

Determinants and Effects of Capital Relief Trades

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Securitization can serve different purposes. We focus on a sample of transactions which aim at releasing capital, so-called capital relief trades (CRTs). *Ex ante*, it turns out that, as expected, higher total capital ratios decrease the likelihood of a CRT, and larger banks are more likely to conduct CRTs. By contrast, the non-performing loans ratio has only a marginal effect on this likelihood and liquidity ratios basically none. The situation changes remarkably when examining determinants of the number of CRTs or their volumes. The total capital ratio has no significant effect anymore, but higher non-performing loans ratios now come along with less CRTs and lower volumes, presumably because banks cannot afford to realize considerable hidden burdens of their loan portfolios. *Ex post*, we observe that neither the occurrence, nor the frequency or the size of a CRT change any of the following ratios: total capital ratio, non-performing loans ratio, liquid assets to total assets, loans to total assets. These results have important policy implications as they indicate that banks, by and large, use CRTs to eventually increase their lending, which is a key objective when trying to restore the market for securitizations.

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1 Introduction

Information asymmetry suggests that loans are non-marketable (Diamond, 1984). However, loan sales have been established over time, among others in the form of securitization, and have become a substantial market, not the least due to particular contractual features (Gorton and Pennacchi, 1995). Banks utilize securitization as an instrument to actively manage their (regulatory) capital, loan default risk, and liquidity. Improvements enable banks to increase their provision of loans to the real economy, i.e. individuals and firms (e.g., Merton, 1995; Loutskina and Strahan, 2009a). In this way, securitization provides an important contribution to the overall macroeconomic development.

The European Central Bank (ECB) started an extensive liquidity provision in 2011, including the eligibility of asset-backed securities (ABS) as collateral in repurchase agreements (repos) and buying ABS as part of the ABS Purchase Programme (ABSPP) (European Central Bank (ECB), 2015). Increasing regulatory capital requirements as part of the Basel III framework was another response to the financial crisis. These developments stimulated the segmentation of the European securitization market into liquidity generating transactions and those relieving banks' (regulatory) capital positions, the latter being called 'capital relief trades' (CRTs)¹. In discussions of regulators and practitioners they are frequently also called 'balance sheet transactions'. Liquidity generating transactions are often retained by the issuing bank and characterized by data submitted to the European Datawarehouse, the central data repository for all ABS which are eligible for ECB liquidity provision.

With this paper, we are among the first to analyze CRTs and shed light on one of the few academically unexplored financial markets in Europe. We highlight the role of CRTs for the management of banks by showing incentives for and consequences of CRT issuances for banks' accounting figures and their business activities. CRTs comprise *traditional* "true-sale transactions", i. e. the actual elimination of loans from banks' balance sheets, as well

¹ In the literature on securitization, the abbreviation 'CRTs' is sometimes alternatively used for 'credit risk transfers' (e.g., Echeverry, 2022) In our paper, CRTs refer to 'capital relief trades', only.

as *synthetic* transactions, i. e. the purchase of instruments hedging against losses from credit defaults (European Parliament and the Council, 2017). The defining characteristic of CRTs is that these transactions are structured predominantly to provide a release of the issuing banks' (regulatory) capital. This is typically achieved by transferring as much credit risk to the investors as tolerable from a regulatory perspective and economically reasonable. Actively managing banks' capital and credit risk is especially important when regulatory capital requirements are increasing. They matter even more in severe economic stress situations, like the Euro crisis, the COVID-crisis, or the war in the Ukraine, when borrowers' ratings tend to deteriorate.

Not only the objectives of transaction types differ, their structures significantly differ as well. The vast majority of CRTs is backed by corporate loans, mostly of very large firms, and marketed bilaterally in OTC deals (European Banking Authority (EBA), 2019). By contrast, liquidity oriented transactions typically involve securities backed by residential mortgages, are sold publicly, and are rated by major credit rating agencies.² As Carbo-Valverde and Rodríguez-Fernández (2015) show that the valuable economic contribution of ABS in Europe on banks' loan supply mainly arises from banks' improved regulatory capital ratios and not from the liquidity generation, our analysis of CRTs examines a pivotal determinant for overall macroeconomic development.

In our empirical analysis, we examine, first, which bank characteristics determine a bank management's use of CRTs. Second, we investigate the consequences of a CRT issuance on a bank's total capital ratio (TCR), liquidity positions as well as the ratios of non-performing loans to total loans (NPL ratios) and gross loans to total assets. Our data set combines a novel repository of CRTs in Europe, provided by Structured Credit Investor, and bank accounting data of 225 large banks from 23 European countries between 2012 and 2021. Based on various regression models, we reveal that ex ante the probability of conducting a CRT as well as the number of CRTs and the volume securitized is higher

² In order to be eligible for a purchase under the ECB's ABS Purchase Program, an ABS needs to be rated by at least two of the four credit rating agencies ("External Credit Assessment Institutions") accepted within the Eurosystem Credit Assessment Framework (European Central Bank (ECB), 2015).

for larger banks. Banks with lower TCRs are more likely to conduct a CRT, whereas the number of CRTs issued and the total deal volume is not found to be driven by banks' TCRs. Interestingly, we find a lower quality of the loan portfolio as expressed by a higher share of NPL to be related to lower CRT deal count and volume. This finding would be consistent with banks shying away from realizing loan losses when selling NPL in traditional true sale transactions. Ex post, we do not find that a bank's TCR and other relevant ratios change significantly as consequence of CRTs which would be in line with banks issuing CRTs to eventually increase their lending.

With our analysis, we contribute to at least two strands of the existing literature. First, we add to the literature on determinants of securitization issuances (Bannier and Hänsel, 2008; Affinito and Tagliaferri, 2010; Cardone-Riportella et al., 2010; Casu et al., 2013; Farruggio and Uhde, 2015). Regarding banks' loan portfolio risk and equity position, up to now it has been an open question whether the actual credit risk affects banks' securitization activities. By applying data with a sample period after the Global Financial Crisis, we provide evidence that large banks issue CRTs more likely and with a higher deal number and volume. Weakly capitalized banks are more likely to issue CRTs, whereas a high NPL ratio is found to decrease CRT deal count and volume. In contrast to most of the former literature on securitization, which did not distinguish different purposes for securitization, our results show that banks' liquidity does not affect managers' decisions to initiate a CRT. Second, our study contributes to the literature on the implications of securitizations on banks' accounting and risk figures (Michalak and Uhde, 2012; Nadauld and Weisbach, 2012; Carbo-Valverde and Rodríguez-Fernández, 2015; Kaya and Masetti, 2019) by showing that CRTs have no measurable influence on the TCRs and other relevant ratios of the issuing banks.

The remainder of this paper is organized as follows: Section 2 summarizes related literature. Section 3 introduces our data sources, and Section 4 the methodology of our analysis. We present our results in Section 5 before concluding with a summary and an outlook in Section 6.

2 Literature Review and Hypotheses Development

By selling ABS tranches on the capital market or purchasing guarantees covering potential losses from loan defaults, banks can achieve at least three objectives: The management and enhancement of their liquidity, their (regulatory) equity ratio, as well as a reduction of their credit risk position (e.g., Affinito and Tagliaferri, 2010; Loutskina, 2011). In this way, securitizations provide an important contribution to bank funding and credit risk diversification, as well as to enhanced bank lending and optimal risk allocation in the economy (e.g., Pennacchi, 1988; Loutskina, 2011). CRTs predominantly affect the equity and credit risk positions of banks, thus, we will focus on this part of the literature.³ As the determinants and consequences of true-sale and synthetic securitization do not differ substantially in the former literature, we will not separate those in our literature review (Haensel and Krahnen, 2007; Farruggio and Uhde, 2015). In the last two decades, the institutional framework in the ABS market as well as the regulatory requirements for banks significantly differ over time and locations. Consequently, we present only studies which contain data sets that have a minimum level of comparability to the current situation in the European market. Especially, there is only little literature on determinants and consequences of ABS transactions focusing on the European ABS market after the Euro zone debt crises and the related ECB interventions.

Focusing on the motives for issuing ABS, securitizations enable banks to actively exclude credit risk from their balance sheet (or buy the respective insurance in case of synthetic transactions). The actual use of securitizations by the bank management as a tool to manage credit risk is supported in empirical studies as the default risk of the loan portfolio significantly increases banks' activity in the securitization market (e.g., Bannier and Hänsel, 2008; Affinito and Tagliaferri, 2010). In contrast, there are a number of studies, which do not find a significant effect of banks' credit risk position on the probability of a

³ By selling the generated ABS tranches on the capital market, banks also generate liquidity for refinancing. In this context, liquidity generation is a major determinant of ABS issuances (e.g., Bannier and Hänsel, 2008; Altunbas et al., 2009; Affinito and Tagliaferri, 2010; Cardone-Riportella et al., 2010; Casu et al., 2011; Loutskina, 2011). This is especially prevalent for banks with liquidity constraints or more difficult capital market access (Almazan et al., 2015)

securitization issuance (e.g., Martín-Oliver and Saurina, 2007; Cardone-Riportella et al., 2010; Farruggio and Uhde, 2015). Banks having a high loan portfolio quality and, thus, a low credit default risk on their balance sheet can realize positive reputation in the market when securitizing high-quality portfolios (Ambrose et al., 2005). Closely related to banks' credit default risk as an important determinant of issuing an ABS transaction, banks' equity position is of importance for the issuance decision. For the period prior to the Global Financial Crisis, especially undercapitalized banks are found to be stronger incentivized to issue a securitization transaction in order to relief their equity position (e.g., Affinito and Tagliaferri, 2010; Casu et al., 2013).

Additionally, banks' performance, their efficiency, as well as their size are shown to be factors incentivizing bank management to issue ABS. Haensel and Krahnen (2007) and Cardone-Riportella et al. (2010) find that better performing and more efficient banks securitize their assets more often. As larger banks have more expertise in risk management as well as a higher degree of capital market access, size is positively affecting banks' probability of being an active supplier in the ABS market (e.g., Haensel and Krahnen, 2007; Cardone-Riportella et al., 2010; Farruggio and Uhde, 2015).

After the securitization transaction has been conducted, various impacts on banks' equity and NPL ratios as well as on the business activities are identified in former studies. On the individual banks' level, there is mixed evidence on bank risk after securitizing a part of the loan portfolio. On the one hand, there is evidence that banks take even greater risks after the issuance than before, which offsets the risk-reducing effect of divestment (e.g., Franke and Krahnen, 2007; Haensel and Krahnen, 2007; Michalak and Uhde, 2010; Casu et al., 2011; Michalak and Uhde, 2012; González et al., 2016; Bakoush et al., 2020). On the other hand, the elimination of loan default risk from bank balance sheet (or the assurance against it in case of synthetic securitizations) relieves banks equity and risk positions and leads to more financial stability (e.g., Jiangli and Pritsker, 2008; Keffala et al., 2020). Focusing on the time dimension of subsequent banks' risk profile, the default

risk of large European banks decreases in the year after the securitization issue, whereas it increases again in the following year (Battaglia et al., 2021).

Focusing on their business activities, banks show higher profitability of the loan portfolios and a seizing of profitable new business opportunities (Bartov, 1993; Beatty et al., 1995; Karaoglu, 2005; Bakoush et al., 2020). Furthermore, the issuance of securitizations enables banks to provide more loan financing for individuals and corporates, which are offered at better conditions, i.e. lower interest rates (e.g., Loutskina and Strahan, 2009b; Loutskina, 2011; Nadauld and Weisbach, 2012; Kaya and Masetti, 2019). A key finding for our study is that in the European banking sector the positive effect of securitization on the loan supply is derived through the channel of regulatory capital relief, whereas in the U.S. it arises through the liquidity effect of the conversion of typically illiquid loans to liquid assets (Loutskina, 2011; Carbo-Valverde and Rodríguez-Fernández, 2015; Kaya and Masetti, 2019). Empirical evidence of this result is provided by comparing the impact of securitizations with that of covered bonds, which provide liquidity but do not lead to regulatory capital relief. Importantly, the expansion of lending only depends on the total volume of securitized loans, not on their type (Loutskina, 2011; Kaya and Masetti, 2019).

The insights from the existing literature mentioned above lead us to the following hypotheses that are to be analyzed in the following sections:

- H1: Banks with a lower ex ante TCR securitize more CRTs.
- H2: Banks with a higher ex ante NPL ratio securitize more CRTs.
- H3: Banks which securitize more CRTs have an increased TCR ex post.

3 Data

To assess the research question empirically, data is retrieved from two sources. The first source is Fitch Connect. A list of European banks with individual total average assets per

bank over USD 50 billion as of December 31, 2021 is accessed. For the banks in the list, a variety of static and dynamic variables is downloaded from Fitch Connect as well. This includes basic information such as Fitch ID or name as well as annual data from 2012 to 2021 on balance sheet and income statement items and regulatory figures. Accounting measures that are not expressed in USD are converted with each year end's exchange rate. The Total Capital Ratio (TCR), the Ratio of Non-Performing Loans to Total Loans (NPL), the Ratio of Liquid Assets to Total Assets (LATA), the Logarithm of Total Assets (LN_TA) and the Ratio of Gross Loans to Total Assets (LTA) are of particular interest for our regressions. For precise definitions of the variables, please refer to Appendix A.1. Some of the entities included in the Fitch Connect list are erroneously declared as commercial or investment banks even though they do not operate as banks. Examples are central banks, stock exchanges or associations of banks. These entities are manually eliminated from the list. Additionally, all banks from Russia and Turkey are eliminated because their economies and banking systems differ largely from all other countries in various structural and regulatory aspects and could bias the results. A list of all banks finally included in the sample is provided in Appendix A.2. A manual, rough overview of the numeric variables indicates that some infrequent and extreme outliers (e.g. TCR values much higher than 100 %) might distort regression results. The variables from Fitch Connect used as explanatory variables in the following analyses are therefore consistently winsorized for each variable to the top and bottom 1 %.

The second data set is provided by Structured Credit Investor (SCI) comprising tranche-level information on CRTs since 2005.⁴ It includes information on approximately 400 CRTs conducted by around 100 originating banks. We generate a dummy variable *CRT* indicating for each bank-year combination, whether the respective bank did at least one CRT in the respective year ($CRT = 1$) or not ($CRT = 0$). Furthermore, we extract from the SCI data set the number of CRT transactions conducted by each bank in a given year (*CRT_COUNT*) and the natural logarithm of the total CRT deal volume for each bank-

⁴ The classification of a certain transaction as a CRT is not fully transparent to researchers. However, as SCI sells access to this data, it should be its commercial interest to supply a correct and unbiased classification, and we have not come across any peculiar attribution.

year combination (*LN_CRT_VOL*). For consistency reasons, *LN_CRT_VOL* is winsorized to the top and bottom 1 %.

To combine the information from these two data sets, they are matched based on bank names. For each of the banks included in the SCI data set, the Fitch ID is retrieved by searching for the bank name in the Fitch Connect database. Here, we try to correct missing matches that exist e.g. due to slightly different spellings as well as in rare cases of name changes, mergers and acquisitions. The data is deliberately not consolidated on the group level, because in principle every subsidiary has to fulfill regulatory requirements, e.g. with respect to minimum capital, on an individual basis (European Parliament and the Council, 2013, Art. 6) and thus motivations for and consequences of securitization transactions have to be analyzed accordingly on this level.⁵

In total, we obtain a panel data set containing accounting, regulatory and securitization information for 225 banks from 23 countries between 2012 and 2021 on an annual basis with up to 2,250 bank-year observations for each variable.

Table 1: Summary statistics

	N	Mean	SD	5 %	50 %	95 %
CRT	2,250	0.06	0.24	0.00	0.00	1.00
CRT_COUNT	2,250	0.12	0.63	0.00	0.00	1.00
LN_CRT_VOL	2,228	0.30	1.28	0.00	0.00	4.39
TCR	1,788	20.69	11.29	12.10	18.40	35.00
NPL	1,790	4.51	6.78	0.10	2.51	14.96
LATA	2,094	22.95	17.64	2.32	18.68	62.11
LN_TA	2,108	11.86	1.21	10.46	11.60	14.10
LTA	2,076	55.31	23.48	8.90	59.59	89.25

Table 1 provides summary statistics for the data set which is partly winsorized as described above. It contains the number of observations (N), the arithmetic mean (Mean) , the standard deviation (SD) and the 5 %, 50 % and 95 % percentiles of the respective variables. The dummy variable *CRT* has a mean of 0.06 which means that in 6 % of the bank-year

⁵ So-called "waivers", where e.g. capital requirements have to be fulfilled only on a group level, are in principle possible under very strict conditions (European Parliament and the Council, 2013, Art. 7 - 10). However, because of these strict requirements, in practice "waivers" are a rare exception.

observations, a certain bank has conducted at least one CRT in a given year. The mean value of the variable *CRT_COUNT* can be interpreted in a way that on average, per bank-year observation 0.12 CRT deals are conducted. Re-transforming the mean of *CRT_VOL* to arithmetic numbers refers to a deal volume of USD 1.35 million. The average total capital ratio lies at roughly 21 %. The mean values as well as the percentiles of *NPL*, *LATA* and *LTA* are within expected and plausible ranges. The mean of *LN_TA* is 11,86. Re-transformed, this values refers to total assets of USD 141 billion.

4 Methodology

To investigate the research questions and to test the corresponding hypotheses , different econometric models are employed.

To address the first question, a regression model is set up with a dependent variable *CRT_VAR* referring to different dimensions of conducting CRTs. *CRT_VAR* is replaced either by *CRT*, *CRT_COUNT* or *LN_CRT_VOL*, depending on the model specification. This means that we analyze the determinants of the binary decision whether a CRT transaction is conducted at all, of the number of CRT transactions conducted and of the CRT deal volume. In our ex ante analyses, we are particularly interested in the variables *TCR* and *NPL* as potential *Determinants* of CRT. We add bank size (*LN_TA*), the relative importance of the credit business for a bank’s business model (*LTA*), and in our full model liquidity (*LATA*) as *Controls*. Because some time is needed to prepare a CRT and in order to partly encounter potential endogeneity issues, all explanatory variables are lagged by one year. This results in the regression equation

$$CRT_VAR_{i,t} = \alpha + \beta_j \cdot Determinant_{i,j,t-1} + \gamma \cdot Control_{i,j,t-1} + \epsilon_{i,t} \quad (4.1)$$

where α is a constant and ϵ the error term. We also control for year- and country-fixed effects. In the specification where *CRT* is used a dependent variable, a probit model is estimated, whereas in the other specifications OLS regressions are applied. The

pairwise correlations between the explanatory variables are generally rather moderate (see Appendix A.3). Only the pairwise correlation between *LN_TA* and *LATA* is comparably high but still low enough to assume that multicollinearity is most likely not a concerning problem in the model.

To address the second question, i.e. how various capital adequacy and risk measures are affected by the CRT activity of a bank τ years ago, the variable *CRT_VAR* is used as an explanatory variable in an OLS regression model. Again, *CRT_VAR* is replaced by either *CRT*, *CRT_COUNT* or *LN_CRT_VOL*. Because we are primarily interested in the change rather than the absolute values of the ratios analyzed in our ex post analysis, the changes in *TCR*, *NPL*, *LATA*, and *LTA* in percentage points are used as dependent variables ($\Delta Measure$). This results in the regression equation

$$\Delta Measure_{j,i,t} = \alpha + \beta \cdot CRT_VAR_{i,t-\tau} + \gamma \cdot LN_TA_{i,t} + \epsilon_{i,t} \quad (4.2)$$

where it is again controlled for *LN_TA*. Additionally, it is controlled for year- and bank⁶ fixed effects.

5 Empirical Results

Tables 2 - 4 provide the regression results of equation (4.1) in different specifications with respect to dependent and independent variables.

⁶ In the ex ante analysis, we are especially interested in analyzing, which banks from the whole sample securitize CRTs and how the decision is determined. To do so, it is controlled for country fixed effects to take into account unobserved influences on the CRT activity that might stem e.g. from different national regulatory peculiarities. Potential bank-related determinants are already largely modeled as variables. However, in the ex post analysis, we want to investigate the consequences of CRTs for a securitizing bank. Here, bank fixed effects are deliberately employed because due to less bank-related explanatory variables, it has to be controlled for potential unobserved influences.

Table 2: Ex ante analysis - CRT decision determinants

		Dependent variable: CRT			
		(M.A1)	(M.A2)	(M.A3)	(M.A4)
II	TCR _{t-1}	-0.042 ** (0.042)		-0.045 ** (0.043)	-0.044 ** (0.045)
	NPL _{t-1}		-0.020 (0.144)	-0.024 * (0.094)	-0.023 (0.107)
	LATA _{t-1}				-0.004 (0.528)
	LN_TA _{t-1}	0.847 *** (0.000)	0.867 *** (0.000)	0.843 *** (0.000)	0.842 *** (0.000)
	LTA _{t-1}	0.004 (0.253)	0.005 (0.132)	0.005 (0.233)	0.003 (0.625)
	Constant	-12.217 *** (0.000)	-13.035 *** (0.000)	-11.999 *** (0.000)	-11.793 *** (0.000)
	Year FE	Y	Y	Y	Y
	Country FE	Y	Y	Y	Y
Obs.		1,402	1,411	1,263	1,263
Pseudo R^2		0.288	0.283	0.271	0.271

p -values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

First, *CRT* is used as dependent variable (Table 2). Each of the models (M.A1) and (M.A2) uses one of the potential determinants of primary interest and controls for *LN_TA* and *LTA*. Model (M.A3) uses both determinants and both controls as variables. Model (M.A4) additionally controls for *LATA*. Banks' capitalization expressed by *TCR* is negatively and significantly at a 95 % significance level related to *CRT* in all three models where it is included. This supports H1 with respect to the CRT decision. *NPL* is negatively related to *CRT* in all three relevant models. However, the relation is only significant at a 90 % significance level in one model. H2 is not supported. There is rather weak evidence for an opposite effect that is analyzed in more detail later on. In accordance with prior literature, in all models *CRT* is found to be significantly and positively related to bank size as expressed by *LN_TA*. No significant relation is found between *LTA* and *CRT*. All four models are characterized by a substantial explanatory power as expressed by Pseudo R^2 values of at least 27 %.⁷

⁷ Because in the present regression model, a probit specification is used, the coefficients cannot be interpreted in the usual way as magnitudes of the effect.

Table 3: Ex ante analysis - CRT deal count determinants

	Dependent variable: CRT_COUNT			
	(M.B1)	(M.B2)	(M.B3)	(M.B4)
TCR_{t-1}	-0.001 (0.513)		-0.001 (0.277)	-0.002 (0.249)
NPL_{t-1}		-0.015*** (0.001)	-0.017*** (0.001)	-0.016*** (0.001)
$LATA_{t-1}$				-0.003 (0.263)
LN_TA_{t-1}	0.154*** (0.002)	0.170*** (0.001)	0.192*** (0.001)	0.187*** (0.001)
LTA_{t-1}	-0.002 (0.140)	-0.001 (0.354)	-0.001 (0.431)	-0.003 (0.203)
Constant	-1.729*** (0.003)	-1.883*** (0.002)	-2.115*** (0.002)	-1.902*** (0.006)
Year FE	Y	Y	Y	Y
Country FE	Y	Y	Y	Y
Obs.	1,601	1,602	1,441	1,441
R^2	0.131	0.130	0.142	0.140

p-values in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Ex ante analysis - CRT deal volume determinants

	Dependent variable: LN_CRT_VOL			
	(M.C1)	(M.C2)	(M.C3)	(M.C4)
TCR_{t-1}	-0.002 (0.276)		-0.005 (0.204)	-0.005 (0.186)
NPL_{t-1}		-0.035*** (0.007)	-0.039*** (0.006)	-0.038*** (0.006)
$LATA_{t-1}$				-0.007 (0.272)
LN_TA_{t-1}	0.325*** (0.000)	0.360*** (0.000)	0.405*** (0.000)	0.394*** (0.000)
LTA_{t-1}	-0.003 (0.217)	-0.002 (0.452)	-0.002 (0.597)	-0.006 (0.246)
Constant	-3.732*** (0.000)	-4.042*** (0.000)	-4.527*** (0.000)	-4.045*** (0.001)
Year FE	Y	Y	Y	Y
Country FE	Y	Y	Y	Y
Obs.	1,581	1,582	1,421	1,421
R^2	0.135	0.129	0.142	0.141

p-values in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Second, *CRT_COUNT* (Table 3) and, third, *LN_CRT_VOL* (Table 4) are analyzed as dependent variables in an otherwise equivalent set of model specifications. The relation between *TCR* and *CRT_COUNT* is insignificant in all three relevant model specifications. The same result is found with respect to the relation between *TCR* and *LN_CRT_VOL*. Thus, whereas a bank's capitalization is found to be a determinant of the overall decision to conduct CRTs, it is not found to drive the number or total volume of the CRT deals conducted. This means that H1 is only supported on an overall CRT decision level, whereas no evidence is found with respect to the number of deals and deal volume. Interestingly, the relation between *NPL* and both *CRT_COUNT* and *LN_CRT_VOL* is found to be negative and significant in all relevant specifications at a 99 % significance level. This result is in contrast to existing literature where especially prior to the Global Financial Crisis mostly a positive relation is found and leads to H2 being rejected. One potential explanation for this result might be that banks presumably shy away from realizing the loan losses involved when selling NPL in traditional true sales. Additionally, compared to the time prior to the Global Financial Crisis, substantially more extensive and stricter regulations on ABS transactions are in place now (e.g. with respect to risk retention, European Parliament and the Council, 2013, Art. 6). In that sense, our result might also be interpreted in a way that these attempts to reduce negative externalities are indeed effective. *LN_TA* is again positively and significantly related to both *CRT_COUNT* and *LN_CRT_VOL* in all model specifications. The relation between *LTA* and both *CRT_COUNT* and *LN_CRT_VOL* is insignificant in all specifications.

Table 5: Ex post analysis - CRT decision as determinant

	ΔTCR		ΔNPL		$\Delta LATA$		ΔLTA	
	(M.D1)	(M.D2)	(M.D3)	(M.D4)	(M.D5)	(M.D6)	(M.D7)	(M.D8)
CRT_{t-1}	0.053 (0.882)		0.356 (0.254)		-0.477 (0.410)		0.569 (0.327)	
CRT_{t-2}		0.044 (0.877)		0.278 (0.352)		0.925 (0.227)		-0.493 (0.436)
LN_TA_t	-0.412 (0.624)	-0.729 (0.440)	0.685 * (0.060)	0.614 * (0.071)	-0.589 (0.345)	-1.088 (0.116)	1.626 (0.578)	1.948 (0.570)
Constant	6.115 (0.512)	8.501 (0.412)	-7.936** (0.042)	-8.441** (0.021)	8.046 (0.239)	12.268 (0.105)	-16.041 (0.617)	-20.903 (0.577)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	1,579	1,421	1,576	1,417	1,866	1,675	1,852	1,663
R^2	0.066	0.105	0.171	0.203	0.136	0.153	0.162	0.173

p-values in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 provides the regression results of equation (4.2) capturing the ex post relation between CRT and ΔTCR ((M.D1) and (M.D2)), ΔNPL ((M.D3) and (M.D4)), $\Delta LATA$ ((M.D5) and (M.D6)), and ΔLTA ((M.D7) and (M.D8)). CRT is used as explanatory variable and lagged by one period in model specifications (M.D1), (M.D3) and (M.D5) and by two periods in (M.D2), (M.D4) and (M.D6). None of the coefficients capturing the ex post relation between CRT and the four different dependent variables is significant. No significant effects are also found when CRT is replaced by CRT_COUNT or LN_CRT_VOL . The corresponding regression results are reported in Appendix A.4. In summary, the results of our ex post analysis suggest that originating a CRT does not significantly alter central capital and risk measures on the bank level. H3 has to be rejected. However, our findings are in line with banks applying CRTs to eventually increase their lending, because such a behavior would simultaneously explain the constancy of all four of the previous values. Replacing sold loans by new ones of about the same quality would obviously leave the total capital ratio, NPL ratio and loans to total assets unaffected. With respect to TCR , banks could also use CRTs to keep target capital ratios rather than increasing TCR . Bank size as expressed by LN_TA is significantly (and positively) related only to ΔNPL .

6 Conclusions

Macroeconomic performance hinges on a number of factors, including real investments of firms as well as individuals' expenditures. Bank loans are often needed to finance these outlays and therefore sufficiently capitalized and liquid banks are a must-have. For some time now, securitization has been an important instrument for transforming otherwise illiquid loans into liquid securities and to allocate risks. Banks can use this tool to adjust their risk exposure, to secure liquidity, or to improve their regulatory capital ratios. Either way they widen their scope for further lending and thereby contribute to growth and economic wealth. In the run-up to the financial crisis, securitization was discredited due to the abuse of the instrument. Information asymmetries were exploited and incentives misaligned, leading to a breakdown of the respective markets. In the aftermath of the crisis, up to now, these markets have not recovered as desired given their commercial relevance. Against this background it is important to understand more deeply determinants and effects of different variants of this instrument.

This empirical study focuses on transactions that must be called under-researched from an academic perspective. Capital relief trades (CRTs) aim at releasing capital. Thus, it is to be expected that banks with a lower total capital ratio will be more likely to conduct a CRT, and this is what we indeed find. However, a lower total capital ratio does neither imply more nor larger CRTs. Liquidity ratios do not have any significant effect concerning CRTs. The significance of this result is twofold. First, it documents that the transactions considered in our study are supposedly correctly classified as CRTs and not contaminated by transactions directed at other objectives. Second, when analyzing securitization it is of utmost importance to distinguish different varieties instead of bunching them all together.

It seems plausible that banks with higher NPL ratios will use CRTs more intensively to reduce their credit risk and to improve their capital ratios. But the opposite seems to be true. The NPL ratio is negatively related to the likelihood of a CRT, although at best weakly significant, as well as to the number and volumes of CRTs, both relations being

strongly significant. Banks presumably shy away from realizing the loan losses involved when selling NPL in traditional true sales. This observation entails an important political message. If it is intended to stabilize a banking system by removing NPL from this sector, this will not work via CRTs as long as these are voluntary.

The results on the determinants above are derived from an *ex ante* perspective, i.e. before a (potential) CRT. For an assessment of the effects, we turn to an *ex post* view, looking at changes in four variables after a (potential) CRT: total capital ratio, NPL ratio, liquid assets over total assets, and loans over total assets. In line with the predominant motive of a CRT and the *ex ante* results, one should expect that banks with one or more CRTs exhibit an increase in their total capital ratio. Alas, this is not what we find: neither the occurrence, nor the frequency or the size of a CRT change any of these ratios. These results suggest that banks, by and large, use CRTs to eventually increase their lending, because such a behavior would simultaneously explain the constancy of all four of the previous values. Replacing sold loans by new ones of about the same quality would obviously leave the total capital ratio, NPL ratio and loans to total assets unaffected. From a political perspective, this observation is good news, as expanding banks' loan origination, without incurring additional risk, is a key reason for trying to restore the markets for securitizations.

Finally, a word on bank size is in order. The relatively high fixed costs of securitization and the necessity to hold sufficiently large portfolios imply that bank size is a driver of securitization. Correspondingly, we are able to show that larger banks conduct significantly more and larger CRTs. Yet in the *ex post* analysis there is only one (weakly) significant relation of bank size, namely a positive one with the NPL ratio meaning the larger the bank, the higher the increase (or the lower the decrease) in the NPL ratio. It looks as if supervisors should pay more attention to the CRTs of larger banks.

References

- Affinito, M. and Tagliaferri, E. (2010). Why do (or did?) banks securitize their loans? Evidence from Italy. *Journal of Financial Stability*, 6:189–202.
- Almazan, A., Martín-Oliver, A., and Saurina, J. (2015). Securitization and banks’ capital structure. *The Review of Corporate Finance Studies*, 4(2):206–238.
- Altunbas, Y., Gambacorta, L., and Marques-Ibanez, D. (2009). Securitisation and the bank lending channel. *European Economic Review*, 53(8):996–1009.
- Ambrose, B. W., LaCour-Little, M., and Sanders, A. B. (2005). Does regulatory capital arbitrage, reputation, or asymmetric information drive securitization? *Journal of Financial Services Research*, 28(1):113–133.
- Bakoush, M., Mishra, T., and Wolfe, S. (2020). Securitization, monetary policy and bank stability. In *American Economic Association 2020 Annual Meeting, San Diego, CA, USA (forthcoming)*.
- Bannier, C. E. and Hänsel, D. N. (2008). Determinants of european banks’ engagement in loan securitization (deutsche bundesbank discussion paper, series 2: Banking and financial studies, no 10/2008. <https://www.bundesbank.de/resource/blob/704276/d7a4b54529f5bc57bf07df0aa74689d0/mL/2008-06-02-dkp-10-data.pdf> (accessed 2021/09/29).
- Bartov, E. (1993). The timing of asset sales and earnings manipulation. *Accounting review*, pages 840–855.
- Battaglia, F., Buchanan, B. G., Fiordelisi, F., and Ricci, O. (2021). Securitization and crash risk: Evidence from large european banks. *Journal of International Financial Markets, Institutions and Money*, 72:101339.
- Beatty, A., Chamberlain, S. L., and Magliolo, J. (1995). Managing financial reports of commercial banks: The influence of taxes, regulatory capital, and earnings. *Journal of Accounting Research*, 33(2):231–261.
- Carbo-Valverde, S., H. D. and Rodríguez-Fernández, F. (2015). The impact of securitization on credit rationing: Empirical evidence. *Journal of Financial Stability*, 20:36–50.
- Cardone-Riportella, C., Samaniego-Medina, R., and Trujillo-Ponce, A. (2010). What drives bank securitisation? The Spanish experience. *Journal of Banking & Finance*, 34(11):2639–2651.

- Casu, B., Clare, A., Sarkisyan, A., and Thomas, S. (2011). Does securitization reduce credit risk taking? Empirical evidence from US bank holding companies. *The European Journal of Finance*, 17(9-10):769–788.
- Casu, B., Clare, A., Sarkisyan, A., and Thomas, S. (2013). Securitization and bank performance. *Journal of Money, Credit and Banking*, 45(8):1617–1658.
- Diamond, D. W. (1984). Financial intermediation and delegated monitoring. *The Review of Economic Studies*, 51:393–414.
- Echeverry, D. (2022). Adverse selection without a housing boom: Evidence from fannie mae’s credit risk transfer. *Working Paper*.
- European Banking Authority (EBA) (2019). Draft report on sts framework for synthetic securitisation under art. 45 of regulation (eu) 2017/2402. - https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwirudXH-ch4AhVjR_EDHRq9Dn0QFnoECBEQAQ&url=https%3A%2F%2Feba.europa.eu%2Fdocuments%2F10180%2F2963923%2FEBA%2BDiscussion%2BPaper%2Bon%2BSTS%2Bsyntehtic%2Bsecuritisation.pdf&usg=AOvVaw120DYwjMr05mfiF6IC58Nw (accessed 2022/06/22).
- European Central Bank (ECB) (2015). Decision (eu) 2015/5 of the european central bank of 19 november 2014 on the implementation of the asset-backed securities purchase programme (ecb/2014/45). [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0045\(01\)&qid=1598950184968&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0045(01)&qid=1598950184968&from=EN) (accessed 2022/07/28).
- European Parliament and the Council (2013). Regulation (eu) no 575/2013 of the european parliament and of the council of 26 june 2013 on prudential requirements for credit institutions and investment firms and amending regulation (eu) no 648/2012. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0575&from=de> (accessed 2022/07/28).
- European Parliament and the Council (2017). Regulation (eu) no 2017/2402 of the european parliament and of the council of 12 december 2017 laying down a general framework for securitisation and creating a specific framework for simple, transparent and standardised securitisation, and amending directives 2009/65/ec, 2009/138/ec and 2011/61/eu and regulations (ec) no 1060/2009 and (eu) no 648/2012. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R2402&from=DE> (accessed 2022/08/12).
- Farruggio, C. and Uhde, A. (2015). Determinants of loan securitization in european banking. *Journal of Banking & Finance*, 56:12–27.

- Franke, G. and Krahnen, J. P. (2007). Default risk sharing between banks and markets: The contribution of collateralized debt obligations. In Carey, M. and Stulz, R. M., editors, *The Risks of Financial Institutions*, pages 603–634. University of Chicago Press.
- González, L. O., Gil, L. I. R., Cunill, O. M., and Lindahl, J. M. M. (2016). The effect of financial innovation on european banks’ risk. *Journal of Business Research*, 69(11):4781–4786.
- Gorton, G. B. and Pennacchi, G. G. (1995). Banks and loan sales marketing nonmarketable assets. *Journal of Monetary Economics*, 35(3):389–411.
- Haensel, D. and Krahnen, J. (2007). Does credit securitization reduce bank risk? evidence from the european cdo market (working paper). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=967430 (accessed 2021/09/23).
- Jiangli, W. and Pritsker, M. (2008). The impacts of securitization on us bank holding companies (working paper). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1102284 (accessed 2021/10/10).
- Karaoglu, E. (2005). Regulatory capital and earnings management in banks: The case of loan sales and securitizations. *FDIC Center for Financial Research Working Paper*, 05(2005).
- Kaya, O. and Masetti, O. (2019). Small- and medium-sized enterprise financing and securitization: Firm-level evidence from the Euro area. *Economic Inquiry*, 57:391–409.
- Keffala, M. R., Farjaoui, A., et al. (2020). The effect of using securitization on the stability and the risk of banks: Evidence from emerging countries. *International Journal of Financial Research*, 11(2):205–217.
- Loutskina, E. (2011). The role of securitization in bank liquidity and funding management. *Journal of Financial Economics*, 100(3):663–684.
- Loutskina, E. and Strahan, P. E. (2009a). Securitization and the declining impact of bank finance on loan supply: Evidence from mortgage originations. *The Journal of Finance*, 64(2):861–889.
- Loutskina, E. and Strahan, P. E. (2009b). Securitization and the declining impact of bank finance on loan supply: Evidence from mortgage originations. *The Journal of Finance*, 64:861–889.
- Martín-Oliver, A. and Saurina, J. (2007). Why do banks securitize assets. In *XV Spanish Finance Forum Conference Proceedings*, pages 1–33. Spanish Finance Association Palma de Mallorca.

- Merton, R. C. (1995). A functional perspective of financial intermediation. *Financial Management*, 24:23–41.
- Michalak, T. C. and Uhde, A. (2010). Securitization and systematic risk in european banking: Empirical evidence. *Journal of Banking & Finance*, 34(12):3061–3077.
- Michalak, T. C. and Uhde, A. (2012). Credit risk securitization and bank soundness in europe. *The Quarterly Review of Economics and Finance*, 52(3):272–285.
- Nadauld, T. D. and Weisbach, M. S. (2012). Did securitization affect the cost of corporate debt? *Journal of Financial Economics*, 105(2):332–352.
- Pennacchi, G. G. (1988). Loan sales and the cost of bank capital. *The Journal of Finance*, 43(2):375–396.

A Appendix

A.1 Variables Description

Table A1: Variable description

Variable	Description	Unit
CRT	Dummy variable indicating whether the respective bank conducted a CRT as originator in the respective year (1) or not (0).	0/1
CRT_COUNT	Number of CRT deals the respective bank conducted as originator in the respective year	units
LATA	Liquid assets divided by total assets	%
LN_TA	(Natural) logarithm of the total assets	ln(mio. USD)
LN_CRT_VOL	(Natural) logarithm of the total CRT deal volume the respective bank conducted as originator in the respective year	ln(mio. USD)
NPL	Share of non-performing loans in total loans.	%
TCR	Total capital ratio calculated as the sum of Tier 1 and Tier 2 capital divided by total risk weighted assets (RWA).	%
LTA	Total gross loans divided by total assets.	%

A.2 List of Banks in the Sample

Table A2: List of banks in the sample

No.	Bank
1	Aareal Bank AG
2	ABANCA Corporacion Bancaria, S.A.
3	ABH Financial Limited
4	ABN AMRO Bank N.V.
5	Accord Mortgages Limited
6	AIB Group Public Limited Company
7	Allied Irish Banks, plc
8	Alpha Bank S.A.
9	Alpha Services and Holdings S.A.
10	Argenta Bank- en Verzekeringsgroep NV
11	Argenta Spaarbank N.V.
12	Banca Mediolanum S.p.A.
13	Banca Monte dei Paschi di Siena S.p.A.
14	Banca Nazionale del Lavoro S.P.A.
15	Banca Popolare di Sondrio - Societa per Azioni
16	Banco Bilbao Vizcaya Argentaria, S.A.
17	Banco BPM S.p.A.
18	Banco Comercial Portugues, S.A.
19	Banco de Sabadell, S.A.
20	Banco Santander Totta S.A.
21	Banco Santander, S.A.
22	BancoPosta RFC
23	Bank Julius Baer & Co. AG
24	Bank of Ireland
25	Bank of Ireland Group plc
26	Bank of Scotland Plc
27	Bankia S.A.
28	Bankinter, S.A.
29	Banque Cantonale Vaudoise
30	Banque et Caisse d'Epargne de l'Etat
31	Banque Federative du Credit Mutuel S.A.
32	Barclays Bank Ireland Plc
33	Barclays Bank plc
34	Barclays Bank UK PLC

35	Barclays plc
36	Basler Kantonalbank
37	Bausparkasse Schwaebisch Hall AG
38	BAWAG Group AG
39	BAWAG P.S.K.
40	Bayerische Landesbank
41	Belfius Bank SA/NV
42	Berliner Sparkasse
43	BFA, Tenedora de Acciones, S.A.U.
44	BGL BNP Paribas
45	BNG Bank N.V.
46	BNP Paribas Fortis SA/NV
47	BNP Paribas Personal Finance
48	BNP Paribas S.A.
49	BNP Paribas Securities Services
50	BPCE S.A.
51	BPER Banca S.p.A.
52	Bpifrance
53	BRED Banque Populaire
54	CA Consumer Finance
55	Caceis Bank
56	CACEIS SA
57	Caisse d'Epargne et de Prevoyance de Rhone Alpes
58	Caisse d'Epargne et de Prevoyance Ile-de-France
59	Caisse Federale de Credit Mutuel
60	Caisse Francaise de Financement Local
61	Caisse Regionale de Credit Agricole Mutuel de Paris et d'Ile de France
62	Caixa Geral de Depositos, S.A.
63	CaixaBank, S.A.
64	Ceska Sporitelna, a.s.
65	Ceskoslovenska Obchodni Banka a.s. (CSOB)
66	Citibank Holdings Ireland Limited
67	Citigroup Global Markets Europe AG
68	Clydesdale Bank PLC
69	Commerzbank AG
70	Compagnie de Financement Foncier
71	Cooperatieve Rabobank U.A.
72	Coventry Building Society

73	Credit Agricole
74	Credit Agricole Corporate and Investment Bank
75	Credit Agricole Italia S.p.A.
76	Credit Agricole S.A.
77	Credit du Nord S.A.
78	Credit Foncier de France S.A.
79	Credit Industriel et Commercial
80	Credit Mutuel
81	Credit Mutuel Alliance Federale
82	Credit Mutuel Arkea
83	Credit Suisse (Schweiz) AG
84	Credit Suisse AG
85	Credit Suisse Group AG
86	Credit Suisse International
87	Credito Emiliano Holding SpA
88	Credito Emiliano S.p.A.
89	Danske Bank A/S
90	de Volksbank N.V.
91	DekaBank Deutsche Girozentrale
92	Deutsche Apotheker- und Aerztebank eG
93	Deutsche Bank AG
94	Deutsche Kreditbank AG
95	Deutsche Pfandbriefbank AG
96	Dexia Credit Local S.A.
97	Dexia S.A.
98	DNB ASA
99	DNB Bank ASA
100	DZ BANK AG Deutsche Zentral-Genossenschaftsbank
101	DZ HYP AG
102	Erste Group Bank AG
103	Erwerbsgesellschaft der S-Finanzgruppe mbH & Co KG
104	Eurobank Ergasias Services and Holdings S.A.
105	Eurobank S.A.
106	Fideuram - Intesa Sanpaolo Private Banking
107	FMS Wertmanagement AoeR
108	Groupe BPCE
109	Hamburger Sparkasse AG (Haspa)
110	HASPA Finanzholding

111	HBOS plc
112	HSBC Bank plc
113	HSBC Continental Europe S.A.
114	HSBC Holdings plc
115	HSBC UK Bank plc
116	Ibercaja Banco, S.A.
117	Iccrea Banca S.P.A.
118	ING Bank N.V.
119	ING Belgium NV/SA
120	ING Groep N.V.
121	ING Holding Deutschland GmbH
122	ING-DiBa AG
123	Intesa Sanpaolo S.p.A.
124	Investec Group
125	J.P. Morgan Capital Holdings Limited
126	J.P. Morgan SE
127	Julius Baer Group Ltd
128	Jyske Bank A/S
129	KBC Bank NV
130	KBC Group NV
131	KfW
132	Komerčni Banka, a.s.
133	Kommunalbanken AS
134	Kutxabank, S.A.
135	La Banque Postale S.A.
136	Landesbank Baden-Wuerttemberg
137	Landesbank Hessen-Thüringen Girozentrale
138	Landeskreditbank Baden-Wuerttemberg - Foerderbank
139	Landwirtschaftliche Rentenbank
140	Le Credit Lyonnais
141	LGT Group Foundation
142	Liberbank S.A.
143	Lloyds Bank Corporate Markets plc
144	Lloyds Bank plc
145	Lloyds Banking Group plc
146	Luzerner Kantonalbank AG
147	Lyonnaise de Banque
148	Mediobanca - Banca di Credito Finanziario SPA

149	Migrosbank AG
150	Muenchener Hypothekenbank eG
151	Municipality Finance PLC
152	National Bank of Greece S.A.
153	National Westminster Bank Plc
154	Nationwide Building Society
155	Natixis S.A.
156	NatWest Group plc
157	NatWest Markets Plc
158	Nederlandse Waterschapsbank N.V.
159	Nomura International plc
160	Norddeutsche Landesbank Girozentrale
161	Nordea Bank Abp
162	Nordea Hypotek AB (publ)
163	Nordea Kredit Realkreditaktieselskab
164	Novo Banco, S.A.
165	NRW.BANK
166	Nykredit A/S
167	Nykredit Realkredit A/S
168	OP Corporate Bank Plc
169	OP Financial Group
170	OTP Bank Plc.
171	Pfandbriefbank schweizerischer Hypothekarinstitute
172	Pfandbriefzentrale der schweizerischen Kantonalbanken AG
173	Pictet Group
174	Piraeus Bank S.A.
175	Piraeus Financial Holdings S.A.
176	Postfinance AG
177	Powszechna Kasa Oszczednosci Bank Polski S.A.
178	PPF Group N.V.
179	Raiffeisen Bank International AG
180	Raiffeisen Group
181	Raiffeisen Schweiz Genossenschaft
182	Raiffeisenlandesbank Oberoesterreich Aktiengesellschaft
183	RBC Europe Limited
184	RCI Banque S.A.
185	Realkredit Danmark A/S
186	Royal Bank of Scotland International (Holdings) Ltd.

187	Royal Bank of Scotland International Limited
188	Santander Bank Polska S.A.
189	Santander Consumer Bank AG
190	Santander Consumer Finance, S.A.
191	Santander Totta, SGPS, S.A.
192	Santander UK Group Holdings plc
193	Santander UK plc
194	SBAB Bank AB (publ)
195	Skandinaviska Enskilda Banken AB (publ)
196	Societe Generale International Limited
197	Societe Generale S.A.
198	Stadshypotek AB (publ)
199	Standard Chartered Bank
200	Standard Chartered PLC
201	State Street Bank International GmbH
202	State Street Europe Holdings Germany S.a.r.l. & Co. KG
203	Storebrand Group
204	Svenska Handelsbanken AB
205	Swedbank AB
206	Swedbank Mortgage AB
207	Swiss Post Ltd
208	The Mortgage Works (UK) plc
209	The Royal Bank of Scotland Public Limited Company
210	Totalkredit A/S
211	TSB Bank plc
212	TSB Banking Group PLC
213	UBS AG
214	UBS Europe SE
215	UBS Group AG
216	UBS Switzerland AG
217	Unicaja Banco, S.A.
218	UniCredit Bank AG
219	UniCredit Bank Austria AG
220	UniCredit S.p.A.
221	Unione di Banche Italiane S.p.A.
222	Volkswagen Bank GmbH
223	Volkswagen Leasing GmbH
224	Yorkshire Building Society

A.3 Correlation of Key Variables

Table A3: Correlation matrix of key variables

	TCR	NPL	LATA	LN_TA	LTA
TCR	1.000				
NPL	-0.235	1.000			
LATA	0.028	-0.251	1.000		
LN_TA	-0.026	-0.074	0.235	1.000	
LTA	0.055	0.173	-0.782	-0.329	1.000

A.4 Regression Results

Table A4: Ex post analysis - CRT deal count as determinant

	ΔTCR		ΔNPL		$\Delta LATA$		ΔLTA	
	(M.E1)	(M.E2)	(M.E3)	(M.E4)	(M.E5)	(M.E6)	(M.E7)	(M.E8)
CRT_COUNT _{<i>t</i>-1}	0.061 (0.431)		0.088 (0.311)		-0.007 (0.970)		0.061 (0.825)	
CRT_COUNT _{<i>t</i>-2}		-0.017 (0.855)		0.087 (0.295)		0.040 (0.859)		0.111 (0.589)
LN_TA _{<i>t</i>}	-0.406 (0.629)	-0.732 (0.439)	0.685 * (0.060)	0.620 * (0.071)	-0.576 (0.357)	-1.098 (0.113)	1.616 (0.580)	1.964 (0.567)
Constant	6.053 (0.516)	8.523 (0.411)	-7.946** (0.043)	-8.504** (0.021)	7.915 (0.247)	12.351 (0.103)	-15.953 (0.619)	-21.062 (0.574)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	1,579	1,421	1,576	1,417	1,866	1,675	1,852	1,663
<i>R</i> ²	0.066	0.105	0.170	0.203	0.136	0.152	0.161	0.173

p-values in parentheses* *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01

Table A5: Ex post analysis - CRT deal volume as determinant

	ΔTCR		ΔNPL		$\Delta LATA$		ΔLTA	
	(M.F1)	(M.F2)	(M.F3)	(M.F4)	(M.F5)	(M.F6)	(M.F7)	(M.F8)
LN_CRT_VOL _{<i>t</i>-1}	-0.010 (0.894)		0.079 (0.183)		-0.059 (0.634)		0.095 (0.423)	
LN_CRT_VOL _{<i>t</i>-2}		0.046 (0.378)		0.085 (0.150)		0.168 (0.239)		-0.058 (0.658)
LN_TA _{<i>t</i>}	-0.418 (0.620)	-0.723 (0.445)	0.692 * (0.059)	0.627 * (0.068)	-0.625 (0.315)	-1.093 (0.114)	1.652 (0.572)	1.966 (0.567)
Constant	6.178 (0.509)	8.460 (0.415)	-8.001** (0.042)	-8.571** (0.020)	8.407 (0.217)	12.336 (0.103)	-16.314 (0.612)	-21.078 (0.575)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	1,563	1,406	1,560	1,402	1,850	1,660	1,836	1,648
<i>R</i> ²	0.066	0.105	0.171	0.203	0.137	0.154	0.162	0.172

p-values in parentheses* *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01