Deal | Deal | Deal | Deal |

The estimates of two-way fixed effects regressions with the log-transformed *Spreads* as dependent variable (Eq. 1). The coefficients of *EUSR* represent the relative change in spreads compared to non-EUSR tranches, and the coefficients of $I_{\text{Features}=48}$ represent the spread change compared to tranches that do not comply with all STS features. We include the number of *Features* as a linear, squared, and cubic term. In column (1) and (4), we consider all observations, in columns (2) and (5), we only consider non-AAA tranches whereas we consider all AAA tranches in columns (3) and (6). We provide all variable definitions in Appendix 2. Standard errors are clustered at the deal level. t statistics are presented in parentheses. Statistical significance is denoted as follows: $^+ p < 0.10$, $^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

Therefore, we examine the EUSR's effect on loan performance measured by the indicator variables *NPL* and *Default*. We compare the loan performance for EUSR deals with the base category of deals issued before the regulation, as stated in Eq. 3.

$$\begin{aligned}
 P(NPL_{j,t+1} = 1|X_{j,t}) &= \beta_0 + \beta_1 \cdot EUSR_{j,t} + \delta \cdot Controls_{j,t} + \psi_o + \psi_t + \psi_{oxl} + \psi_{j,l} + \psi_{j,year} \\
 &\text{and} \\
 P(Default_{j,t+1} = 1|X_{j,t}) &= \beta_0 + \beta_1 \cdot EUSR_{j,t} + \delta \cdot Controls_{j,t} + \psi_o + \psi_t + \psi_{oxl} + \psi_{j,l} + \psi_{j,year}
 \end{aligned}
 \tag{3}$$

Here, *EUSR* indicates if loan *j* at time *t* is part of an EUSR deal. *Controls* is a vector consisting of the loan-level control variables *Time To Maturity*, *Interest Rate*, *Loan To Value*, and *Log Loan Balance*. We provide variable definitions in Appendix 2. Since the variable of interest, *EUSR*, does not vary within a deal, we cannot use deal fixed effects. However, we include originator and time fixed effects as well as originator-year fixed effects, which allows us to control for heterogeneity within originator and year. Controlling for the originator is important to mitigate confounding problems emerging from originator-specific factors such as market positions, margins, and costs. With these fixed effects, we implicitly also control for country fixed effects since the originators only securitize loans from a single country in our sample. In addition, we control for loan lien fixed effects $\psi_{j,l}$ and year-of-loan-origination fixed effects $\psi_{j,year}$. We estimate the main model as pooled logit regressions and cluster standard errors on deal level.³

Columns (1) and (2) of Table 8 present the results. We find that the likelihood of becoming NPL is twice lower for EUSR loans than for pre-EUSR loans, and that defaults are even less likely, which is in line with hypothesis H5. The results for the control variables are in line with our expectations: Loans that are riskier regarding LTV and loans with higher interest rates perform worse. In addition, we check whether our results differ if we exclude our control variables because the results might be driven by systematic differences in loan characteristics considered in our controls. Without controlling for loan characteristics, the coefficients for EUSR (not displayed) become economically even more meaningful and statistically significant, which suggests that originators might assign loans based on observable loan characteristics to the different deal types.

As the regulation increases performance, controlling for the originator, our previous results hint towards within-originator heterogeneity. A possible explanation is the circumvention of security design *features* by accessing deals issued in the pre-EUSR period. This might occur in two ways: Originators can shift risk from their balance sheet to securitizations, or, anticipating that they will issue EUSR deals with enhanced security design features in the future, they can shift risk from future EUSR deals to pre-EUSR deals to circumvent the features. In either way, a necessary condition is the originator's access to pre-EUSR deals.

³ To investigate the causal effect of the regulation, it could also be considered to implement a standard difference-in-differences (DID) setting. In such a case, the indicator variable *EUSR Loan* would constitute the post indicator and another indicator for *STS Loans* for treated (STS) loans; however, the exogeneity assumption of the treatment would be violated since originators can choose to issue STS deals.

Table 8 Loan performance in EUSR deals

| Dep. Variable | NPL (1) | Default (2) | NPL (3) | Default (4) | NPL (5) | Default (6) |
|-------------------------------|-------------------|--------------------|-----------------------|-----------------------|-----------------------|---------------------|
| Instrument/Estimation | Logit | Logit | Non-EUSR Deals (0/1) | Share Non-EUSR Deals | | |
| EUSR | -0.934** (-2.656) | -1.689*** (-6.586) | -0.008237*** (-3.694) | -0.000323*** (-3.300) | -0.008027*** (-4.337) | -0.000185* (-1.662) |
| Interest Rate | 0.110* (2.215) | 0.094 (1.023) | 0.000974 (1.475) | 0.000029 (0.630) | 0.000974 (1.475) | 0.000029 (0.625) |
| Log Loan Balance | -0.004 (-0.176) | 0.002 (0.059) | -0.000055 (-0.262) | -0.000002 (-0.175) | -0.000056 (-0.267) | -0.000002 (-0.209) |
| Loan to Value | 0.010*** (7.388) | 0.019*** (6.302) | 0.000077*** (4.688) | 0.000005*** (3.300) | 0.000077*** (4.688) | 0.000005*** (3.302) |
| Time to Maturity | 0.000 (0.554) | 0.000 (0.067) | 0.000003 (1.179) | 0.000000 (0.551) | 0.000003 (1.179) | 0.000000 (0.541) |
| Observations | 31,147,450 | 17,977,621 | 31,169,215 | 26,792,557 | 31,156,623 | 26,782,638 |
| Adj. Pseudo R^2 /Adj. R^2 | 0.132 | 0.103 | 0.025 | 0.002 | 0.025 | 0.002 |
| First Stage F-Test | | | 988.11 | 824.85 | 198.12 | 93.00 |
| Fixed Effects | | | | | | |
| Loan Origination Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Lien | Yes | Yes | Yes | Yes | Yes | Yes |
| Originator | Yes | Yes | Yes | Yes | Yes | Yes |
| Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Originator \times Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Clustered SE | Deal | Deal | Deal | Deal | Deal | Deal |

The estimates of logit regressions in column (1) and (2) (see Eq. 3) as well as the corresponding IV 2SLS setting (columns 3–6). The dependent variables are the performance measures (indicators for *NPL* and *Default*). The estimates of the *EUSR* indicator display the change in performance in comparison to non-EUSR loans. We instrument this indicator with the access to non-EUSR deals, measured with an indicator for the originators' access to non-EUSR deals (columns 3 and 4) and the share of non-EUSR deals (columns 5 and 6). For columns 3–6, we provide the adj. R^2 of the 2SLS estimation. We include originator, year, and originator \times year fixed effects as well as fixed effects for the year of loan origination and the loan's lien. We provide all variable definitions in Appendix 2. Standard errors are clustered at the deal level. t statistics are presented in parentheses. Statistical significance is denoted as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

For further investigations of the potential circumvention of the features, we exploit the originators' access to deals issued before the enactment of the EUSR by implementing an instrumental variables (IV) setting. We construct the instruments following Ashcraft et al. (2019), whose analyses focus on access to deals without risk retention. First, we measure the originators' accessibility of non-EUSR deals by computing the share of non-EUSR deals of all the originator's deals in a moving window from one year before to one year after the issuance of deal d . Second, we measure accessibility with an indicator variable, which takes the value 1 if an originator has access to a non-EUSR deal in the above-mentioned time window. If the originator uses non-EUSR deals to remove undesired exposures, the performance of EUSR loans should be higher if access to non-EUSR deals is easy. Notably, the IV approach does not allow for conclusions regarding the misuse of non-EUSR deals for unwanted balance sheet exposures, and we cannot investigate this since we do not have data on the balance-sheet loans available.

Discussing the IV assumptions, the F-tests of excluding the instruments suggest that the instruments are both very strong ($F > 92$ in all specifications). We implement originator and year fixed effects to meet the exclusion restriction. The fact that all originators are subject to EUSR requirements helps to ensure the exclusion of this instrument. The IV setting corresponds to the model presented in Eq. 3 but instruments the indicator *EUSR* with the different measures of access to pre-EUSR deals. In all specifications, we include year-of-loan-origination, loan-lien, and originator-year fixed effects to follow the exclusion restriction, and we cluster standard errors on deal level. We estimate the IV regressions as two-stage least squares (2SLS) and present the results in columns (3)–(6) of Table 8.

We find that the IV estimators of the instrumented *EUSR* indicator are highly significant. Although the coefficients appear to be small compared to the results of the logit regressions, the effects are economically meaningful when the sample averages of *NPLs* and *Defaults* are considered. This provides evidence that EUSR loans are particularly better performing if access to non-EUSR deals is easy. Thus, the IV results reveal that originators circumvent the features of EUSR deals to remove undesired risks from future EUSR deals. The results underline that the investors' negative perception of securitizations before the regulation due to asymmetric information and incentive problems was reasonable. More importantly, our results suggest that improving the design features was necessary and that the performance-oriented EUSR's features effectively mitigate problems in the securitization market. In the subsequent section, we investigate the relevance of the regulation's different features and identify the most important parts of loan performance.

5.2 Features or label—what does matter for performance?

We have shown that the EUSR framework induces increased loan performance, which is why we now disentangle the effect and investigate whether this is due to the STS label or improved design features. In particular, we test hypothesis H6a/b (*Improved design features lead to a better loan performance of STS (EUSR)*)

deals”). Moreover, we provide evidence that investors do *not* possess private information about differences between pre-EUSR, EUSR and STS deals.

To decompose the previous findings, we proceed analogously to the regression discontinuity design of Sect. 4.2 : First, we add the indicator for *STS* and the variable *Features* to the model in Eq. 3 to disentangle the label’s effect and the security design (Table 9, columns 1–2). Second, we include a quadratic and a cubic term of *Features* to account for a potential non-linear relationship between performance and the security design features (columns 3–4). The coefficients of the variable *Features* present the change in performance if a deal fulfills one additional security design requirement. Unlike the corresponding specification in the context of spreads, we do not have daily but quarterly data available, leading to a correlation of 1 between $I_{Features=48}$ and $EUSR \times STS$. Thus, we cannot decompose the effect of complying with all features and receiving the label in this analysis; instead, the coefficient of $EUSR \times STS$ captures both effects of the potential discontinuity. We cluster standard errors on the deal level and include originator-year fixed effects, as well as fixed effects for the year of loan origination and the loan’s lien to avoid endogeneity concerns. As in the previous analyses, originator fixed effects also include country-specific effects, as each originator operates only in one country in our sample.

Regarding the consideration that investors may possess private information about differences between pre-EUSR, EUSR and STS deals, possibly explaining the substantially higher spreads of non-STs tranches, we do not find any evidence that loans in deals with the STS Label outperform loans in EUSR deals without the STS label. Instead, we find that STS and EUSR (non-STs) loans have no significantly different performance, but EUSR loans substantially outperform loans in pre-EUSR deals, which is in line with both hypotheses H6a&b.

Concerning features versus labels, we find that the features contained in the obligatory EUSR requirements are important for loan performance, unlike all optional STS features and the STS label. Although we show that improvements in the features of the security design increase loan performance, investors do not value these factors (as discussed in Sect. 4.2) but rather rely on the STS label. The results also underline that the higher spreads of EUSR tranches compared to both STS and pre-EUSR tranches are unlikely to be due to investors’ private information regarding pool risk, as we show that the ex-post performance in EUSR loans is higher. The findings substantiate the interpretation that investors simply rely on the easily accessible information of the label, although the originators’ behavior and, therefore, loan performance are not driven by the label but rather by the features of the security design, which, in turn, are neglected by the investors.

Possible explanations are the investors’ bounded rationality and a general demand shift toward STS tranches, which could be induced by the investors’ conjecture that the decision not to issue STS deals is a negative quality signal. A further explanation is free riding by investors: The fact that the STS label has been assigned to a securitized asset might lead investors to assume that other parties have conducted a risk assessment and, thus, to neglect their own due diligence. This effect is particularly pronounced for AAA tranches as the combination of a high rating and the STS label might induce that investors deem it unnecessary to perform a risk assessment themselves. Moreover, the investors’ focus on the label could be influenced by

Table 9 Design features and labels—what does matter for performance?

| Dep. variable | NPL (1) | Default (2) | NPL (3) | Default (4) | NPL (5) | Default (6) |
|----------------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|
| EUR | -1.590* (-2.169) | -1.265* (-2.461) | -1.018** (-2.910) | -0.540 (-1.088) | -0.516 (-1.372) | -0.058 (-0.131) |
| EUR × STS | -1.001 (-1.200) | -2.993 (-1.306) | 2.241 (1.166) | 15.069 (1.053) | 0.526 (1.286) | 0.448 (0.624) |
| Features | 0.035 (0.555) | 0.085 (0.751) | -1.646 (-1.015) | -8.306+ (-1.729) | | |
| Features ² | | | 0.059 (1.071) | 0.286 (1.641) | | |
| Features ³ | | | -0.001 (-1.125) | -0.003 (-1.559) | | |
| EUR Features | | | | | | |
| Observations | 21,724,594 | 13,537,839 | 21,724,594 | 13,537,839 | -0.287** (-2.870) | -0.368** (-2.761) |
| Adj. Pseudo R ² | 0.126 | 0.109 | 0.127 | 0.110 | 21,724,594 | 13,537,839 |
| Loan Controls | Yes | Yes | Yes | Yes | 0.127 | 0.110 |
| Fixed Effects | | | | | Yes | Yes |
| Loan Origination Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Lien | Yes | Yes | Yes | Yes | Yes | Yes |
| Originator | Yes | Yes | Yes | Yes | Yes | Yes |
| Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Originator × Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Clustered SE | Deal | Deal | Deal | Deal | Deal | Deal |

The estimates of logit regressions with the performance measures as dependent variables. The model corresponds to Eq. 3, but we add an indicator variable for *EUR* × *STS* loans. In columns (1) and (2), we also include the linear term of *Features*. In columns (3) and (4), we provide estimates of analyses, in which we add the quadratic and the cubic term of the variable *Features*. In all regressions, we include loan-level controls, originator, year, and originator × year fixed effects as well as fixed effects for the year of loan origination and the loan's lien. We provide all variable definitions in Appendix 2. Standard errors are clustered at the deal level. *t* statistics are presented in parentheses. Statistical significance is denoted as follows: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

companies' investment policies or by providing investment managers with a simpler justification regarding adverse outcomes. We provide evidence for the mispricing of EUSR tranches because the EUSR deals' security design and performance are superior to pre-EUSR deals, whereas their risk premia are higher. These results imply that investors should adjust their pricing and focus more on the features of the security design and perform their own risk assessment of the deals instead of relying on the label because the features of the security design—and not the label—are relevant for the originators' behavior and loan performance.

6 Alternative specifications and robustness checks

We implement several alternative specifications and robustness checks to underline the reliance of our results. In the context of our pricing analyses (chapter 4), we check for their robustness regarding alternative estimators and run the regression of Tables 5 and 7 by random effects instead of two-way fixed effects models. To check for functional form misspecifications, we make sure that our results hold for tranche ratings and sovereign ratings in non-linear functional forms; furthermore, we test whether the log transformation of the dependent variable *Spreads* has an impact on the results. Additionally, instead of trading day fixed effects, we check if our results hold if we control for macroeconomic factors such as the ABSPP when applying quarter or year fixed effects.

In the context of our loan level analyses (chapter 5), we check if our results are robust to changes in the estimation methods by implementing a linear probability model instead of logit for the regressions of Tables 8 and 9. Furthermore, in the IV setting, we utilize IV probit instead of 2SLS. In all of our analyses we check if our results hold if we do not winsorize the control variables or exclude outliers, run our analyses on subsamples (e.g. only post-EUSR period) and implement combinations of the abovementioned specifications and robustness checks. In all, our results do not change substantially and remain robust. The corresponding results are available upon request.

7 Conclusion

Our study aims to investigate the influence of features compared to labels on both the pricing and performance of complex financial securities. We leverage the European securitization regulation, a framework that on the one hand enhances requirements for the features of complex financial securities and on the other hand introduces the STS label for securitizations meeting supplementary optional criteria. The EUSR framework was designed with the purpose of easing the risk assessment process for investors and revitalizing the securitization market.

Our findings indicate that a substantial share of investors, particularly risk-averse AAA investors, tend to lean on the readily available information offered by the label, neglecting to consider the enhanced features when pricing complex financial securities. Contrary to pricing decisions, our analysis reveals that the actual performance

is primarily driven by enhanced design features rather than the presence of the label. Our observations show a reduction in spreads for tranches in STS-labeled deals and an increase in spreads for tranches in non-STS deals, as compared to tranches issued prior to the introduction of EUSR. Interestingly, this observation stands in contrast to the reality that pre-EUSR deals exhibit inferior features in security design and inferior ex-post performance concerning non-performing loans and defaults. In summary, our results strongly suggest that investors tend to overlook a thorough risk assessment of complex securities. The misinterpretation lies in perceiving the issuance of deals with STS labels as a signal of superior performance, while deals without STS labels are erroneously considered signals of inferior performance.

Our findings carry significant implications, especially for regulators, investors, and originators in the realm of complex financial securities. For regulators, our results indicate that introducing extensive regulation can effectively mitigate asymmetric information in securitization markets. Nevertheless, a regulation incorporating both enhanced security design features and quality labels may lead to investors overly relying on the label rather than conducting a thorough risk assessment. This echoes the pitfalls of overreliance on AAA ratings prior to the financial crisis. Investors, based on our findings, should give precedence to the analysis of security design, as it significantly shapes the incentives of originators and, consequently, influences the resulting performance. However, it is imperative for originators to acknowledge that, at present, it is not solely the features of a proper security design but also obtaining the STS label that is crucial for signaling high asset quality. This results in significant spread reductions and lower financing costs. As an illustrative example, spreads, on average, decrease by 13% within a tranche after obtaining the STS label, equating to a reduction of the risk premium of € 2.3 million per annum for an average tranche. In conclusion, our results underscore that even well-intentioned regulatory measures aimed at enhancing simplicity, transparency, and standardization fall short of guaranteeing a thorough risk assessment by investors and mitigating asymmetric information in highly complex financial securities. Instead, measures fostering a harmonization of interests between originators and investors, such as the minimum risk retention, seem more promising. This ensures that even in the presence of information asymmetries, there are no significant disincentives. Furthermore, rather than solely emphasizing the STS label as a means to facilitate an appropriate risk assessment, regulators could compel financial institutions to actively conduct a proper risk assessment if they want to benefit from reduced capital requirements for investments in complex financial securities.

Appendix 1: EUSR and STS features

In this table, we present all the relevant design features of the regulation. In total, we identify 48 features in the regulatory text and consider 13 features for *EUSR* (+ 1 for *STS eligibility*), 17 for *Simple*, 5 for *Transparent*, and 12 for *Standardized* deals.

| | Feature | Description | Art. in EUSR |
|---|--|--|---------------|
| <i>Panel A: EUSR (and basic STS) features</i> | | | |
| EUSR | 1 Limited sale to retail clients | Sale of securitization positions to retail clients only if certain criteria fulfilled | 3 |
| | 2 Requirements for SSPEs | SSPE not established in certain third countries | 4 |
| | 3 Risk retention | Retention of a material net economic interest in the securitization of not less than 5% on an ongoing basis | 6 |
| | 4 No cherry picking | Originators shall not select assets to be transferred to the Securitization Special Purpose Entity (SSPE) with the aim of rendering losses on the assets | 6 (2) |
| | 5 No re-securitizations | Ban on re-securitizations except for a “legitimate purpose” | 8 |
| | 6 Origination in ordinary course | Same credit-granting criteria for securitized and non-securitized exposures | 9 (1, 3) |
| | 7 Thorough credit assessment | Sound and well-defined credit granting criteria and established processes for approving, amending, renewing and refinancing credits | 9 (1, 3) |
| | 8 RMBS: information verified by lender | Verification of residential mortgage debtors’ information | 9 (2) |
| | 9 Information on underlying exposures | Loan-level reporting | 7 (1) a |
| | 10 Prospectus | Prospectus or deal summary providing information on the main features of the securitization | 7 (1) b i |
| | 11 Transaction documents | E.g. asset sale agreement, derivatives agreement | 7 (1) b ii-vi |
| | 12 Reporting | Investor reports, significant events, inside information | 7 (1) e–g |
| | 13 Due diligence | Verification of information, performance of risk-assessment, monitoring, stress testing of the securitization | 5 |
| STS | 14 STS eligibility | Originator, Sponsor & SSPE established in EU | 18 |
| <i>Panel B: Simplicity features</i> | | | |
| Simplicity | 15 True sale | Title to the underlying exposures acquired by SSPE by means of a true sale | 20 (1) |
| | 16 No severe clawback provisions | No possibilities of invalidation of the transfer of title for certain reasons | 20 (1–2) |

| | Feature | Description | Art. in EUSR |
|----|--|--|--------------|
| 17 | Trigger events for transfer of underlying exposures after closing | Trigger events in case of deterioration of the seller's credit quality standing, breaches of contractual obligations or insolvency of the seller | 20 (5) |
| 18 | No encumbrance of underlying exposures | Underlying exposures committed to other counterparties cannot be freely transferred and are therefore prohibited | 20 (6) |
| 19 | No active portfolio management | Sale and purchase of assets only under certain circumstances e.g., purchase due to replenishment purposes | 20 (7) |
| 20 | Same eligibility criteria before and after closing | Eligibility criteria for underlying exposures remain the same | 20 (7) |
| 21 | Homogeneity of underlying exposures | Underlying exposures shall be homogeneous in terms of asset type, leading to similar cashflow, contractual, credit-risk and prepayment characteristics | 20 (8) |
| 22 | Assessment of borrower's creditworthiness defined in Directives | Assessment of a borrower's creditworthiness shall follow the requirements provided in the EU directives 2008/48/EG or 2014/17/EU | 20 (10) |
| 23 | Underlying exposures transferred after selection without undue delay | Immediate transfer to the SSPE after selection for securitization pool | 20 (11) |
| 24 | Contain obligations that are contractually binding and enforceable | Contracts have to be enforceable in court | 20 (8) |
| 25 | Not include transferable securities | No inclusion of classes of securities that are negotiable on the capital market | 20 (8) |
| 26 | No exposures to credit impaired debtors at selection | No credit score indicating that likelihood of payments not being made is higher than for comparable exposures | 20 (11) a, c |
| 27 | No exposures to credit impaired debtors at origination | Not on credit registry of persons with adverse credit history | 20 (11) b |
| 28 | No exposures in default | No exposures in which the obligor is past due more than 90 days | 20 (11) |
| 29 | Defined periodic payment streams | E.g. instalments consisting of interest and repayment of a principal | 20 (8) |
| 30 | At least one payment made | Rental, principal, interest or any other kind of payment | 20 (12) |

| | Feature | Description | Art. in EUSR |
|-----------------------------------|---|--|-----------------|
| | 31 Originator's or original lender's expertise | Expertise in originating exposures of a similar nature to those securitized | 20 (10) |
| Panel C: Transparency features | | | |
| Transparency | 32 Performance Data | Historical default and loss performance data of similar exposures to those securitized covering a period of at least 5 years | 22 (1) |
| | 33 Asset Audit | External verification of a sample of the underlying exposures including verification that disclosed information is correct | 22 (2) |
| | 34 Liability Cashflow Model | Outline of the contractual relationship between the underlying exposures and the payments flowing between the originator, sponsor, investors, other third parties and the SSPE | 22 (3) |
| | 35 STS Notification | Notice of STS status including key information of the securitization | 7 (1) d, 27 (1) |
| | 36 STS Verification Report | Possibility of mandating a third party authorized by the competent authority to verify compliance with STS criteria | 28 |
| Panel D: Standardization features | | | |
| Standardization | 37 Interest and Currency Risk Hedged | Hedging shall cover a major share of the risk under different scenarios | 21 (2) |
| | 38 No Derivatives in the Pool of Underlying Exposures | Use of derivatives only for hedging purposes | 21 (2) |
| | 39 Generally Used Market Rates for Interest Payments Under the Assets and Liabilities | Referenced to generally used market rates, sectoral rates and shall not be based on complex formulae or derivatives | 21 (3) |
| | 40 Clear Rules in the Event of Conflicts Between Classes of Noteholders | Problems shall be resolved in a timely manner, voting rights clearly defined and allocated, fiduciary duties of deal parties clearly identified | 21 (10) |
| | 41 Technical Instructions in Case of an Enforcement or Acceleration Notice | Cash only trapped in SSPE if operationally necessary, sequential amortization of principal receipts, no automatic liquidation | 21 (4) |
| | 42 Sequential Repayment as Fallback | Performance triggers leading to switch from pro-rata to sequential amortization at least related to credit quality of underlying exposures | 21 (5) |

| | Feature | Description | Art. in EUSR |
|----|---|--|--------------|
| 43 | Early Amortization Provisions or Triggers for Termination of the Revolving Phases | In case of credit quality or exposure value deterioration, insolvency related event, if not sufficient new underlying exposures | 21 (6) |
| 44 | Deal Documents Specify Obligations, Duties and Responsibilities of Servicer, Trustees and other Service Providers | Provide transparency to investors in terms of potential disruptions to cashflow collections and servicing | 21 (7) a |
| 45 | Deal Documents Specify Replacement Measures for Servicer, Derivative Counterparties, Liquidity Providers and Account Bank | Continuous functioning of the deals in case of default or insolvency of certain parties | 21 (7) b-c |
| 46 | Expertise of the Servicer | Expertise in servicing exposures of a similar nature to those securitized | 21 (8) |
| 47 | Servicing Based on Well Documented and Adequate Policies, Procedures, Risk-Management Controls | Servicer is subject to prudential and capital regulation and supervision in the union or proofs the existence of adequate measures | 21 (8) |
| 48 | Servicing of Non-Performing Exposures | Definitions, remedies and actions regarding non-performing exposures | 21 (9) |

Appendix 2: Variable definitions

| Variable | Description | |
|--|---|-----------------|
| Panel A: Deal-level EUSR data (hand-collected) | | |
| <i>EUSR</i> | Indicator variable equal to 1 if the respective tranche is issued under the European Union's Securitization Regulation (EUSR) | |
| <i>STS</i> | Indicator variable equal to 1 if the respective tranche refers to a deal with STS ("Simple, Transparent, and Standardized") label | |
| <i>Features</i> | Number of fulfilled STS requirements | |
| $I_{Features=48}$ | Indicator variable equal to 1 if a deal fulfills all STS requirements | |
| $I_{\Delta Cap. Req. < 0}$ | Indicator variable equal to 1 if the EUSR reduces a tranche's capital requirements | |
| Variable | Description | EDW variable AR |
| Panel B: Loan-level data (European Data Warehouse) | | |
| <i>Default</i> | Indicator variable equal to 1 if a loan will default at $t+1$ | 166 |
| <i>NPL</i> | Indicator variable equal to 1 if a loan will be nonperforming at $t+1$ | 166 |

| Variable | Description | EDW variable AR |
|--|--|-----------------|
| <i>Interest Rate</i> | Current interest rate (in %) | 109 |
| <i>Loan Balance</i> | Current loan balance (in thousand €) | 67 |
| <i>Loan To Value</i> | Current ratio of loan balance and collateral value (in %) | 141 |
| <i>Non-Performing Loan (NPL)</i> | Indicator variable equal to 1 if a loan status is non-performing and the time in arrears is greater than 30 days | 166 |
| <i>Time To Maturity</i> | Number of months until loan maturity | 56 |
| Variable | Description | |
| Panel C: Deal- and tranche-level data (Concept ABS & IHS Markit) | | |
| <i>Spread</i> | Tranche's risk premium at t (in bp). This variable corresponds to the variable <i>mid-spread</i> from IHS Markit | |
| <i>Subordination Level</i> | Percentage of total liabilities that is subordinate to the tranche (in %) | |
| <i>Weighted Average Life (WAL)</i> | Weighted time to maturity of all loans securitized in the pool | |
| <i>Volume Tranche</i> | Nominal value of the tranche (in million €) | |
| <i>Volume Deal</i> | Nominal value of the deal (in million €) | |
| <i>No. Tranches</i> | Number of tranches the deal consists of | |

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