Digging into the Black Box of Portfolio Replenishment in Securitization: Evidence from the ABS Loan-Level Initiative.

Arved Fenner
University of Münster *

Philipp Klein
University of Münster †

Carina Mössinger
University of Münster ‡

August 28, 2019

*Arved Fenner, M. Sc., Finance Center Münster, University of Münster, Universitätsstr. 14-16, 48143 Münster, Germany, Email: arved.fenner@wiwi.uni-muenster.de.

†Philipp Klein, M. Sc., Finance Center Münster, University of Münster, Universitätsstr. 14-16, 48143 Münster, Germany, Email: philipp.klein@wiwi.uni-muenster.de.

‡Carina Mössinger, M. Sc., Finance Center Münster, University of Münster, Universitätsstr. 14-16, 48143 Münster, Germany, Email: carina.moessinger@wiwi.uni-muenster.de.

Abstract

Taking advantage of extensive data on 59 ABS backed by more than 1.9 million SME loans from the central repository under the ECB loan-level initiative, we ascertain that securitized loan pools are not static over time. We explore empirically whether originators exploit existing leeway regarding portfolio replenishment in securitization. Our results reveal that poor-performing loans are more likely to be transferred to ABS transactions after their issuance, and well-performing loans are more likely to be removed prior to pool and loan maturity. Turning to the bank perspective, we find that originators being undercapitalized or exhibiting high NPL ratios make particularly use of portfolio replenishment. The opposite holds when originators specify loan eligibility criteria in their ABS prospectuses.

Keywords: ABS, Agency Problems, ECB, Portfolio Replenishment, Securitization
JEL Classification: G11, G21, G23, G24

I Introduction

The novel framework for simple, transparent and standardized (STS) securitization constitutes a major milestone in the EU's capital markets union (CMU) reform agenda. This legislative package became effective on January 1, 2019, and aims at revitalizing a trustworthy securitization market in Europe by distinguishing STS securitizations from opaque and complex transactions. In order to comply with the simplicity criterion, "the underlying exposures transferred from, or assigned by, the seller[1] to the SSPE[2] shall meet predetermined, clear and documented eligibility criteria which do not allow for active portfolio management of those exposures on a discretionary basis. [...] Exposures transferred to the SSPE after the closing of the transaction shall meet the eligibility criteria applied to the initial underlying exposures" (Regulation (EU) 2017/2402, Article 20 (7)). The main objective of this requirement is to impede originators from deliberately adding poor-performing loans to asset-backed securities (ABS) ex post, thus chronologically after the closing of the transaction.

Indeed, our comprehensive sample reinforces the relevance of portfolio replenishment[3] in securitization as we exhibit 48 % of observations referring to loans which are ex post added to and 44 % of observations including loans which are prematurely removed from ABS portfolios. Furthermore, portfolio replenishment is not surprising in securitization when comparing the average time to maturity of ABS tranches, approximately 36 years, and of the corresponding underlying loans, around

[1] Below, we use originator as a synonym for seller.

[2] SSPE refers to securitization special-purpose entity.

[3] By portfolio replenishment we understand both that loans are added to ABS transactions after their closing, and that loans are removed from ABS transactions prior to pool and loan maturity.

4.5 years. Beyond maturing loans, portfolio replenishment can also be attributed to the fact that securitized loans "have [...] prepaid, been cancelled, repurchased, defaulted (with no further recoveries expected) or substituted" (European Central Bank, 2019).

Though, portfolio replenishment in securitization may be contractually limited. Loan eligibility criteria defined in ABS prospectuses not only establish a framework for initial underlying exposures, but also for loans added to ABS transactions ex post. For instance, ABS prospectuses determine that "no receivable is a defaulted receivable", "no receivable is a delinquent receivable and no receivable has been a delinquent receivable at any time during the six months period immediately preceding the relevant cut-off date." In addition, the originator has to ensure that the "purchase of the receivable does not result in a violation of any concentration limit."[4] However, not every ABS prospectus includes information on the possibility of portfolio replenishment or specifies loan eligibility criteria. Only 61 % of our ABS transactions exhibit information on portfolio replenishment in their prospectuses and only 13 % define explicitly loan eligibility criteria. Consequently, originators are able to take advantage of some discretionary scope by exploiting information advantages and choosing poor-performing loans for securitization.

This motivates us to analyze whether poor-performing loans are more likely to be added to already-securitized ABS portfolios ex post than well-performing ones, and whether originators remove particularly well-performing loans from ABS transactions prior to pool and loan maturity. Building on these two analyses at the loan-level, we examine at the bank-level whether there are common bank characteristics

[4] For reasons of confidentiality, we do not reveal the originator or ISIN of the ABS prospectuses. The quotations reflect commonly used wording which can be found in various prospectuses.

that drive originators to make use of portfolio replenishment in securitization, and whether details and requirements in ABS prospectuses affect the extent of portfolio replenishment. To the best of our knowledge, this paper is the first to study portfolio replenishment in typical[5] securitizations based on a very comprehensive data set and on detailed insights into ABS prospectuses, as well as covering different perspectives, namely the loan- and bank-level. Against this background, our analysis expands the research on portfolio replenishment which focuses predominantly on collateralized loan obligations (CLOs) so far. While several studies examine CLO managers behavior regarding portfolio management in CLOs, we contribute to this literature strand by focusing on typical, non-actively managed ABS transactions from various European originators that are backed by micro, small and medium-sized enterprise (SME) loans. We also add to the wide range of literature on agency problems in securitization by providing evidence that originators exploit their discretionary scope regarding portfolio replenishment.

In our analysis, we rely on two main samples. First, we utilize a comprehensive and novel data set collected for the purpose of the ABS loan-level initiative on behalf of the ECB. This reporting initiative obliges originators to report quarterly loan-by-loan information of their ABS portfolios to the European DataWarehouse (ED), the first and so far only central securitization repository in Europe. Our primary sample, the *Loan-level sample*, covers the reporting period from 2013 until 2017, and consists of 1,959,617 SME loans from seven European countries. Applying several logit regression models as well as a large set of control variables, many fixed effects, and clustered robust standard errors, we provide evidence that originators indeed

[5] The EBA explicitly acknowledges the difference between typical securitizations and CLOs because "unlike a typical securitisation, CLO managers are not transferrring credit exposures from their balance sheets. CLO managers are managing assets to create an investment return for third-party clients, like typical portfolio managers" (European Banking Authority, 2014).

take advantage of existing leeway in portfolio replenishment. On the one hand, we observe that the probability of being added to ABS transactions ex post is higher for poor-performing loans. On the other hand, we provide evidence that well-performing loans are more likely to be removed from ABS portfolios subsequent to their closing, but prior to pool and loan maturity.

Second, we focus on the bank perspective, and enrich our first sample by several originator characteristics from Fitch Connect. This *Bank-level sample* comprises 59 originators, and is based on the same reporting period as our first sample from 2013 until 2017. Using several fractional response regression models, we find that originators which are undercapitalized or exhibit high NPL ratios make particularly use of portfolio replenishment in securitization. Furthermore, originators that mention portfolio replenishment or define specific eligibility criteria for loans being ex post transferred to already-closed ABS transactions in their ABS prospectuses make less use of portfolio replenishment. Combining both parts of our analysis, originating banks seem to make use of portfolio replenishment in order to obtain positive balance sheet effects.

The remainder of this paper is organized as follows. Section II reviews the literature. In Section III, we present our data sources and sample selection procedures. Section IV introduces our variables and summary statistics. In Section V, we outline our empirical strategy and discuss our major empirical findings. In Section VI, we perform several robustness tests. Section VII concludes.

II Literature review

Below, we provide an overview of the relevant literature. First, we outline research examining agency conflicts in securitization. Second, we focus on several studies on portfolio replenishment which focuses predominantly on CLOs so far.

II.1 Agency conflicts in securitization

Agency conflicts in securitization result particularly from asymmetric information between the informed bank that grants and securitizes loans as well as executes borrower screening and monitoring, and investors that buy ABS tranches. Information asymmetries induce investor uncertainty which not only refers to the loan quality of the underlying exposures at ABS issuance, but also to possible changes in the ABS portfolio composition due to loans being added to as well as being removed from the pool after the closing of the ABS transaction. Concerning the loan selection procedure prior to the ABS closing, the findings in the literature are contradictory. On the one hand, several studies provide evidence that originating banks exploit their information advantage regarding loan default risk, and securitize riskier loans while retaining loans with lower default risk on their balance sheets (e.g., Downing et al., 2009; An et al., 2011). Following the same argumentation line, it is widely agreed that originating banks tend to lower screening and monitoring activities for securitized loans (e.g., Parlour and Plantin, 2008; Keys et al., 2010; Purnanandam, 2011; Keys et al., 2012; Wang and Xia, 2014). On the other hand, some studies reveal the opposite and suggest that particularly high-quality loans are securitized, while underperforming loans are retained on bank balance sheets (e.g., Benmelech

et al., 2012; Albertazzi et al., 2015; Kara et al., 2018). This may be explained by originator incentives arising from risk retention which induces "skin in the game" or from possible reputational gains in the securitization market.

In addition to the quality of the underlying loan exposures, the actual risk, ABS investors bear, also depends on the ABS tranching structure. Due to the waterfall principle, investors suffer losses from defaulted loans to a different extent (e.g., DeMarzo, 2005; Hanson and Sunderam, 2013). In order to signal high-quality ABS tranches as well as great own loan screening and monitoring efforts, originators usually provide overcollateralization and ensure risk retention to lower tranche default risk (e.g., Fender and Mitchell, 2009; Hattori and Ohashi, 2011; Guo and Wu, 2014; Malekan and Dionne, 2014; Begley and Purnanandam, 2016).

In the follow-up of the latest financial crisis, central banks and regulators, most prominently the ECB and the U.S. Securities and Exchange Commission, recognized the negative effects of agency issues inherent in securitization as well as increasing investor mistrust towards ABS. Therefore, they introduced loan-level initiatives to improve transparency and facilitate investor risk assessment of ABS tranches (Ertan et al., 2017; European Central Bank, 2018; Neilson et al., 2019).

II.2 Portfolio replenishment in securitization

While agency conflicts are widely studied in the literature covering many different types of securitizations, portfolio replenishment is so far, to the best of our knowledge, analyzed mainly with regard to the case of CLOs. However, there is no common definition of CLOs in the literature. Predominantly, CLOs are defined as

securitzations being backed by corporate loans, and are are often associated with active portfolio management, performed by a CLO collateral manager, which allows for substantial changes in portfolio composition after CLO issuance (e.g., Benmelech et al., 2012; Gorton and Metrick, 2012; Fabozzi et al., 2018; Loumioti and Vasvari, 2018; Gallo and Park, 2019; Loumioti and Vasvari, 2019; Peristiani and Santos, 2019). Nevertheless, CLO managers' behavior regarding portfolio management is restricted by contractually predetermined, as well as legally given standards (Franke et al., 2012; Bozanic et al., 2018). The European Banking Authority (EBA) acknowledges explicitly the economic differences between actively managed CLOs and typical securitizations (European Banking Authority, 2014).

In their study, Peristiani and Santos (2015) observe that CLO managers sell about 30 % of their initial loan investments by the end of the second year after issuance. Moreover, they demonstrate that the monthly purchase activity of CLOs accounts for 5.5 % of total portfolio balance. Benmelech et al. (2012) confirm these dynamics in CLO portfolio composition, and observe that the probability of a loan to be excluded after one month amounts to 4 %, after three months this probability yields 7 %, and after six months the probability of being excluded reaches 11 %. These regular loan replacements in CLOs cause extensive credit risk assessment effort of CLO managers. Driven by cost considerations, managers of frequently rebalanced CLOs are more likely to add loans with greater covenant standardization to their portfolio than other loans, probably because standardization reduces information costs in screening and monitoring (Bozanic et al., 2018).

Beyond the extent of portfolio replenishment, CLO managers may strategically – in the given contractual and legal framework – choose poor- or well-performing loans to add them to, or remove them from the current CLO portfolio. In this regard,

empirical findings in the literature are ambiguous. On the one hand, studies argue that CLO managers intend to enhance pool quality after its closing. For instance, Fabozzi et al. (2018) provide evidence that with increasing portfolio replenishment, pool default rates decrease. In accordance, Peristiani and Santos (2019) reveal a link between CLO manager compensation and the return of the CLO equity tranche. Because managers are able to improve their own profit by ensuring well-performing CLOs, they have an incentive to remove distressed loans and add high-quality loans to CLOs. In this context, Peristiani and Santos (2019) also suggest that managers who are affiliated with the loan originator exhibit a lower risk appetite than managers without affiliation and exclude particularly distressed loans before default. Following their line of argumentation, this is reasonable because managers who are affiliated with the loan originator have access to private information concerning future loan repayment.

On the other hand, Loumioti and Vasvari (2018) argue that CLO managers make use of portfolio replenishment in order to pass overcollateralization (OC) tests because not only their compensation, but also their reputation is linked to the outcome of these tests.[6] The appealing opportunity to sell good-quality loans above their principal balance and the unfavorable option to sell low-rated loans below their principal balance incentivize CLO managers to keep poor-performing loans in the CLO portfolio and to sell well-performing loans. Loumioti and Vasvari (2019) confirm these findings in their most recent study, in which they evaluate the impact of portfolio constraints specified in CLO prospectuses on CLO performance. Their empirical results indicate that more severe constraints come along with more frequent portfolio

[6] Simply put, the threshold to pass OC tests is calculated by dividing the sum of total principal balances of well-performing loans, cash received from trading activities and the fair value of defaulted loans by the principal balance of CLO notes.

rebalancing, as well as with the exclusion of profitable loans and the inclusion of riskier ones to pass OC tests. Finally, Franke et al. (2012) examine the impact of asset pool dynamics in collateralized debt obligations (CDOs) on the equity tranche size. However, they yield no significant coefficients for a dummy variable which is equal to one for dynamic pools, and zero otherwise. They argue that strict replenishment rules prevent managers from adding strategically poor-performing loans to as well as removing well-performing loans from already-securitized portfolios.

III Data sources and sample selection

This paper builds on two distinct samples. Whereas our *Loan-level sample* contains granular information on securitized loans, our *Bank-level sample* comprises the related originating bank characteristics as well as aggregated information derived from the ABS loan- and portfolio-level. Both samples cover the reporting period from 2013 until 2017. The data sources and sample selection procedures are described below.

III.1 Loan-level sample

Our primary sample, the *Loan-level sample*, includes detailed information on ABS transactions at the loan-level. We collect this data from ED, the first and so far only central securitization repository in Europe. Being established in 2012 in the wake of the ECB's ABS loan-level initiative, ED collects, validates, and distributes granular and standardized loan, tranche, and portfolio information of more than 1,200 ABS

transactions comprising about 120 mio. loans (European DataWarehouse, 2019). One concern regarding this novel and comprehensive data set may be that it could be selective with respect to originating bank liquidity needs, because solely originators which pledge ABS as collateral for repurchasement agreements ('repos') with the ECB are obliged to report to ED. Elsewise, originators report voluntarily to ED. Even though Drechsler et al. (2016) provide evidence that weakly-capitalized banks borrow more from the ECB and provide riskier collateral than strongly-capitalized banks, this potential limitation only marginally affects our analysis. Considering the time period from 2011 until 2017, market coverage of newly issued ABS backed by SME loans and reported to ED account for more than 80 % (Securities Industry and Financial Markets Association, 2018).

In our analysis, we focus on ABS backed by SME loans as this asset class is of special interest for studying portfolio replenishment in securitization. This is due to the fact that ABS backed by SME loans are renowned for being specifically affected by information asymmetries as SMEs are usually not monitored by capital markets (Dietsch and Petey, 2002; Schertler et al., 2015; Albertazzi et al., 2017).[7] Consequently, originating banks exhibit informational advantages over ABS investors with respect to loan quality, and retain ABS backed by SME loans to a greater extent compared to other asset classes. For instance, around 86 % of newly issued European ABS backed by SME loans were retained in 2013, whereas for ABS backed by residential mortgages this percentage only amounted to 66 % (Association for Financial Markets in Europe, 2014).

[7] According to the European Commission, SMEs employ fewer than 250 persons. Furthermore, SMEs exhibit a maximum annual turnover of € 50 million, or an annual balance sheet not exceeding € 43 million (European Commission, 2003). Overall, SMEs account for more than 99 % of all EU-28 non-financial business sector enterprises, and generate almost 57 cents of every euro value added in the non-financial business sector. SMEs employ around two-thirds of the total EU-28 workforce (Muller et al., 2018).

At the loan-level, the SME reporting requirements as part of the ECB's ABS loan-level initiative comprise 48 mandatory and 65 optional variables grouped into six categories: identifiers, obligor information, loan characteristics, interest rate details, financials, and performance measures. In our analysis, we primarily employ mandatory variables because, on average, 98 % of the mandatory, but only 32 % of the optional fields are reported in our sample. Initially, we start our sample selection procedure with 32,026,829 loan observations. First, we drop missing and implausible observations, but only with regard to variables used in our analysis.[8] For instance, we exclude observations for which the days in arrears exceed the loan period or where the loan maturity date is before the loan origination date. Second, we exclude ambiguous originating bank names.[9] As a next step, we take into account that originators are obliged to report to ED at least quarterly, but may voluntarily report on a monthly basis. In order to ensure that loans from monthly-reporting originators are not overweighted in our analysis, we focus on the last observation in a quarter in case of voluntary monthly reporting and ignore previous observations in the same quarter. Employing the last observation is motivated by the fact that the majority of quarterly-reporting banks reports shortly before the end of a quarter. Finally and only applied to our *Loan-level sample*, we have to remove all loans with no variation in endogenous variables within single fixed effects used in our regression model.[10] In Table 1 in the appendix, we summarize our *Loan-level sample* selection procedure in detail.

---

[8] The variables used in our analysis are described in Section IV. In case of loan default or delinquency, we observe that the originators in our sample reduce the current loan balance by the default or delinquent amount. We do not drop these observations, but rather reverse this adjustment by adding the default or delinquent amount to the current loan balance.

[9] By solely allowing originating banks in our sample that can be identified uniquely, we follow Ertan et al. (2017).

[10] Our regression model at the loan-level is described in Section V.2.

Eventually, our *Loan-level sample* includes 7,484,423 loan-quarter observations, encompassing 1,959,617 unique SME loans to 630,278 borrowers, which are securitized in 59 ABS pools by originators from Belgium, France, Germany, Italy, the Netherlands, Portugal, and Spain. These countries represent almost all Eurozone countries active in SME loan securitization (Association for Financial Markets in Europe, 2014). In Table 2, we illustrate our final *Loan-level sample*'s distribution by reporting year and country.

[Table 2 about here.]

III.2 Bank-level sample

Our second sample contains mainly originating bank characteristics as well as aggregated information derived from the ABS loan- and portfolio-level. Below, we refer to this second sample as *Bank-level sample*. One major difference between our *Loan-level* and *Bank-level sample* is the observation frequency. Whereas our *Loan-level sample* comprises quarterly observations, our *Bank-level sample* is based on annual observations as originating bank characteristics are only available annually. In order to create our second sample, we utilize the originating bank names of the securitized asset pools from our final *Loan-level sample* as starting point. Subsequently, we match manually the corresponding banks available in Fitch Connect, and collect important bank characteristics. Finally, we add annualized information from our *Loan-level sample* as well as aggregated information derived from the ABS

portfolio-level obtained from ED. Overall, our *Bank-level sample* includes 167 annual observations containing 49 banks and 63 ABS transactions.[11]

IV Variable construction and summary statistics

IV.1 Loan-level analysis

As the name suggests, our loan-level analysis is based on the *Loan-level sample*. First, we analyze whether the probability of being added to an ABS portfolio ex post, thus after the ABS closing, is higher for poor-performing loans. Second, we examine whether well-performing loans are more likely to be removed from ABS portfolios prior to pool and loan maturity. Below, we describe all variables used in both parts of our loan-level analysis. Each variable is also outlined in Table 3 in the appendix. Summary statistics based on our *Loan-level sample* are reported in Table 4. Additionally, Table 5 in the appendix shows the variables' pairwise correlations.[12]

[Table 4 about here.]

Identification strategy for *Incoming loans*:

When analyzing whether poor-performing loans are more likely to be added to ABS

[11] Our *Bank-level sample* comprises ten originating banks less than our *Loan-level sample* as we cannot find these ten originating banks in Fitch Connect.

[12] We also test for multicollinearity using variance inflation factors (VIF). In our *Loan-level sample*, the mean VIF accounts for 1.52 and all VIFs are smaller than 2.27. This result indicates that multicollinearity is not an issue in our empirical setting.

portfolios ex post in the first part of our loan-level analysis, our endogenous variable of main interest is *Incoming loan*. *Incoming loan* refers to a loan that is not yet included in the ABS transaction at the time the transaction is reported to ED for the first time, and is defined as an indicator variable. We determine this indicator variable by both identifying the first reporting quarter of each ABS transaction and the first reporting quarter of each loan in our *Loan-level sample*. If the first loan reporting quarter is chronologically after the corresponding first ABS reporting quarter, this loan is categorized as an *Incoming loan*. The mean value of *Incoming loan* is 0.48 indicating that 48 % of the observations in our *Loan-level sample* refer to loans added to ABS transactions after the transactions' first reporting quarter.

Identification strategy for *Outgoing loans*:

In the second part of our loan-level analysis, we examine whether the probability of being removed from ABS portfolios prior to pool and loan maturity is higher for well-performing loans than for poor-performing ones. Thus, our second endogenous variable of main interest is *Outgoing loan* defined as a loan which is not anymore included in the ABS transaction at the time the transaction is reported to ED for the last time. We specify *Outgoing loans* also as an indicator variable and determine this variable in two subsequent steps. First, we both detect the last reporting quarter of each ABS transaction and the last reporting quarter of each loan in our *Loan-level sample*. If the last loan reporting quarter is chronologically before the corresponding last ABS reporting quarter, this loan is categorized as an *Outgoing loan* in the first place. In a second step, we account for the fact that loans may be removed from the ABS portfolio prior to a pool's last reporting quarter due to their loan maturity. Therefore, we adjust our initial classification and do not categorize a loan, whose last reporting quarter either coincides with or is larger than its maturity quarter, as

an *Outgoing loan*. The mean value of *Outgoing loan* is 0.44. This reflects that 44 % of the observations in our *Loan-level sample* refer to loans which are removed from ABS transactions prior to pool and loan maturity.

Loan performance measures:

To derive implications for portfolio risk from portfolio replenishment in securitization in the first part of our loan-level analysis, we employ six different performance measures as exogenous variables: *Default* (1), *Default amount* (2), *PD* (3), *Delinquency* (4), *Delinquent amount* (5), and *Number of days in delinquency* (6). *Default* is defined as an indicator variable being equal to one if the borrower ever defaulted on the loan, and zero otherwise. In our *Loan-level sample*, the mean of *Default* accounts for 3 %. Our second loan performance measure, *Default amount*, refers to the natural logarithm of the maximum default amount per loan. On average, *Default amount* is 0.18, which corresponds to € 2,425. *PD* represents the loan probability of default. In our PD estimation procedure, we apply a probit model with our loan default indicator as endogenous variable. In this probit model, we control for several borrower and loan characteristics, and apply various FE. The results are reported in Table 6 in the appendix. The mean *PD* in our sample is 2 %.

Delinquency represents an indicator variable and equals one if the borrower is ever in arrears, either with respect to principal or interest payments, and zero otherwise. *Delinquency* amounts to 10 % on average in our sample. *Delinquent amount* refers to the natural logarithm of the maximum sum of principal and interest arrears per loan. In our *Loan-level sample*, *Delinquent amount* accounts for 0.72 on average, which corresponds to € 902. Our sixth loan performance measure is *Number of days in delinquency* which is defined as the natural logarithm of the maximum number of days for which the borrower delays principal or interest payments per loan. The

mean *Number of days in delinquency* is 0.28, which represents around 4.3 days. Following Ertan et al. (2017), we winsorize the values of all continuous variables in our *Loan-level sample* at the 1 % and 99 % level.

In the second part of our loan-level analysis, we employ four different performance measures as exogenous variables: *PD* (1), *Delinquency* (2), *Delinquent amount* (3), and *Number of days in delinquency* (4). In contrast to the first part of our loan-level analysis, we do not apply *Default* and *Default amount* as loan performance measures because defaulted loans with no further recoveries expected need to be reported to ED only once after their default event (European Central Bank, 2019). Consequently, a defaulted loan with no further recoveries expected is in any case classified as an *Outgoing loan*. In order to not distort our results in the second part of our loan-level analysis by classifying defaulted loan as an *Outgoing loan*, we also adjust the *Loan-level sample* used in our first regression model and delete observations containing defaulted loans. Our adjusted *Loan-level sample* still yields 7,392,210 observations.

Loan-level controls:

To incorporate observable differences among loans in both parts of our loan-level analysis, we control for numerous loan characteristics, and basically follow the variable definitions by Ertan et al. (2017).

First of all, *Interest rate* refers to the current loan interest rate and serves as a proxy for loan riskiness. In our *Loan-level sample*, the mean *Interest rate* is 3.52 %. Additionally, we control for loan riskiness by using an indicator variable which is equal to one if a loan is collateralized, and zero otherwise (*Collateralization*). In our *Loan-level sample*, 75 % of the observations include collateralized loans. Further-

more, we calculate *Years since loan origination* as the natural logarithm of the time period, expressed in years, between the loan origination and the current reporting date. The mean of *Years since loan origination* is 1.29 which reflects around 4.60 years. The control variable *Loan years to maturity* refers to the natural logarithm of the remaining years to maturity at the current reporting date. On average, we observe that *Loan years to maturity* amount to 1.16. This corresponds to around 4.48 years.

Moreover, we specify *Current balance* as the natural logarithm of the current loan balance. On average, the *Current balance* in our *Loan-level sample* is 9.92 which represents € 94,115. In addition, *Securitized loan ratio* refers to the ratio of the outstanding loan balance at the time of securitization to the original loan amount, and serves as a proxy for the time to loan securitization because, generally, the outstanding loan balance declines over time. As a result, loans being securitized directly at the time of origination exhibit a *Securitized loan ratio* of 100 %. This control variable is of particular relevance as bank screening incentives are assumed to be weaker for loans that are securitized directly at the time of their origination (e.g., Keys et al., 2010; Purnanandam, 2011). In our *Loan-level sample*, the mean value of *Securitized loan ratio* accounts for 0.78 suggesting that the average loan observation in our sample corresponds to a loan which was securitized 7.5 quarters after its origination.

We further employ *Lending relationship* as a control variable, although the empirical evidence on the importance of an existing relationship between borrower and lender is ambiguous (e.g., Kysucky and Norden, 2016). *Lending relationship* is defined as an indicator variable which is equal to one if a borrower borrows at least twice from the same bank, and zero otherwise. In our *Loan-level sample*, 69 % of the

observations include borrowers that exhibit lending relationships with their bank. Furthermore, we control for *Loan uniqueness* by estimating the natural logarithm of the number of loans that were originated in the same year, and that can be assigned to the same one-digit NACE industry code as well as to the same two-digit postcode area. Observing a low number of comparable loans may indicate that these loans are unique to the originating bank, and cannot easily be replaced in ABS transactions. On average, 2,580 comparable loans are reported in our *Loan-level sample*.

IV.2 Bank-level analysis

Building on our loan-level perspective, we conduct our bank-level analysis based on our *Bank-level sample*, and explain the corresponding variables below. Table 7 in the appendix presents an overview of our bank-level variables and in Table 8, we report the summary statistics. Table 9 in the appendix shows the variables' pairwise correlations.[13]

[Table 8 about here.]

Identification strategy for portfolio replenishment:

In order to analyze portfolio replenishment at the bank-level, we use both our variable definitions *Incoming loan* and *Outgoing loan* from the loan-level analysis as the starting point to define our endogenous variables at the bank-level. *Percentage of incoming loans* represents the weighted average of *Incoming loans* per ABS portfolio. We weight our observations based on the current loan balance. In line with

[13] Multicollinearity is also not an issue in our empirical setting using our *Bank-level sample*. The mean VIF account for 2.59, and all VIFs are smaller than 6.05.

our definition of *Percentage of incoming loans*, we calculate the *Percentage of outgoing loans* as the weighted average of *Outgoing loans* per ABS portfolio. Finally, we compute the average values of *Percentage of incoming loans* and *Percentage of outgoing loans* per originating bank and per year to gain bank-level observations on an annual basis. Overall, in our *Bank-level sample*, *Percentage of incoming loans* amounts to 38 %, *Percentage of outgoing loans* to 13 % on average.

Bank exposure to credit risk and capital strength:

In our bank-level analysis, we incorporate bank exposure to credit risk and capital strength as exogenous variables of main interest. The *NPL ratio*, as proxy for bank exposure to credit risk, is computed by dividing the volume of non-performing loans by the volume of gross loans. In our sample, we observe a mean *NPL ratio* of 13 %. Turning to the originating bank capital strength, we include the *Equity ratio* defined as the ratio of equity to total assets. On average, the *Equity ratio* amounts to 7 % in our *Bank-level sample*.

Bank-level controls:

Our controls at the bank-level comprise information on the originating bank size, business model, liquidity, and profitability. To begin with, we proxy bank size and business model by utilizing the natural logarithm of total assets (*Bank size*), as well as the sum of net loans divided by total assets (*Loan ratio*). *Bank size* accounts for around 10.65 on average which represents € 221 billion. The mean *Loan ratio* in our sample is 61 %. In addition, we measure a bank's liquidity position in relation to its funding needs by employing the ratio of liquid assets to deposits and short-term funding (*Liquidity*). We observe, on average, a ratio of 35 %. Regarding the originating bank efficiency and profitability, we utilize the Cost-Income-Ratio (*CIR*) as well as the Return on Equity (*RoE*). On average, the *CIR* accounts for 67 % and

the *RoE* for -1 %. Finally, we include *Loan growth* to control for the possible impact of changes in bank lending policy on portfolio replenishment in securitization. On average, *Loan growth* amounts to 1 % in our *Bank-level sample*.

V Empirical strategy and results

V.1 Approach

In our empirical strategy, we distinguish between our loan- and bank-level analysis. In our loan-level analysis, we take advantage of the fact that ED collects granular loan-level data for ABS transactions. We differentiate between *Incoming loans* and *Outgoing loans* using two indicator variables as defined in Section IV.1, and analyze portfolio replenishment in securitization at the loan-level by estimating two main regression models based on our *Loan-level sample*. Whereas our first regression model examines whether poor-performing loans are more likely to be *Incoming loans*, our second regression model focuses on *Outgoing loans* by investigating whether well-performing loans are more likely to be removed from already-securitized ABS portfolios prior to pool and loan maturity. Based on our *Bank-level sample*, our third regression model studies whether there are common bank characteristics that drive originators to make use of portfolio replenishment in securitization, and whether details and requirements in ABS prospectuses affect the extent of portfolio replenishment.

V.2 Loan-level analysis (First and second regression model)

***Incoming loans* (First regression model):**

In our first regression model, we analyze whether poor-performing loans are more likely to be added to already-securitized loan portfolios ex post than well-performing ones. Beyond our loan performance measures, we control for loan riskiness, loan period, loan volume, as well as several borrower characteristics (see Section IV.1). In addition, we incorporate reporting quarter, ABS pool, industry, loan type, as well as borrower type fixed effects in order to control for unobserved dynamics over time as well as unobserved variations at the pool- and loan-level. We estimate the following logit model on quarterly data:

$$\begin{aligned} Incoming\ loan_{it} = \alpha &+ \beta_1 \cdot Loan\ performance_{itk} + \beta_2 \cdot Interest\ rate_{it} \\ &+ \beta_3 \cdot Collateralization_{it} + \beta_4 \cdot Years\ since\ loan\ origination_{it} \\ &+ \beta_5 \cdot Loan\ years\ to\ maturity_{it} + \beta_6 \cdot Current\ balance_{it} \\ &+ \beta_7 \cdot Securitized\ loan\ ratio_{it} + \beta_8 \cdot Lending\ relationship_{it} \\ &+ \beta_9 \cdot Loan\ uniqueness_{it} + Reporting\ quarter\ FE \\ &+ ABS\ pool\ FE + Industry\ FE \\ &+ Loan\ type\ FE + Borrower\ type\ FE + \epsilon_{it}, \end{aligned} \tag{V.1}$$

where i indexes loans, t indexes quarters, k indexes one specific loan performance measure, and ϵ_{it} refers to the error term. We use robust standard errors that are clustered with respect to the ABS pool. Clustering is especially important as we observe the same ABS pool several times in our sample. Therefore, we need to control for correlations within one ABS pool over time. We expect the coefficient of *Loan performance* (β_1) to be positive in our first regression model.

Table 10 presents the results of our first regression model based on our *Loan-level sample* analyzing whether poor-performing loans are more likely to be ex post added

to already-securitized loan portfolios than well-performing ones (see Formula V.1). Applying *Incoming loan* as endogenous variable, we find a positive and significant coefficient for each loan performance measure, namely *Default*, *Default amount*, *PD*, *Delinquency*, *Delinquent amount*, and *Number of days in delinquency*. To be more precise, specification (1) shows that, on average, defaulted loans have a 3.3 percentage points (pp) higher probability of being an *Incoming loan* compared to non-defaulted loans. This represents around 7 % of the sample's mean *Incoming loan*. Specification (4) reveals that delinquent loans exhibit a 1.5 pp higher probability of being an *Incoming loan*. This translates into around 4 % of the sample's mean *Incoming loan*. Specifications (2), (3), (5) and (6) reinforce these finding by revealing that loans with higher *Default amounts*, a higher *PD*, higher *Delinquent amounts* and a larger *Number of days in delinquency* are more likely to be *Incoming loans*. Altogether, these results indicate that poor-performing loans are more likely to be ex post added to already-securitized loan portfolios than well-performing ones.

[Table 10 about here.]

Beyond our six loan performance measures, the control variables' coefficients are predominantly consistent with our expectations. With regard to *Interest rate*, we yield significantly negative coefficients across all specifications indicating that loan observations exhibiting higher interest rates have a lower probability of being *Incoming loans*. Besides, we provide evidence that, on average, fewer *Years since loan origination* increase the probability of being an *Incoming loan*. Our results show also that loans with more *Loan years to maturity* are more likely to be ex post added to already-securitized loan portfolios than other loans. This finding may result from originators intending to relieve their balance sheets from long-term loans.

Additionally, observations with a lower *Securitzed loan ratio* are more likely to be ex post added to already-securitized loan portfolios than other loans. This suggests that originating banks particularly add loans ex post, which are not securitized directly after their origination. Moreover, we gain significantly negative coefficients of *Loan uniqueness* across all specifications. Thus, unique loans, i. e. loans for which there are only few comparable loans with regard to their origination year, one-digit NACE industry code as well as two-digit postcode area, are more likely to be *Incoming loans*. This can be explained by the fact that originators aim at enhancing diversification in ABS portfolios, or that they prefer to retain more common loans on their balance sheets, as the quality of common loans can be assessed more precisely.

***Incoming loans* (Subsample analysis):**

One potential concern regarding the results of our first regression model may be that our results are driven by the fact that *Incoming loans* differ from other loans with regard to the point in time when the loan was originated which we do not sufficiently control for by applying the exogenous variable *Years since loan origination*. To address this concern, we limit our sample to loans that were granted before the issuance of the respective ABS transaction. Consequently, both *Incoming loans* as well as other loans have already been originated at the time the originating bank structured the asset pool. This constraint diminishes our sample size by 3,523,189 observations. In this subsample, we observe only a minor variation in loan age. Whereas *Incoming loans* exhibit on average 5.72 *Years since loan origination*, other loans show on average 6.44 *Years since loan origination*.[14]

[14] In our first regression model, *Incoming loans* show 3.16 *Years since loan origination* and other loans exhibit 5.93 *Years since loan origination* on average.

As illustrated in Table 11, five out of six specifications reveal that poor-performing loans are significantly more likely to be ex post added to already-securitized loan portfolios than well-performing ones. When limiting our sample to loans that were granted before the issuance of the respective ABS transaction, the economic significance relative to our first regression model even increases in specifications (1), (2), (4) and (5). Beyond the findings in our first regression model, we obtain one more significant control variable in our subsample analysis. Across all six specifications, we exhibit negative and significant coefficients of *Collateralization*. This indicates that secured loans, which usually exhibit lower loss given defaults (LGD) than unsecured loans, are by around 7 pp less likely to be ex post added to already-securitized loan portfolios than other loans. Additionally, the coefficients of *Loan uniqueness* are not significant anymore. Summarizing our subsample analysis, we strengthen the results gained in our first regression model, and provide evidence that our findings are not driven by the fact that *Incoming loans* differ from other loans with regard to the point in time when the loan was originated.

[Table 11 about here.]

***Outgoing loans* (Second regression model):**

In our second regression model, we analyze whether well-performing loans are more likely to be removed from already-securitized loan portfolios prior to pool and loan maturity. In contrast to our first regression model, our second regression model

utilizes *Outgoing loan* as endogenous variable. In line with our first regression model, we estimate the following logit model on quarterly data:

$$\begin{aligned} Outgoing\ loan_{it} = \alpha &+ \beta_1 \cdot Loan\ performance_{itk} + \beta_2 \cdot Interest\ rate_{it} \\ &+ \beta_3 \cdot Collateralization_{it} + \beta_4 \cdot Years\ since\ loan\ origination_{it} \\ &+ \beta_5 \cdot Loan\ years\ to\ maturity_{it} + \beta_6 \cdot Current\ balance_{it} \\ &+ \beta_7 \cdot Securitized\ loan\ ratio_{it} + \beta_8 \cdot Lending\ relationship_{it} \\ &+ \beta_9 \cdot Loan\ uniqueness_{it} + Reporting\ quarter\ FE \\ &+ ABS\ pool\ FE + Industry\ FE \\ &+ Loan\ type\ FE + Borrower\ type\ FE + \epsilon_{it}, \end{aligned} \tag{V.2}$$

where i indexes loans, t indexes quarters, k indexes one specific loan performance measure, and ϵ_{it} refers to the error term. As in our first regression model, we apply robust standard errors that are clustered with respect to the ABS pool. We expect the coefficient of *Loan performance* (β_1) to be negative in our second regression model.

Table 12 illustrates the results of our second regression model based on our *Loan-level sample* analyzing whether well-performing loans are more likely to be removed from already-securitized loan portfolios than poor-performing ones (see Formula V.2).[15] Employing *Outgoing loan* as endogenous variable, we yield significantly negative coefficients for each loan performance measure, namely *PD*, *Delinquency*, *Delinquent amount*, and *Number of days in delinquency*. For instance, specification (2) shows that delinquent loans exhibit a 6 pp lower probability of being an *Outgoing loan*. This corresponds to around 14 % of the sample's mean *Outgoing loan*. Specifications (1), (3) and (4) strengthen these results by suggesting that loans with a lower PD, lower *Delinquent amounts* and a fewer *Number of days in delinquency* are more likely to

[15] As explained in Section IV.1, we adjust our *Loan-level sample* for this part of our analysis by deleting all observations that contain defaulted loans.

be *Outgoing loans*. Altogether, our second regression model provides evidence that well-performing loans are more likely to be removed from already-securitized loan portfolios prior to pool and loan maturity than poor-performing ones.

[Table 12 about here.]

Beyond our four loan performance measures, we gain significantly positive coefficients of *Collateralization*. Thus, secured loans are more likely to be removed from already-securitized loan portfolios than non-secured loans. This corresponds to our subsample results in our first regression model and can be explained by the fact that originating banks prefer to keep secured loans on their balance sheets. This also strengthens the results regarding our loan performance measures because secured loans usually have lower LGDs. Furthermore, we observe significant negative coefficients of *Loan years to maturity*. Across all specifications, we provide evidence that observations with fewer *Loan years to maturity* are more likely to be removed from already-securitized loan portfolios than other loans. This indicates that originating banks particularly remove loans with shorter residual maturity.

***Outgoing loans* (Subsample analysis):**

In line with our subsample analysis for *Incoming loans*, we again address the potential concern that our results may be driven by the fact that *Outgoing loans* differ from other loans with regard to the point in time when the loans were originated which we do not sufficiently control for by applying the exogenous variable *Years since loan origination*. Limiting our sample to loans that were granted before the issuance of the respective ABS transaction, our sample size decreases by 3,510,910 observations. We again observe only a small variation in loan age. Whereas *Out-*

going loans show 5.82 *Years since loan origination*, other loans exhibit 6.54 *Years since loan origination* on average.[16]

As illustrated in Table 13, two out of four specifications reveal that poor-performing loans are significantly less likely to be removed from already-securitized loan portfolios than well-performing ones. Beyond our second regression model, we gain three more significant control variable in our subsample analysis. In particular, we observe that loans with a higher *Interest rate*, more *Years since loan origination*, as well as higher *Current balance* are less likely to be removed from already-securitized loan portfolios than other loans. Summarizing our subsample analysis, we reinforce the finding obtained in our second regression model, and demonstrate that they are not driven by the fact that *Outgoing loans* differ from other loans with regard to the point in time when the loan was originated, which we do not sufficiently control for by applying the exogenous variable *Years since loan origination*.

[Table 13 about here.]

Altogether, the results of our loan-level analysis demonstrate that originating banks tend to exploit their leeway, and replenish their ABS portfolios ex post by adding poor-performing loans to, as well as removing well-performing loans from already-securitized loan portfolios. Below, we turn towards the bank perspective and our third regression model.

[16] In our second regression model, *Outgoing loans* exhibit 3.97 *Years since loan origination*, whereas other loans show 5.07 *Years since loan origination* on average.

V.3 Bank-level analysis (Third regression model)

Bank-level analysis **(Third regression model):**

In our third regression model, we aim at examining whether there are common bank characteristics that drive originators to make use of portfolio replenishment in securitization. Thus, we apply our *Bank-level sample* and proxy for the extent of portfolio replenishment by utilizing both the endogenous variables *Percentage of incoming loans* and *Percentage of outgoing loans* as described in Section IV.2. Both portfolio replenishment measures are restricted to the interval between zero and one. Due to the bounded nature of these variables, it is inappropriate to implement an ordinary least squares (OLS) regression model (Bastos, 2010). Therefore, we apply a fractional response regression model which is particularly suitable for modeling continuous variables bounded to the interval [0, 1] ensuring that the predicted values lie in the unit interval (Papke and Wooldridge, 1996). Fractional response regression modeling is also applied in several studies (e.g., Ramalho and da Silva, 2009; Bastos, 2010; Bellotti and Crook, 2012; Li et al., 2018), and is based on a quasi-likelihood estimation. In line with the study of Louzis et al. (2012), our exogenous variables aim at depicting bank exposure to credit risk, capital strength, size, business model, liquidity, efficiency and profitability. Our exogenous variables of main interest are *NPL ratio*, as proxy for bank exposure to credit risk, and *Equity ratio*, as proxy for capital strength. We apply the following fractional response regression model on annual data using our *Bank-level sample*:

$$\begin{aligned} Portfolio\ replenishment_{itk} = \alpha &+ \beta_1 \cdot NPL\ ratio_{it} + \beta_2 \cdot Equity\ ratio_{it} \\ &+ \beta_3 \cdot Bank\ size_{it} + \beta_4 \cdot Loan\ ratio_{it} \\ &+ \beta_5 \cdot Liquidity_{it} + \beta_6 \cdot CIR_{it} + \beta_7 \cdot RoE_{it} \\ &+ \beta_8 \cdot Loan\ growth_{it} + Reporting\ year\ FE + \epsilon_{itk}, \end{aligned} \tag{V.3}$$

where i indexes originating banks, t indexes years, k indexes one specific portfolio replenishment measure, and ϵ_{itk} refers to the error term. We use robust standard errors that are clustered with respect to the originating bank. Clustering with respect to the originating bank is especially important, as we observe the same bank several times in our samples. Therefore, we need to control for correlations within one bank over time. In our third regression model, we expect the coefficient of *NPL ratio* (β_1) to be positive, as well as the coefficient of *Equity ratio* (β_2) to be negative. The first prediction can be explained by the fact that originating banks with high *NPL ratios* attempt to lower these ratios or at least keep them at a constant level by conducting portfolio replenishment in securitization. Against this background, we also expect that originating banks with lower *Equity ratios* especially make use of portfolio replenishment as poor-performing loans held on their balance sheets further negatively affect the *Equity ratio*.

In Table 14, we present the results of our third regression model. In specification (1), we apply *Percentage of incoming loans* as our endogenous variable, and gain a significantly positive coefficient of *NPL ratio* as well as a significantly negative coefficient of *Equity ratio*. These findings are consistent with our expectation. In specification (2), our endogenous variable is *Percentage of outgoing loans*. Based on this specification, we yield a positive, however not significant, coefficient of *NPL ratio*, as well as a significantly negative coefficient of *Equity ratio*. Thus, our finding is mostly in accordance with our expectations, and suggest that originating banks with lower *Equity ratios* show higher *Percentages of outgoing loans* on average. Overall, our third regression model reveals that banks being undercapitalized or exhibiting high *NPL ratios* particularly make use of portfolio replenishment in securitization. This result corresponds with our loan-level analysis, and reveals that originating

banks seem to add poor-performing loans to as well as to remove well-performing loans from already-securitized ABS portfolios to a greater extent in order to obtain positive balance sheet effects.

[Table 14 about here.]

***Bank-level analysis* (Analysis of ABS prospectuses):**

To expand our results at the bank-level, we manually explore ABS prospectuses of ABS pools included in our *Bank-level sample*. Based on the available prospectuses, we assign two indicator variables for each ABS transaction. First, *Replenishment* is equal to one if the ABS prospectus includes a description of the possibility of portfolio replenishment, and zero otherwise. Second, we define *Eligibility criteria* as an indicator variable equal to one if the ABS prospectus not only includes the possibility of portfolio replenishment, but also explicitly specifies certain eligibility criteria for loans being ex post added to the ABS transactions, and zero otherwise. By adding these two variables to our third regression model (see Equation V.3), we diminish our *Bank-level sample* size by four observations because the corresponding prospectuses are not available.

As illustrated in Table 15, specifications (1) and (3) reveal that originating banks which include the possibility of portfolio replenishment in their ABS prospectuses conduct significantly less portfolio replenishment than other originating banks. In particular, the *Percentage of incoming loans* decreases by 21 pp, and the *Percentage of outgoing loans* diminishes by 11 pp. These results are in line with both specifications (2) and (4) which show that originating banks defining specific loan eligibility criteria in their ABS prospectuses make also less use of portfolio replenishment in securitization. On average, we provide evidence that their *Percentage of incom-*

ing loans is 33 pp, and their *Percentage of outgoing loans* is 10 pp lower than for other originating banks. This shows that details and requirements in ABS prospectuses may constitute a disciplining effect on originating banks regarding portfolio replenishment in securitization.

[Table 15 about here.]

VI Robustness checks

In order to reinforce our findings, we perform several robustness tests below. Firstly, we account for the fact that there is an unequal number of non-defaulted and defaulted loans, as well as of non-delinquent and delinquent loans in our *Loan-level sample*. For instance, only 3 % of our sample observations refer to defaulted loans, and only 10 % of our sample observations include delinquent loans (see Table 4). When analyzing the impact of loan performance on the probability of being an *Incoming loan* or an *Outgoing loan* in our loan-level analysis, we underweight defaulted and delinquent loan observations. Consequently, we rebuild our first and second regression model (see Equations V.1 and V.2) based on a data set consisting of two equally sized subsamples of 20,000 observations which are randomly drawn from poor- and well-performing loans. We follow this approach regarding defaulted and non-defaulted loans for our first regression model, as well as regarding delinquent and non-delinquent loans for both our first and second regression model. We present our findings in Tables 16 and 17 in the appendix. Both tables reveal that we still yield the same results in eight out of ten specifications for the loan performance

measures as in our baseline regressions. Thus, we provide evidence that our findings are not driven by underweighting defaulted or delinquent loans in our *Loan-level sample*.

Secondly, a possible concern may be that our results at the loan-level are driven by differences in originating banks which we do not sufficiently control for by applying ABS pool fixed effects (see Section V.2). Therefore, we incorporate originating bank characteristics as an alternative to applying ABS pool fixed effects in both our first and second regression model (see Equations V.1 and V.2). In line with our bank-level analysis, we obtain originating bank characteristics from Fitch Connect, and employ *NPL ratio*, *Equity ratio*, *Bank size*, *Loan growth*, *CIR*, *RoE*, *Liquidity*, as well as *Loan ratio* as further control variables.[17] We summarize our findings in Tables 18 and 19 in the appendix. As illustrated in Table 18, we still yield significantly positive coefficients for three loan performance measures in this adjusted first regression model. Moreover, in Table 19, the significantly negative impact of three loan performance measures on *Outgoing loan* is also consistent with our second regression model. Consequently, even though controlling for many originating bank characteristics, we predominantly yield the same results and still provide evidence that originating banks tend to replenish their ABS portfolios ex post by adding poor-performing loans to, as well as removing well-performing loans from already-securitized loan portfolios.

Thirdly, we incorporate that our loan-level results may be driven by the fact that *Incoming loans* and *Outgoing loans* differ, on average, in both their *Years since loan origination* and *Loan years to maturity* from other loans. Even though we control for *Years since loan origination* as well as *Loan years to maturity*, and conduct our

[17] Variables are described in the appendix in Table 7.

subsample analysis for both our first and second regression model, we also vary *Years since loan origination* and *Loan years to maturity* in further robustness tests. Thus, in both adjusted regression models, we use the non-logarithmized variables as well as the squared variables as controls. As presented in Tables 20 and 21 in the appendix, we yield the same findings in nine out of ten specifications for our loan performance measures as in our baseline regressions.

VII Conclusion

The STS regulation requires loans transferred to ABS transcations after their closing to meet certain eligibility criteria. This novel requirement protects investors by preventing originators from exploiting discretionary leeway via active portfolio management. Our study explores empirically portfolio replenishment in securitization on a very granular level. At the loan-level, we analyze whether poor-performing loans are more likely to be added to already-securitized ABS portfolios ex post, and whether well-performing loans are more likely to be removed from already-securitized ABS portfolios prior to pool and loan maturity. Building on these two analyses, we turn to the bank perspective, and examine whether there are common bank characteristics that drive originators to make use of portfolio replenishment in securitization, and whether details and requirements in ABS prospectuses affect the extent of portfolio replenishment. To the best of our knowledge, this paper is the first to study portfolio replenishment in typical securitizations based on a very comprehensive data set and on detailed insights into ABS prospectuses, as well as covering different perspectives, namely the loan- and bank-level.

We obtain our extensive securitization data set from ED, the first and so far only central repository of all loan-level information under the ECB's ABS loan-level reporting initiative. Utilizing several logit models and applying five different fixed effects as well as clustered robust standards errors with respect to one ABS pool, our results indicate that originating banks indeed take advantage of existing leeway in portfolio replenishment. On the one hand, we observe that the probability of being added to an ABS transaction ex post is higher for poor-performing loans. On the other hand, we provide evidence that well-performing loans are more likely to be removed from the ABS portfolio subsequent to ABS issuance, but prior to pool and loan maturity. Based on these findings, we turn to the bank perspective and enrich our data set collected from ED by originating bank characteristics from Fitch Connect. Employing several fractional response regression models and adding time fixed effects as well as clustered robust standards errors with respect to one originating bank, our results reveal that particularly originators being undercapitalized or exhibiting high NPL ratios make use of portfolio replenishment in securitization. Furthermore, we manually explore ABS prospectuses and find that originating banks, which include the possibility of portfolio replenishment or specify certain eligibility criteria for loans being transferred ex post to already-securitized ABS transactions in their ABS prospectuses, make less use of portfolio replenishment. Several robustness tests reinforce our findings.

Altogether, we find ample evidence that portfolio replenishment in securitization negatively affects ABS loan composition as originating banks exploit existing leeway. Especially because we provide evidence that specific loan eligibility criteria defined in ABS prospectuses limit portfolio replenishment in securitization, the novel

requirement by the STS regulation is of high importance for revitalizing a trustworthy securitization market in Europe.

References

Albertazzi, U., M. Bottero, L. Gambacorta, and S. Ongena (2017). Asymmetric information and the securitization of SME loans. *BIS Working Papers 601*.

Albertazzi, U., G. Eramo, L. Gambacorta, and C. Salleo (2015). Asymmetric information in securitization: An empirical assessment. *Journal of Monetary Economics 71*, 33–49.

An, X., Y. Deng, and S. A. Gabriel (2011). Asymmetric information, adverse selection, and the pricing of CMBS. *Journal of Financial Economics 100*, 304–325.

Association for Financial Markets in Europe (2014). High-quality securitisation for Europe, The market at a crossroads.

Bastos, J. A. (2010). Forecasting bank loans loss-given-default. *Journal of Banking & Finance 34*, 2510–2517.

Begley, T. A. and A. Purnanandam (2016). Design of Financial Securities: Empirical Evidence from Private-Label RMBS Deals. *The Review of Financial Studies 30*, 120–161.

Bellotti, T. and J. Crook (2012). Loss given default models incorporating macroeconomic variables for credit cards. *International Journal of Forecasting 28*, 171–182.

Benmelech, E., J. Dlugosz, and V. Ivashina (2012). Securitization without adverse selection: The case of CLOs. *Journal of Financial Economics 106*, 91–113.

Bozanic, Z., M. Loumioti, and F. P. Vasvari (2018). Corporate loan securitization and the standardization of financial covenants. *Journal of Accounting Research 56*, 45–83.

DeMarzo, P. M. (2005). The pooling and tranching of securities: A model of informed intermediation. *The Review of Financial Studies 18*, 1–35.

Dietsch, M. and J. Petey (2002). The credit risk in SME loans portfolios: Modeling issues, pricing, and capital requirements. *Journal of Banking & Finance 26*, 303–322.

Downing, C., D. Jaffee, and N. Wallace (2009). Is the market for mortgage-backed securities a market for lemons? *Review of Financial Studies 22*, 2457–2494.

Drechsler, I., T. Drechsel, D. Marques-Ibanez, and P. Schnabl (2016). Who borrows from the lender of last resort? *Journal of Finance 71*, 1933–1974.

Ertan, A., M. Loumioti, and R. Wittenberg-Moerman (2017). Enhancing loan quality through transparency: Evidence from the European Central Bank loan level reporting initiative. *Journal of Accounting Research 55*, 877–918.

European Banking Authority (2014). EBA report on securitisation risk retention, due diligence and disclosure.

European Central Bank (2018). Loan-level initiative, URL https://www.ecb.europa.eu/paym/coll/loanlevel/html/index.en.html.

European Central Bank (2019). Loan-level initiative, Frequently asked questions, URL https://www.ecb.europa.eu/paym/coll/loanlevel/faq/html/index.en.html.

European Commission (2003). Commission recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises.

European DataWarehouse (2019). European DataWarehouse, About Us, URL https://eurodw.eu/about-us/.

Fabozzi, F., S. Klingler, P. Mølgaard, and M. S. Nielsen (2018). Active loan trading. *Working Paper*.

Fender, I. and J. Mitchell (2009). Incentives and tranche retention in securitisation: A screening model. *BIS Working Papers 289*.

Franke, G., M. Herrmann, and T. Weber (2012). Loss allocation in securitization transactions. *Journal of Financial and Quantitative Analysis 47*, 1125–1153.

Gallo, A. and M. Park (2019). CLO market and corporate lending. *Working Paper*.

Gorton, G. and A. Metrick (2012). Securitized banking and the run on repo. *Journal of Financial Economics 104*, 425 – 451.

Guo, G. and H.-M. Wu (2014). A study on risk retention regulation in asset securitization process. *Journal of Banking & Finance 45*, 61–71.

Hanson, S. G. and A. Sunderam (2013). Are there too many safe securities? Securitization and the incentives for information production. *Journal of Financial Economics 108*, 565–584.

Hattori, M. and K. Ohashi (2011). Detrimental effects of retention regulation: Incentives for loan screening in securitization under asymmetric information. *IMES Discussion Paper Series*.

Kara, A., D. Marques-Ibanez, and S. Ongena (2018). Securitization and credit quality in the European market. *European Financial Management 25*, 407–434.

Keys, B. J., T. Mukherjee, A. Seru, and V. Vig (2010). Did securitization lead to lax screening? Evidence from subprime loans. *Quarterly Journal of Economics 125*, 307–362.

Keys, B. J., A. Seru, and V. Vig (2012). Lender screening and the role of securitization: Evidence from prime and subprime mortgage markets. *Review of Financial Studies 25*, 2072–2108.

Kysucky, V. and L. Norden (2016). The Benefits of Relationship Lending in a Cross-Country Context: A Meta-Analysis. *Management Science 62*, 90–110.

Li, P., X. Zhang, and X. S. Zhao (2018). Modeling loss given default. FDIC Center for Financial Research Paper No. 2018-03.

Loumioti, M. and F. P. Vasvari (2018). Portfolio performance manipulation in collateralized loan obligations. *Journal of Accounting and Economics 67*, forthcoming.

Loumioti, M. and F. P. Vasvari (2019). Consequences of CLO Portfolio Constraints. *Working Paper*.

Louzis, D. P., A. T. Vouldis, and V. L. Metaxas (2012). Macroeconomic and bank-specific determinants of non-performing loans in greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance 36*, 1012 – 1027.

Malekan, S. and G. Dionne (2014). Securitization and optimal retention under moral hazard. *Journal of Mathematical Economics 55*, 74–85.

Muller, P., A. Mattes, D. Klitou, O.-K. Lonkeu, P. Ramada, F. A. Ruiz, S. Devnani, J. Farrenkopf, A. Makowska, N. Mankovska, N. Robin, and L. Steigertahl (2018). Annual report on European SMEs 2017/2018, SMEs growing beyond borders, November 2018.

Neilson, J., S. Ryan, P. Wang, and B. Xie (2019). Asset-level transparency and the (e)valuation of asset-backed securities. *Working Paper*.

Papke, L. E. and J. M. Wooldridge (1996). Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *Journal of Applied Econometrics 11*, 619–632.

Parlour, C. A. and G. Plantin (2008). Loan sales and relationship banking. *Journal of Finance 63*, 1291–1314.

Peristiani, S. and J. A. Santos (2015). Investigating the trading activity of clo portfolio managers. Federal Reserve Bank of New York.

Peristiani, S. and J. A. Santos (2019). CLO trading and collateral manager bank affiliation. *Journal of Financial Intermediation (forthcoming)*.

Purnanandam, A. (2011). Originate-to-distribute model and the subprime mortgage crisis. *Review of Financial Studies 24*, 1881–1915.

Ramalho, J. J. and J. V. da Silva (2009). A two-part fractional regression model for the financial leverage decisions of micro, small, medium and large firms. *Quantitative Finance 9*, 621–636.

Schertler, A., C. Hubensack, and A. Pfingsten (2015). Bank lines of credit for small business clients: Cash substitution and funding source. *Journal of Banking Law and Banking 84*, 84–107.

Securities Industry and Financial Markets Association (2018). Europe structured finance issuance and outstanding.

Wang, Y. and H. Xia (2014). Do lenders still monitor when they can securitize loans? *Review of Financial Studies 27*, 2354–2391.

VIII Appendix

Table 1: Overview of the *Loan-level sample* selection procedure

	Loans	Borrowers	ABS pools	Observations at the loan-level
Data reported to ED from 2012-2017	**6,612,261**	**2,517,548**	**172**	**32,026,829**
Less				
Relevant variables are missing or implausible (e.g., days in arrears exceed the loan period, reporting date is before the loan origination date)	2,872,957	975,606	20	13,346,069
Ambiguous bank names	905,699	704,420	58	5,617,992
Voluntary monthly reporting	609,785	11,716	0	4,360,619
Observations with no variation in endogenous variables within single fixed effects	264,203	195,528	35	1,217,726
Loan-level sample	**1,959,617**	**630,278**	**59**	**7,484,423**

Table 2: Number of loans and SMEs by country-reporting year in our *Loan-level sample*

	2013		2014		2015		2016		2017	
Country	Loans	SMEs	Loans	SMEs	Loans	SMEs	Loans	SMEs	Loans	SMEs
BE	295,403	152,413	279,972	146,105	276,189	140,991	258,345	130,770	270,445	139,968
DE	0	0	0	0	18,861	13,566	20,468	14,131	17,762	12,053
ES	10,401	9,714	7,909	7,346	67,202	59,802	81,787	73,485	64,056	58,013
FR	91,103	16,905	267,618	5,098	250,452	10,629	233,711	9,660	158,756	9,389
IT	68,959	60,412	61,838	54,367	96,688	83,354	100,897	86,211	94,150	82,181
NL	0	0	11,663	6,680	9,839	5,723	7,942	4,718	5,963	3,605
PT	0	0	0	0	29,930	19,658	28,351	21,713	20,723	15,761
Total	465,866	239,444	629,000	219,596	749,161	333,723	731,501	340,688	631,860	320,973

This table reports the number of loans and borrowers from 2013 until 2017 for every year and country. Our sample consists of seven different countries: Belgium (BE), Germany (DE), Spain (ES), France (FR), Italy (IT), the Netherlands (NL), and Portugal (PT).

Table 3: Definitions of our variables in the *Loan-level sample*

Variable	Description	Data source
Replenishment measures		
Incoming loan	Indicator variable equal to one for loans that are not yet included in the ABS transaction at the time it is reported to ED for the first time, and zero otherwise.	ED, own calc.
Outgoing loan	Indicator variable equal to one for non-matured loans that are not anymore included in the ABS transaction at the time it is reported to ED for the last time, and zero otherwise.	ED, own calc.
Loan performance measures		
Default	Indicator variable equal to one if the borrower ever defaulted on the loan, and zero otherwise.	ED, own calc.
Default amount	Natural logarithm of the maximum default amount per loan.	ED, own calc.
PD	Loan probability of default.	ED, own calc.
Delinquency	Indicator variable equal to one if the borrower was ever in arrears, either with respect to principal or interest payments, and zero otherwise.	ED, own calc.
Delinquent amount	Natural logarithm of the maximum sum of principal and interest arrears per loan.	ED, own calc.
Number of days in delinquency	Natural logarithm of the maximum number of days for which the borrower delays principal or interest payments per loan.	ED, own calc.
Loan-level controls		
Interest rate	Current loan interest rate (in %).	ED
Collateralization	Indicator variable equal to one if a loan is collateralized, and zero otherwise.	ED, own calc.
Years since loan origination	Natural logarithm of the time period, expressed in years, between loan origination and the current reporting date.	ED, own calc.
Loan years to maturity	Natural logarithm of the remaining years to maturity at the time of the current reporting date.	ED, own calc.
Current balance	Natural logarithm of the current loan balance.	ED, own calc.
Securitized loan ratio	Ratio of the outstanding loan balance at the time of securitization to the original loan amount.	ED, own calc.
Lending relationship	Indicator variable equal to one if a borrower borrows at least twice from the same bank, and zero otherwise.	ED, own calc.
Loan uniqueness	Natural logarithm of the number of loans that were originated in the same year, and that can be assigned to the same one-digit NACE industry code as well as the same two-digit postcode area.	ED, own calc.

Table 4: Summary statistics for our *Loan-level sample*

Variable	N	Mean	SD	p1	p50	p99
Replenishment measures						
Incoming loan	7,484,423	0.48	0.50	0.00	0.00	1.00
Outgoing loan	7,484,423	0.44	0.50	0.00	0.00	1.00
Loan performance measures						
Default	7,484,423	0.03	0.16	0.00	0.00	1.00
Default amount	7,484,423	0.18	1.38	0.00	0.00	9.98
PD	7,484,423	0.02	0.08	0.00	0.01	0.12
Delinquency	7,484,423	0.10	0.30	0.00	0.00	1.00
Delinquent amount	7,484,423	0.72	2.26	0.00	0.00	9.50
Number of days in del.	7,484,423	0.28	0.95	0.00	0.00	4.34
Loan-level controls						
Interest rate (%)	7,484,423	3.52	1.52	0.75	3.26	8.28
Collateralization	7,484,423	0.75	0.44	0.00	1.00	1.00
Years since loan origination	7,484,423	1.29	0.71	0.08	1.34	2.75
Loan years to maturity	7,484,423	1.16	0.81	0.00	1.13	2.95
Current balance	7,484,423	9.92	1.78	5.00	9.90	13.95
Securitized loan ratio	7,484,423	0.78	0.25	0.05	0.87	1.00
Lending relationship	7,484,423	0.69	0.46	0.00	1.00	1.00
Loan uniqueness	7,484,423	6.76	1.60	2.77	6.82	10.17

This table reports the descriptive statistics for the variables used in our loan-level analysis. Variables are described in the appendix in Table 3. N refers to the number of observations. SD means standard deviation. p1, p50, and p99 represent the first, fiftieth, and the ninety-ninth percentile.

Table 5: Correlations for our *Loan-level sample*

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	Default	1.00													
(2)	Default amount	0.81	1.00												
(3)	PD	0.55	0.02	1.00											
(4)	Delinquency	0.28	0.29	0.08	1.00										
(5)	Delinquent amount	0.34	0.36	0.09	0.96	1.00									
(6)	Number of days in del.	0.38	0.44	0.03	0.78	0.81	1.00								
(7)	Interest rate (%)	0.08	0.05	0.18	0.14	0.12	0.14	1.00							
(8)	Collateralization	0.00	-0.02	-0.02	-0.02	-0.02	-0.04	-0.20	1.00						
(9)	Years since loan origination	0.09	0.05	0.18	0.13	0.14	0.12	0.30	-0.05	1.00					
(10)	Loan years to maturity	0.04	0.05	0.07	0.12	0.13	0.10	0.05	0.07	0.38	1.00				
(11)	Current balance	0.06	0.08	0.10	0.08	0.12	0.07	-0.09	0.10	0.23	0.68	1.00			
(12)	Securitized loan ratio	-0.00	-0.00	-0.04	-0.02	-0.01	-0.02	-0.23	0.15	-0.44	0.10	0.10	1.00		
(13)	Lending relationship	-0.01	-0.05	-0.01	-0.14	-0.14	-0.13	-0.20	0.32	-0.20	-0.14	-0.06	0.19	1.00	
(14)	Loan uniqueness	-0.08	-0.04	-0.16	-0.10	-0.10	-0.07	-0.15	0.08	-0.52	-0.36	-0.26	0.27	0.22	1.00

This table reports the pairwise correlations of our variables used in the loan-level analysis. Variables are described in the appendix in Table 3.

Table 6: Probit regression to estimate loan-level PDs

	Default
	(1)
Interest rate	0.00484***
	(0.00134)
Collateralization	-0.00988*
	(0.00581)
Years since loan origination	0.0124*
	(0.00720)
Loan years to maturity	-0.00895***
	(0.00232)
Current balance	0.00642***
	(0.00122)
Securitized loan ratio	0.0131
	(0.0139)
Lending relationship	-0.0000139
	(0.00352)
Loan uniqueness	-0.000111
	(0.00117)
Reporting quarter FE	Yes
Loan type FE	Yes
Borrower type FE	Yes
Industry FE	Yes
N	13,882,732
R^2	0.21

This table reports the probit model to estimate a PD for every single loan in our *Loan-level sample*. Variables are described in the appendix in Table 3. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 7: Definitions of our variables in the *Bank-level sample*

Variable	Description	Data source
Replenishment measures		
Percentage of incoming loans	Annualized weighted average of loans added to already-securitized ABS portfolios after their first reporting quarter. Weighting is based on the current loan balance.	ED, own calc.
Percentage of outgoing loans	Annualized weighted average of loans removed from securitized ABS portfolios before their last reporting quarter, but prior to pool and loan maturity. Weighting is based on the current loan balance.	ED, own calc.
ABS prospectus information		
Replenishment	Indicator variable equal to one if the ABS prospectus of a transaction includes a description of the possibility of portfolio replenishment, and zero otherwise.	ED prospectuses, own calc.
Eligibility criteria	Indicator variable equal to one if the ABS prospectus not only includes the possibility of portfolio replenishment, but also specifies certain eligibility criteria for loans being added to the ABS transactions ex post, and zero otherwise.	ED prospectuses, own calc.
Bank exposure to credit risk and capital strength		
NPL ratio	Ratio of non-performing loans volume to gross loans volume.	Fitch Connect
Equity ratio	Ratio of equity to bank total assets.	Fitch Connect
Bank-level controls		
Bank size	Natural logarithm of bank total assets.	Fitch Connect
Loan ratio	Sum of net loans divided by bank total assets.	Fitch Connect
Liquidity	Ratio of liquid assets to deposits and short-term funding.	Fitch Connect
CIR	Cost-Income-Ratio.	Fitch Connect
RoE	Return on Equity.	Fitch Connect
Loan growth	Loan growth compared to the previous year.	Fitch Connect

Table 8: Summary statistics for our *Bank-level sample*

Variable	N	Mean	SD	p10	p50	p90
Replenishment measures						
Percentage of incoming loans	167	0.38	0.43	0.00	0.12	1.00
Percentage of outgoing loans	167	0.11	0.20	0.00	0.01	0.34
Bank exposure to credit risk and capital strength						
NPL ratio	167	0.13	0.10	0.03	0.13	0.27
Equity ratio	167	0.07	0.02	0.04	0.07	0.10
ABS prospectus information						
Replenishment	163	0.61	0.49	0.00	1.00	1.00
Eligibility criteria	163	0.13	0.34	0.00	0.00	1.00
Bank-level controls						
Bank size	167	10.65	1.97	8.29	10.53	13.65
Loan ratio	167	0.61	0.16	0.37	0.63	0.81
Liquidity	167	0.35	0.18	0.13	0.32	0.62
CIR	167	0.67	0.28	0.48	0.61	0.80
RoE	167	-0.01	0.41	-0.26	0.03	0.10
Loan growth	167	0.01	0.16	-0.06	-0.01	0.10

This table reports the descriptive statistics for the variables used in our bank-level analysis. Variables are described in the appendix in Table 7. N refers to the number of observations. SD means standard deviation. p10, p50, and p90 represent the tenth, fiftieth, and the ninetieth percentile.

Table 9: Correlations for our *Bank-level sample*

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	NPL ratio	1.00							
(2)	Equity ratio	-0.05	1.00						
(3)	Bank size	-0.40	-0.17	1.00					
(4)	Loan ratio	0.24	0.56	-0.49	1.00				
(5)	Liquidity	-0.24	-0.53	0.35	-0.89	1.00			
(6)	CIR	0.38	-0.21	0.03	-0.03	-0.08	1.00		
(7)	RoE	-0.21	-0.10	-0.02	-0.05	0.01	0.14	1.00	
(8)	Loan growth	-0.35	0.16	0.02	0.04	0.06	-0.48	-0.26	1.00

This table reports the pairwise correlations of our variables used in the bank-level analysis. Variables are described in the appendix in Table 7.

Table 10: *Incoming loans* (First regression model)

	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan
	(1)	(2)	(3)	(4)	(5)	(6)
Default	0.0332**					
	(0.0143)					
Default amount		0.00365**				
		(0.00154)				
PD			0.996***			
			(0.270)			
Delinquency				0.0152*		
				(0.00788)		
Delinquent amount					0.00224**	
					(0.00111)	
Number of days in del.						0.00493*
						(0.00254)
Interest rate	-0.0228***	-0.0228***	-0.0281***	-0.0230***	-0.0230***	-0.0230***
	(0.00448)	(0.00448)	(0.00392)	(0.00457)	(0.00455)	(0.00456)
Collateralization	-0.0366	-0.0366	-0.0295	-0.0366	-0.0366	-0.0366
	(0.0305)	(0.0305)	(0.0302)	(0.0304)	(0.0304)	(0.0304)
Years since loan origination	-0.375***	-0.375***	-0.381***	-0.375***	-0.376***	-0.376***
	(0.0368)	(0.0368)	(0.0374)	(0.0368)	(0.0367)	(0.0367)
Loan years to maturity	0.0785***	0.0786***	0.0826***	0.0780***	0.0783***	0.0782***
	(0.00720)	(0.00719)	(0.00715)	(0.00722)	(0.00724)	(0.00719)
Current balance	0.000383	0.000304	-0.00428**	0.000455	0.000252	0.000442
	(0.00216)	(0.00218)	(0.00178)	(0.00216)	(0.00220)	(0.00217)
Securitized loan ratio	-0.546***	-0.546***	-0.551***	-0.546***	-0.546***	-0.546***
	(0.0579)	(0.0578)	(0.0583)	(0.0579)	(0.0578)	(0.0578)
Lending relationship	0.00167	0.00167	0.00572	0.00200	0.00201	0.00206
	(0.0102)	(0.0102)	(0.0101)	(0.0103)	(0.0103)	(0.0103)
Loan uniqueness	-0.0188**	-0.0188**	-0.0181**	-0.0188**	-0.0188**	-0.0188**
	(0.00848)	(0.00848)	(0.00836)	(0.00850)	(0.00850)	(0.00850)
Rep. quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
ABS pool FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan type FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower type FE	Yes	Yes	Yes	Yes	Yes	Yes
N	7,484,423	7,484,423	7,484,423	7,484,423	7,484,423	7,484,423
R^2	0.65	0.65	0.65	0.65	0.65	0.65

This table reports the analysis whether loan performance affects the probability of being added to already-securitized loan portfolios ex post. Variables are described in the appendix in Table 3. Specifications (1) to (6) are estimated by a logit regression model. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 11: *Incoming loans* (Subsample analysis)

	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan
	(1)	(2)	(3)	(4)	(5)	(6)
Default	0.0403***					
	(0.0155)					
Default amount		0.00438***				
		(0.00156)				
PD			0.380			
			(0.292)			
Delinquency				0.0184**		
				(0.00863)		
Delinquent amount					0.00282***	
					(0.00100)	
Number of days in del.						0.00379**
						(0.00186)
Interest rate	-0.0140*	-0.0140*	-0.0161*	-0.0141*	-0.0141*	-0.0140*
	(0.00832)	(0.00831)	(0.00910)	(0.00840)	(0.00836)	(0.00832)
Collateralization	-0.0668**	-0.0668**	-0.0636**	-0.0668**	-0.0668**	-0.0668**
	(0.0273)	(0.0273)	(0.0281)	(0.0272)	(0.0271)	(0.0272)
Years since loan origination	-0.207**	-0.207**	-0.210**	-0.207**	-0.207**	-0.208**
	(0.0806)	(0.0806)	(0.0818)	(0.0806)	(0.0806)	(0.0806)
Loan years to maturity	0.0819***	0.0820***	0.0838***	0.0814***	0.0819***	0.0814***
	(0.0184)	(0.0184)	(0.0200)	(0.0185)	(0.0185)	(0.0184)
Current balance	0.00102	0.000878	-0.00124	0.00125	0.000885	0.00126
	(0.00302)	(0.00302)	(0.00415)	(0.00302)	(0.00305)	(0.00301)
Securitized loan ratio	-0.506***	-0.506***	-0.507***	-0.506***	-0.506***	-0.506***
	(0.142)	(0.142)	(0.143)	(0.142)	(0.142)	(0.142)
Lending relationship	0.0110	0.0110	0.0127	0.0114	0.0114	0.0113
	(0.00860)	(0.00859)	(0.00874)	(0.00873)	(0.00871)	(0.00871)
Loan uniqueness	-0.00974	-0.00973	-0.00942	-0.00974	-0.00977	-0.00975
	(0.00594)	(0.00593)	(0.00586)	(0.00596)	(0.00596)	(0.00595)
Rep. quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
ABS pool FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan type FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower type FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3,961,234	3,961,234	3,961,234	3,961,234	3,961,234	3,961,234
R^2	0.52	0.52	0.52	0.52	0.52	0.52

This table reports the analysis whether loan performance affects the probability of being added to already-securitized loan portfolios ex post, using only those loans which are originated prior to the issuance of the respective ABS pool. Variables are described in the appendix in Table 3. Specifications (1) to (6) are estimated by a logit regression model. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 12: *Outgoing loans* (Second regression model)

	Outgoing loan	Outgoing loan	Outgoing loan	Outgoing loan
	(1)	(2)	(3)	(4)
PD	-0.661**			
	(0.260)			
Delinquency		-0.0613***		
		(0.00669)		
Delinquent amount			-0.00865***	
			(0.00120)	
Number of days in del.				-0.0143***
				(0.00547)
Interest rate	-0.00397	-0.00615	-0.00623	-0.00654
	(0.00466)	(0.00468)	(0.00467)	(0.00470)
Collateralization	0.0635*	0.0689**	0.0689**	0.0685**
	(0.0328)	(0.0331)	(0.0331)	(0.0331)
Years since loan origination	-0.0123	-0.0155	-0.0152	-0.0160
	(0.0241)	(0.0240)	(0.0240)	(0.0240)
Loan years to maturity	-0.264***	-0.262***	-0.263***	-0.262***
	(0.0440)	(0.0448)	(0.0447)	(0.0447)
Current balance	0.00665	0.00451	0.00493	0.00433
	(0.0149)	(0.0156)	(0.0154)	(0.0158)
Securitized loan ratio	0.00134	0.000907	0.00125	0.000392
	(0.0520)	(0.0511)	(0.0511)	(0.0511)
Lending relationship	-0.000659	0.000530	0.000630	0.000950
	(0.00678)	(0.00689)	(0.00690)	(0.00691)
Loan uniqueness	0.00388	0.00482	0.00480	0.00478
	(0.00601)	(0.00621)	(0.00621)	(0.00620)
Reporting quarter FE	Yes	Yes	Yes	Yes
ABS pool FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Loan type FE	Yes	Yes	Yes	Yes
Borrower type FE	Yes	Yes	Yes	Yes
N	7,392,210	7,392,210	7,392,210	7,392,210
R^2	0.34	0.35	0.35	0.35

This table reports the analysis whether loan performance affects the probability of being removed from already-securitized loan portfolios prior to pool and loan maturity. Variables are described in the appendix in Table 3. Specifications (1) to (4) are estimated by a logit regression model. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 13: *Outgoing loans* (Subsample analysis)

	Outgoing loan	Outgoing loan	Outgoing loan	Outgoing loan
	(1)	(2)	(3)	(4)
PD	0.348*			
	(0.210)			
Delinquency		-0.0493***		
		(0.0105)		
Delinquent amount			-0.00613***	
			(0.00155)	
Number of days in del.				-0.00891
				(0.00600)
Interest rate	-0.0106**	-0.00735*	-0.00746*	-0.00766**
	(0.00435)	(0.00397)	(0.00397)	(0.00386)
Collateralization	0.0738**	0.0712**	0.0711**	0.0706**
	(0.0351)	(0.0352)	(0.0352)	(0.0353)
Years since loan origination	-0.0502***	-0.0479***	-0.0478***	-0.0477***
	(0.0135)	(0.0131)	(0.0131)	(0.0131)
Loan years to maturity	-0.128***	-0.130***	-0.131***	-0.130***
	(0.0282)	(0.0286)	(0.0286)	(0.0284)
Current balance	-0.0240***	-0.0209***	-0.0202***	-0.0210***
	(0.00620)	(0.00579)	(0.00579)	(0.00574)
Securitized loan ratio	-0.0169	-0.0135	-0.0135	-0.0138
	(0.0287)	(0.0287)	(0.0287)	(0.0290)
Lending relationship	0.00422	0.00164	0.00182	0.00199
	(0.00759)	(0.00736)	(0.00739)	(0.00731)
Loan uniqueness	0.000945	0.000626	0.000642	0.000665
	(0.00370)	(0.00376)	(0.00376)	(0.00376)
Reporting quarter FE	Yes	Yes	Yes	Yes
ABS pool FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Loan type FE	Yes	Yes	Yes	Yes
Borrower type FE	Yes	Yes	Yes	Yes
N	3,881,300	3,881,300	3,881,300	3,881,300
R^2	0.38	0.38	0.38	0.38

This table reports the analysis whether loan performance affects the probability of being removed from already-securitized loan portfolios prior to pool and loan maturity, using only those loans which are originated prior to the ABS issuance. Variables are described in the appendix in Table 3. Specifications (1) to (4) are estimated by a logit regression model. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 14: *Bank-level analysis* (Third regression model)

	Percentage of incoming loans	Percentage of outgoing loans
	(1)	(2)
NPL ratio	1.058*	0.0952
	(0.5420)	(0.1805)
Equity ratio	-5.185***	-1.313*
	(1.5767)	(0.7451)
Bank size	0.0378*	0.00941
	(0.0210)	(0.0124)
Loan ratio	1.254**	0.368
	(0.4962)	(0.2282)
Liquidity	0.498	0.102
	(0.3760)	(0.1668)
CIR	0.402**	0.0434
	(0.1627)	(0.0497)
RoE	0.843***	0.0128
	(0.2991)	(0.0319)
Loan growth	-0.0313	0.0936
	(0.2157)	(0.0859)
Time FE	Yes	Yes
N	167	167
R^2	0.19	0.11

This table reports the analysis whether there are common bank characteristics that drive originators to make use of portfolio replenishment in securitization. Variables are described in the appendix in Table 7. Specifications (1) to (2) are estimated by a fractional response regression model. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS transaction originator are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 15: *Bank-level analysis* (Analysis of ABS prospectuses)

	Percentage of incoming loans	Percentage of incoming loans	Percentage of outgoing loans	Percentage of outgoing loans
	(1)	(2)	(3)	(4)
NPL ratio	1.382**	1.422***	0.223	0.294
	(0.5373)	(0.4730)	(0.1940)	(0.2013)
Equity ratio	-4.520***	-3.993**	-1.148	-1.144
	(1.5110)	(1.5793)	(0.7130)	(0.8043)
Replenishment	-0.208***		-0.109***	
	(0.0540)		(0.0291)	
Eligibility criteria		-0.326***		-0.0974**
		(0.0791)		(0.0423)
Bank size	0.0418*	0.0363	0.0142	0.0126
	(0.0218)	(0.0239)	(0.0116)	(0.0127)
Loan ratio	1.043**	0.852	0.292	0.308
	(0.4601)	(0.5205)	(0.2087)	(0.2131)
Liquidity	0.399	0.365	0.0152	0.0708
	(0.3893)	(0.3387)	(0.1802)	(0.1427)
CIR	0.550***	0.553***	0.00759	0.0631
	(0.1605)	(0.1683)	(0.0617)	(0.0590)
RoE	1.303***	1.227***	0.150*	0.147*
	(0.2825)	(0.2349)	(0.0819)	(0.0798)
Loan growth	0.0209	-0.119	0.0411	0.0509
	(0.2098)	(0.1932)	(0.0817)	(0.1032)
Time FE	Yes	Yes	Yes	Yes
N	163	163	163	163
R^2	0.25	0.25	0.15	0.11

This table reports the analysis whether details and requirements in ABS prospectuses affect the extent of portfolio replenishment. Variables are described in the appendix in Tables 7. Specifications (1) to (4) are estimated by a fractional response regression model. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS transaction originator are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 16: *Incoming loans* (Robustness check: Randomly drawn subsamples)

	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan
	(1)	(2)	(3)	(4)	(5)	(6)
Default	0.0212**					
	(0.00954)					
Default amount		0.00284**				
		(0.00115)				
PD			0.559**			
			(0.273)			
Delinquency				0.0146		
				(0.00957)		
Delinquent amount					0.00227*	
					(0.00132)	
Number of days in del.						0.00584**
						(0.00288)
Interest rate	-0.0141***	-0.0143***	-0.0168***	-0.0246***	-0.0247***	-0.0250***
	(0.00507)	(0.00500)	(0.00494)	(0.00485)	(0.00479)	(0.00482)
Collateralization	-0.0346	-0.0350*	-0.0287	-0.0385	-0.0385	-0.0385
	(0.0213)	(0.0211)	(0.0217)	(0.0310)	(0.0309)	(0.0307)
Years since loan origination	-0.335***	-0.335***	-0.337***	-0.395***	-0.396***	-0.396***
	(0.0324)	(0.0322)	(0.0337)	(0.0412)	(0.0410)	(0.0410)
Loan years to maturity	0.0654***	0.0665***	0.0671***	0.0820***	0.0833***	0.0826***
	(0.00848)	(0.00848)	(0.00755)	(0.00933)	(0.00947)	(0.00941)
Current balance	0.00253	0.00111	-0.0000291	0.000419	-0.000595	0.000180
	(0.00322)	(0.00355)	(0.00196)	(0.00347)	(0.00378)	(0.00349)
Securitized loan ratio	-0.449***	-0.451***	-0.449***	-0.557***	-0.557***	-0.557***
	(0.0633)	(0.0627)	(0.0645)	(0.0811)	(0.0809)	(0.0811)
Lending relationship	0.0124	0.0126	0.0147	0.0105	0.0106	0.0111
	(0.0177)	(0.0176)	(0.0173)	(0.0122)	(0.0123)	(0.0121)
Loan uniqueness	-0.0131**	-0.0131**	-0.0125**	-0.0174**	-0.0175**	-0.0176**
	(0.00616)	(0.00613)	(0.00613)	(0.00701)	(0.00696)	(0.00693)
FE	Yes	Yes	Yes	Yes	Yes	Yes
N	37,306	37,306	37,306	37,439	37,439	37,439
R^2	0.65	0.65	0.65	0.61	0.61	0.61

This table reports the analysis whether loan performance affects the probability of being added to already-securitized loan portfolios ex post based on randomly drawn and equally sized subsamples of defaulted and non-defaulted as well as delinquent and non-delinquent loans. Variables are described in the appendix in Table 3. Specifications (1) to (6) are estimated by a logit regression model including reporting quarter, ABS pool, industry, loan type, and borrower type FE. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 17: *Outgoing loans* (Robustness check: Randomly drawn subsample)

	Outgoing loan	Outgoing loan	Outgoing loan	Outgoing loan
	(1)	(2)	(3)	(4)
PD	-0.468			
	(0.571)			
Delinquency		-0.0637***		
		(0.00638)		
Delinquent amount			-0.00892***	
			(0.00139)	
Number of days in del.				-0.0141***
				(0.00396)
Interest rate	-0.00937	-0.00906*	-0.00916*	-0.00990*
	(0.00700)	(0.00504)	(0.00492)	(0.00530)
Collateralization	0.0696**	0.0757***	0.0757***	0.0746***
	(0.0281)	(0.0273)	(0.0272)	(0.0277)
Years since loan origination	-0.00497	-0.00502	-0.00387	-0.00771
	(0.0195)	(0.0200)	(0.0198)	(0.0199)
Loan years to maturity	-0.181***	-0.178***	-0.182***	-0.178***
	(0.0405)	(0.0409)	(0.0409)	(0.0406)
Current balance	-0.0104	-0.0116	-0.00860	-0.0124
	(0.0179)	(0.0154)	(0.0146)	(0.0159)
Securitized loan ratio	0.0402	0.0426	0.0441	0.0397
	(0.0329)	(0.0342)	(0.0338)	(0.0342)
Lending relationship	0.00547	0.00372	0.00397	0.00452
	(0.0124)	(0.0127)	(0.0126)	(0.0127)
Loan uniqueness	0.00568	0.00681	0.00684	0.00679
	(0.00494)	(0.00477)	(0.00478)	(0.00470)
FE	Yes	Yes	Yes	Yes
N	39,936	39,936	39,936	39,936
R^2	0.30	0.30	0.30	0.30

This table reports the analysis whether loan performance affects the probability of being removed from already-securitized loan portfolios prior to pool and loan maturity based on randomly drawn and equally sized subsamples of defaulted and non-defaulted as well as delinquent and non-delinquent loans. Variables are described in the appendix in Table 3. Specifications (1) to (4) are estimated by a logit regression model including reporting quarter, ABS pool, industry, loan type, and borrower type FE. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 18: *Incoming loans* (Robustness check: Bank variables)

	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan
	(1)	(2)	(3)	(4)	(5)	(6)
Default	0.0187					
	(0.0259)					
Default amount		0.00170				
		(0.00274)				
PD			0.521			
			(1.240)			
Delinquency				0.0425***		
				(0.0159)		
Delinquent amount					0.00641***	
					(0.00207)	
Number of days in del.						0.0123***
						(0.00399)
NPL ratio	0.000789	0.000786	0.000806	0.000693	0.000637	0.000777
	(0.00523)	(0.00522)	(0.00520)	(0.00518)	(0.00516)	(0.00518)
Equity ratio	0.00765	0.00764	0.00764	0.00720	0.00704	0.00765
	(0.0260)	(0.0260)	(0.0259)	(0.0260)	(0.0259)	(0.0259)
Bank size	0.0421	0.0420	0.0421	0.0435*	0.0436*	0.0432*
	(0.0261)	(0.0261)	(0.0261)	(0.0259)	(0.0259)	(0.0261)
Loan ratio	-0.00248	-0.00248	-0.00248	-0.00259	-0.00258	-0.00247
	(0.00599)	(0.00599)	(0.00599)	(0.00602)	(0.00600)	(0.00598)
Liquidity	-0.0114**	-0.0114**	-0.0114**	-0.0115**	-0.0115**	-0.0114**
	(0.00569)	(0.00569)	(0.00569)	(0.00569)	(0.00568)	(0.00567)
CIR	0.00217	0.00217	0.00217	0.00217	0.00218	0.00217
	(0.00209)	(0.00209)	(0.00208)	(0.00208)	(0.00206)	(0.00207)
RoE	-0.00217	-0.00217	-0.00216	-0.00218	-0.00218	-0.00217
	(0.00375)	(0.00375)	(0.00370)	(0.00367)	(0.00363)	(0.00367)
Loan growth	-0.00156	-0.00156	-0.00156	-0.00160	-0.00161	-0.00158
	(0.00185)	(0.00185)	(0.00185)	(0.00184)	(0.00183)	(0.00184)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes
FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5,672,546	5,672,546	5,672,546	5,672,546	5,672,546	5,672,546
R^2	0.51	0.51	0.51	0.51	0.51	0.51

This table reports the analysis whether loan performance affects the probability of being added to already-securitized loan portfolios ex post when additionally controlling for bank characteristics. Moreover, we apply the same loan control variables as in our main analysis in Table 10. Variables are described in the appendix in Table 3 and 7. Specifications (1) to (6) are estimated by a logit regression model including reporting quarter, industry, loan type, and borrower type FE. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 19: *Outgoing loans* (Robustness check: Bank variables)

	Outgoing loan	Outgoing loan	Outgoing loan	Outgoing loan
	(1)	(2)	(3)	(4)
PD	0.468			
	(0.309)			
Delinquency		-0.0641***		
		(0.0133)		
Delinquent amount			-0.00876***	
			(0.00173)	
Number of days in del.				-0.0171***
				(0.00588)
NPL ratio	0.00590***	0.00596***	0.00602***	0.00585***
	(0.00182)	(0.00181)	(0.00179)	(0.00179)
Equity ratio	0.0191***	0.0199***	0.0200***	0.0191***
	(0.00731)	(0.00748)	(0.00741)	(0.00737)
Bank size	0.0218	0.0194	0.0194	0.0201
	(0.0145)	(0.0146)	(0.0146)	(0.0146)
Loan ratio	0.0107***	0.0109***	0.0108***	0.0107***
	(0.00153)	(0.00153)	(0.00152)	(0.00151)
Liquidity	0.00743***	0.00754***	0.00753***	0.00740***
	(0.00221)	(0.00223)	(0.00223)	(0.00221)
CIR	-0.000231	-0.000251	-0.000257	-0.000245
	(0.000947)	(0.000963)	(0.000966)	(0.000954)
RoE	-0.000274	-0.000289	-0.000285	-0.000289
	(0.00152)	(0.00154)	(0.00154)	(0.00154)
Loan growth	-0.000764	-0.000721	-0.000705	-0.000739
	(0.000759)	(0.000758)	(0.000755)	(0.000754)
Loan controls	Yes	Yes	Yes	Yes
FE	Yes	Yes	Yes	Yes
N	6,162,198	6,162,198	6,162,198	6,162,198
R^2	0.35	0.35	0.35	0.35

This table reports the analysis whether loan performance affects the probability of being removed from already-securitized loan portfolios prior to pool and loan maturity when additionally controlling for bank characteristics. Moreover, we apply the same loan control variables as in our main analysis in Table 12. Variables are described in the appendix in Table 3 and 7. Specifications (1) to (4) are estimated by a logit regression model including reporting quarter, industry, loan type, and borrower type FE. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 20: *Incoming loans* (Robustness check: Loan term measures)

	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan	Inc. loan
	(1)	(2)	(3)	(4)	(5)	(6)
Default	0.0282**					
	(0.0140)					
Default amount		0.00314**				
		(0.00150)				
PD			0.807**			
			(0.329)			
Delinquency				0.0148*		
				(0.00776)		
Delinquent amount					0.00214*	
					(0.00111)	
Number of days in del.						0.00477*
						(0.00256)
Interest rate	-0.0234***	-0.0234***	-0.0277***	-0.0236***	-0.0236***	-0.0237***
	(0.00467)	(0.00466)	(0.00484)	(0.00474)	(0.00473)	(0.00475)
Collateralization	-0.0369	-0.0370	-0.0311	-0.0369	-0.0369	-0.0369
	(0.0290)	(0.0290)	(0.0280)	(0.0290)	(0.0289)	(0.0289)
Years since loan origination	-0.155***	-0.155***	-0.156***	-0.155***	-0.155***	-0.155***
	(0.0143)	(0.0143)	(0.0142)	(0.0142)	(0.0142)	(0.0142)
Years since loan origination^2	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.000731)	(0.000730)	(0.000733)	(0.000728)	(0.000727)	(0.000728)
Loan years to maturity	0.0275***	0.0275***	0.0285***	0.0274***	0.0275***	0.0274***
	(0.00334)	(0.00334)	(0.00328)	(0.00336)	(0.00335)	(0.00333)
Loan years to maturity^2	-0.0009***	-0.0009***	-0.0009***	-0.0009***	-0.0009***	-0.0009***
	(0.000154)	(0.000154)	(0.000152)	(0.000155)	(0.000154)	(0.000153)
Current balance	0.00380	0.00373	0.000298	0.00381	0.00364	0.00380
	(0.00278)	(0.00279)	(0.00303)	(0.00277)	(0.00280)	(0.00279)
Securitized loan ratio	-0.504***	-0.504***	-0.507***	-0.504***	-0.504***	-0.504***
	(0.0569)	(0.0569)	(0.0571)	(0.0569)	(0.0569)	(0.0568)
Lending relationship	0.00179	0.00179	0.00505	0.00211	0.00211	0.00216
	(0.0101)	(0.0101)	(0.0106)	(0.0103)	(0.0103)	(0.0102)
Loan uniqueness	-0.0129**	-0.0129**	-0.0125**	-0.0129**	-0.0129**	-0.0129**
	(0.00621)	(0.00621)	(0.00615)	(0.00622)	(0.00622)	(0.00622)
FE	Yes	Yes	Yes	Yes	Yes	Yes
N	7,484,423	7,484,423	7,484,423	7,484,423	7,484,423	7,484,423
R^2	0.64	0.64	0.64	0.64	0.64	0.64

This table reports the analysis whether loan performance affects the probability of being added to already-securitized loan portfolios ex post, additionally controlling for non-logarithmized and squared *Years since loan origination* and *Loan years to maturity*. Variables are described in the appendix in Table 3. Specifications (1) to (6) are estimated by a logit regression model including reporting quarter, ABS pool, industry, loan type, and borrower type FE. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.

Table 21: *Outgoing loans* (Robustness check: Loan term measures)

	Outgoing loan	Outgoing loan	Outgoing loan	Outgoing loan
	(1)	(2)	(3)	(4)
PD	-0.246			
	(0.236)			
Delinquency		-0.0631***		
		(0.00702)		
Delinquent amount			-0.00874***	
			(0.00122)	
Number of days in del.				-0.0149***
				(0.00564)
Interest rate	-0.00560	-0.00538	-0.00549	-0.00577
	(0.00471)	(0.00464)	(0.00462)	(0.00465)
Collateralization	0.0659**	0.0685**	0.0685**	0.0680**
	(0.0333)	(0.0338)	(0.0338)	(0.0338)
Years since loan origination	-0.00107	-0.00111	-0.000984	-0.00138
	(0.00814)	(0.00810)	(0.00812)	(0.00810)
Years since loan origination^2	-0.000187	-0.000203	-0.000208	-0.000189
	(0.000307)	(0.000306)	(0.000307)	(0.000308)
Loan years to maturity	-0.127***	-0.127***	-0.127***	-0.127***
	(0.0207)	(0.0209)	(0.0208)	(0.0208)
Loan years to maturity^2	0.00532***	0.00532***	0.00533***	0.00532***
	(0.000949)	(0.000953)	(0.000954)	(0.000951)
Current balance	0.00326	0.00278	0.00316	0.00260
	(0.0151)	(0.0152)	(0.0150)	(0.0153)
Securitized loan ratio	0.0659**	0.0685**	0.0685**	0.0680**
	(0.0333)	(0.0338)	(0.0338)	(0.0338)
Lending relationship	-0.000948	-0.00161	-0.00149	-0.00120
	(0.00608)	(0.00604)	(0.00605)	(0.00608)
Loan uniqueness	0.000572	0.000837	0.000824	0.000833
	(0.00693)	(0.00700)	(0.00700)	(0.00699)
FE	Yes	Yes	Yes	Yes
N	7,392,210	7,392,210	7,392,210	7,392,210
R^2	0.35	0.35	0.35	0.35

This table reports the analysis whether loan performance affects the probability of being removed from already-securitized loan portfolios prior to pool and loan maturity, additionally controlling for non-logarithmized and squared *Years since loan origination* and *Loan years to maturity*. Variables are described in the appendix in Table 3. Specifications (1) to (4) are estimated by a logit regression model including reporting quarter, ABS pool, industry, loan type, and borrower type FE. Marginal effects are reported and robust standard errors that are clustered with respect to the ABS pool are in parentheses. *, ** and *** denote significance at the 10 %, 5 %, and 1 % levels.