The impact of the 2007–09 financial crisis on bank credit risk, dividend payout and capital structure

The impact of the 2007-09 financial crisis on bank credit risk, dividend payout, and capital structure

By

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Table of Contents

List of Tables

Chapter 2

Chapter 3

Chapter 4

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

List of Figures

List of Abbreviations

ABS	*Asset-Backed Security*
AR1	*First Order Autocorrelation*
AR2	*Second Order Autocorrelation*
BHC	*Bank Holding Company*
C&I Loans	*Commercial and Industrial Loans*
Fannie Mae	*Federal National Mortgage Association*
Freddie Mac	*Federal Home Loan Mortgage Corporation*
GMM	*Generalised Method of Moments*
GSE	*Government Sponsored Enterprise*
IV	*Instrumental Variable*
IV-Tobit	*Tobit Model with Instrumental Variable Approach*
LDV	*Lagged Dependent Variable*
M&A	*Mergers and Acquisition*
MBS	*Mortgage-Backed Security*
OLS	*Ordinary Least Square*
PCA	*Prompt Corrective Action*
PLC	*Public Listed Bank*
SPV	*Special Purpose Vehicle*
U.S.	*United States of America*

Declaration

I certify that this thesis and the work presented herein are my own and have been generated by me as the result of my own original research. I declare that where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis has been composed solely by me and that it has not been submitted, in whole or in part, in any previous application for a degree.

Part of this work (Chapter 2) was jointly co-authored with Dr. Vitor Castro and Dr. Justine Wood. It has been published in the International Journal of Finance & Economics. In this paper, I undertook the majority of the work; Dr. Vitor and Dr. Justine helped shaping the paper's structure, sharpen the analysis, and polish the writing.

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Abstract

This thesis analyses the impact of the 2007-09 financial crisis on the banking industry. The main research question addressed here is: ó*What was the impact of the 2007-09 financial crisis on credit risk, dividend payout, and capital structure in the banking sector*.ô These financial aspects are investigated in three separate chapters. Accordingly, this thesis seeks to explore the effectiveness of the post-crisis changes in regulation, supervision, and bank risk management.

The first empirical study (Chapter 2) examines whether banks that practise excessive lending charge an adequate premium and whether there is a trade-off between the amount of loans that they create and the amount of risk accumulated in their asset portfolios. It also aims to investigate whether bank performance is a key driver for exercising excessive lending and higher risk. Employing a two-step system generalised method of moments estimator over a panel of 149 European banks, the results show that the implications of excessive lending can be explained by modern financial theories of risk management and moral hazard incentives. That is, the *risk-management hypothesis* holds for the period after the 2007-09 financial crisis and for large banks. This means that banks exercise excessive lending with low risk borrowers and generate adequate premium from both high and low risk borrowers. Evidence points out that bank performance plays a significant role as it can induce a ósearch for yieldô or ógamble to surviveô behaviour, and the crisis has a significant impact in reducing the ógamble to surviveô behaviour.

In the second empirical study (Chapter 3), the attention is turned to the dividend payout policy. This chapter examines the impact of uninsured debt, namely subordinated debt, on banksô dividend payout policy during and after the financial crisis. It is expected that uninsured debtholders have the relative strength needed to monitor, discipline, and force bank managers to cut their dividends when their solvency comes into question. Employing an IV-Tobit model over a dataset of 684 U.S. banks during and after the 2007-09 financial crisis, we find that the

risk-shifting hypothesis holds for publicly listed banks during both periods. Contrarily, we show that the *monitoring hypothesis,* under which a higher share of subordinated debt is associated with a strong monitoring impact prohibiting weak banks from distributing dividends, holds for unlisted banks. We also provide evidence in favour of the *signalling hypothesis* for all safe banks.

Finally, the third empirical study (Chapter 4) is focused on the adjustments of banksô capital structure during and after the 2007-09 financial crisis. It revisits the issue of how banksô capital adjustment affects credit supply and liquidity holdings by accounting for the securitisation activity. It has been argued that the need for banks to adjust their capital in response to new regulations, particularly the ones that followed the financial crisis, might have constrained banksô lending capacity, and shrunk other important items on their balance sheets. The study argues, however, that one way for banks to mitigate such negative side effects is by transferring their risky investments out of their balance sheets by engaging in securitisation activities. This is the case because securitisation makes loans more liquid since banks can sell them to a separate legal entity known as special purpose vehicle. The empirical analysis starts by employing a partial adjustment framework to estimate a bank-specific and time-varying target equity capital ratio. Then, using the estimated ratios, a two-step system generalised method of moments estimator is run over a sample of 375 U.S. commercial banks. The results show that banks that rely highly on securitisation are reluctant to issue equity when adjusting towards their target capital. Instead, they choose to cut their on-balance sheet lending when they face capital shortage, whereas under capital surplus they increase their liquidity buffer. This finding is more evident in the case of low capitalised banks. Additionally, our results point out that securitisation helps banks to increase their commercial and industrial loans that offer a higher profit.

Chapter 1
Introduction

1. Background

This year marks the 13th anniversary of the 2008 global financial crisis that was caused by the housing market in the U.S. Many argue that the U.S legislation, which was enacted to stimulate lending in the housing market and allowing financial institutions to grant more mortgages to risky borrowers with bad credit history (subprime mortgages), is one of the main causes of the global financial crisis. This is because when house prices rose between the period 2001-2006, homeowners were induced to take more mortgages knowing that their houses would act as good collateral. During the same period, the financial innovation of loan selling through a process called securitisation, alongside to the prevailing low interest rates and lax credit standards, led banks to indulge in risker activities at large volumes. Suddenly, however, with the increasing defaults of many borrowers, house prices began to fall sharply leading mortgages to become overvalued and therefore deteriorating their collateral value and precipitating the global financial crisis. As a result, banks as well as other lenders were hit by many shocks forcing them to absorb losses and adjust their operations with different financial policies. With the severe defaults of many big corporations, the viability of banks was called into question. The Basel Committee issued a reform package ï Basel III ï to better encourage resilience in the banking industry and improve its ability to absorb shocks arising from financial stress (BCBS, 2010).

The most recent vintage of the Basel accords (Basel III) underlines many of the shortcomings of Basel II, including not only the problem of inaccurate risk-weights but also the regulatory capital. For example, the Tier 1 capital ratio has increased from 4% to 6%. Banks are also required to maintain a capital conservation buffer of 2.5% of Tier 1 capital ratio at all times, which means that total requirement has increased to 8.5%. This buffer was mainly induced to address the problem of procyclicality through reducing pressure on banks to deleverage when the economic condition deteriorates. In addition, banks must hold a counter-cyclical buffer of 0% - 2.5% of Tier 1 capital during times of high credit booms in order to prevent the build-up of systemic risk. Another special buffer has been imposed for Systemically Important Banks (SIB), which is mandated by national authorities of each country (BCBS, 2011).[1] As a consequence of all these new regulations included in Basel III, banks have taken transforming measures on different levels due to the difficult business environment. Among these measures that banks have undertaken are reductions in credit s0upply to risky borrowers, cut/overpaid dividends to shareholders, and adjustments to the capital structure.

Policy-makers have aimed at limiting excessive risk-taking, which is accompanied with lax credit standards fuelling credit booms and asset price bubbles and thereby sowing seeds for future turmoil. At the same time, they expressed deep concern that the introduction of new regulations at both the micro- and macro-prudential levels may compromise financial stability. This is because central banks and regulators typically aim to establish precise measures that maximise efficiency to achieve a preferred level of stability whilst attempting to limit the potential inefficiency costs associated with such new measures, *i.e*. the welfare implications of new policies. Accordingly, researchers and economists have attempted to explain the implications of the crisis and the regulations that followed it through various analyses, which vary across countries. As these attempts were partly successful in explaining the moral hazard behaviour that was prevailing during the crisis, this thesis analyses the extent to which the financial crisis and the post-crisis changes in regulations, supervisions, and bank risk

[1] Note that Basel I was issued by the Basel Accord in 1988, which mainly focused on credit risk. Also, it is worth mentioning that while Basel II was finalised in July 2007, it came into effect in April 2008, which was during the global financial crisis. Further, Basel III was enacted as a response to the global financial crisis in 2011 and was scheduled for implementation in years 2013-2015 (Naceur *et al*., 2018).

management have impacted the banking industry. Moreover, it considers how dividend payouts played a significant role in aggravating the turmoil through moral hazard behaviours.

There is a growing literature pointing out to the causes and consequences of the financial crisis and highlighting the responsibility of banks and their significant role in aggravating the turmoil. Within this line of research, scholars and regulators point out to the increasing risk taken by banks that was carried out through excessive credit growth and accompanied by a reduction in credit standards. For example, there is evidence that banks gave little consideration to risk premium and undermined the evaluation of credit risk when granting loans (*e.g.*, Lepetit *et al*., 2008; Foos *et al*., 2010). While finding little support for the increased credit risk, other scholars put a spotlight on banksô strategy to provide and hold liquidity and on the role of capital in banksô liquidity creation in the presence of securitisation. According to Cornett *et al*. (2011), for example, banks that held more loans and securitised assets during the crisis chose to decrease lending and increase their holdings of liquid assets, which shows why some banks managed to build up liquidity faster than others during the crisis.

In another line of research, scholars highlight the way banks distribute their available cash during the turmoil, which might have exacerbated the crisis due to potential misallocations of cash. They argue that dividend payouts were not only used to signal financial strength, but also exploited by bank mangers to shift default risk to their creditors, especially when many risky banks continued to pay and even increased their dividend payouts as their financial situation worsened (Acharya *et al*., 2011). This is because banks took different measures in adjusting the dividend payouts in response to the difficult business environment in order to manage the crisis. While the previous lines of research in the banking literature provide suggestive evidence that banks indeed changed their strategy during the crisis, it can be said that, depending upon the characteristics of a bank, the impact of the financial crisis on the size of their operations is different.

The aim of this thesis is to contribute to the literature by examining whether banks have changed their behaviour due to the 2007-09 global financial crisis, especially in what concerns bank lending, dividend payout policy, and capital structure adjustment. It is directed towards banksô behaviour after the financial crisis to shed light on the implications of the post-crisis regulations. The thesis is divided into three well-differentiated but interrelated chapters that analyse the changes in the banking sector during and after the crisis. The first chapter uses a dataset of European countries, whereas the remaining two chapters rely on a dataset of U.S. banks.

1.1 Research question

The main question of this thesis can be stated as: ó*What was the impact of the 2007-09 financial crisis on the credit risk, dividend payout, and capital structure in the banking sector?'* This means that there are three key inter-related topics to be addressed in this study: (i) credit risk and its association with lending, (ii) dividend payout policy, and (iii) capital structure adjustment and its link with securitisation. Each topic is investigated in a separate chapter in a comprehensive way, which in turn allows drawing a key conclusion on the impact of the financial crisis on the banking industry.

Chapter 2 explores the practice of abnormal/excessive lending on loan pricing and credit risk in a sample of 149 European banks over the period 2001-2016. As potentially destabilising for the banking industry, a key matter for regulators is whether banks providing high quantity loans undertake efficient loan pricing and risk mechanisms. This is because risk premium demanded by banks represents a significant channel to promote economic growth in the long-term (Adusei, 2019). On the other hand, excessive lending may damage banksô abilities to maintain certain lending standards, leading to higher credit risk (Altunbas *et al.*, 2017). In addition, the activity of bank lending is not constrained by the need to remain profitable; it is even incentivised by the presence of banksô ability to diversify asset portfolios and potential cross-selling of loans. This leads banks to underestimate the associated credit risk, thereby, under-pricing the lending rates they charge (*e.g.*, Lepetit *et al*., 2008; Foos *et al*., 2010). Accordingly, given the important association between lending and credit risk, this chapter tests whether banks practising excessive lending charge an adequate premium and whether these banks apply a trade-off between the amounts of loans created and the amount of risk piled up in their asset portfolios. In addition, to develop a better understanding of the association between excessive lending and risk, we develop a prediction about whether bank performance is a key driver for banks exercising excessive lending increasing their credit risk. More specifically, we test whether bank performance induces a ósearch for yieldô or ógamble to surviveô behaviour, and the role that the financial crisis played.

Chapter 3 of this thesis turns the attention to the dividend payout policy and examines the impact of uninsured debt, namely subordinated debt, on banksô dividend policy during and after the financial crisis. This study highlights the role of subordinated debt on the basis of risk level to examine the reasons behind dividend payouts and whether distributing dividends has been used as a means of wealth expropriation or as a signalling motive. We argue that while distributing dividends reduces the agency conflicts of free cash flow between shareholders and managers, it may trigger the role of monitoring by creditors, thereby creating an agency conflict between shareholders and debtholders. This is because from subordinated debtholdersô perspective, they have high incentives to monitor risk as their funds serve as a loss absorber. They, however, do not reap any gains from bank excessive risk-taking like equity holders. Therefore, the incentive of subordinated debt investors to discipline bank managers and curb excessive risk-taking is similar to that of bank supervisors and in contrast to that of equity holders. Accordingly, in an effort to understand the role of uninsured debt on dividend policy, this study tests whether uninsured debtholders have the relative strength needed to monitor, discipline, and force bank managers to cut their dividends when solvency comes into question during financial turmoil.

Finally, Chapter 4 is focused on banksô capital structure adjustments and revisits the issue of how banksô capital adjustments affect credit supply and liquidity holdings by accounting for securitisation activities. There has been a growing concern that the net benefits of new capital regulations might be declining and showing an adverse effect due to their negative side effects. A number of scholars argue that such regulations, particularly the ones that followed the 2007-09 financial crisis, might have constrained banksô lending capacity and shrunk other important items on their balance sheets in order to comply with the new capital regulations. For example, when banks face difficulties with their capital ratios, they reduce their lending in order to build their liquidity holdings. Since the cost of equity is normally perceived by banks to be higher than the cost of debt - as it is often too costly to raise new shares - banks may tend to cut down lending rather than increase capital (*e.g.*, Berger and Udell, 1994; Dionne and Harchaoui, 2008; Cornett *et al*., 2011). However, one way for banks to mitigate such negative side effects is to transfer their risky investments out of their balance sheets by engaging in securitisation activities. This is the case because, unlike illiquid real projects, securitisation makes loans more liquid as banks can pool them together and sell that package to a separate legal entity known as special purpose vehicle. Therefore, in an effort to study the impact of the way banks adjust their capital structure on their operations, this chapter aims at determining what would be the effect of target capital adjustment in the presence of securitisation. More concretely, it examines whether banks respond to positive (negative) capital shocks by expanding (shrinking) illiquid loans or liquid assets or by decreasing (increasing) their equity capital, particularly, in the presence of securitisation.

1.2 Aim and objectives of research

The aim and objectives of the thesis are to ascertain the extent to which the financial crisis has influenced banksô credit risk, dividend-payout policy, and capital structure in the banking sector. In order to develop a deep understanding of the topic, a set of aims and objectives have been developed. These can be summarised as follows:

- To determine the extent to which the crisis influences the lending-risk nexus and its association with loan pricing in banks in Europe (Chapter 2).
- To explore the role of bank performance on the relation between credit supply and credit risk (Chapter 2).
- To determine the extent to which the crisis influences the dividend payout policy of the banks of U.S. (Chapter 3).
- To explore the impact of uninsured debt on the modified payout policy and its implications on shareholders and debtholders (Chapter 3).
- To ascertain the impact of the financial crisis on banksô capital structure adjustment and its linkage with securitisation and the implications of this linkage on the way banks manage their assets (Chapter 4).
- To explore the effectiveness of the post-crisis changes in regulations, supervisions, and bank risk management (Chapter 4).
- To compare and contrast the banking industry during and after the financial crisis (Chapters 2-4).

1.3 Research methodology

Given that this thesis seeks to investigate the impact of the financial crisis on three key topics within the banking sector, it was necessary to use secondary data from different databases. The database used for Chapter 2 is Datastream since it provides relatively adequate data to calculate the key variables of interest such as the premium rate and risk-weighted assets ratio, as will be shown throughout the study. It also contains data for all international banks, particularly Europe, and for long time periods which helps conduct a better comparison between the period preceding the crisis and the period after.[2] On the other hand, Chapters 3 and 4 utilise BvD Orbis Bank Focus as the main database alongside to Datastream, which is used only for macroeconomic variables or variables related to market capitalisation. The reason for choosing BvD Orbis Bank Focus as a main database is because it offers a wide range of bank data and it is a quite rich database particularly for U.S. banks. Importantly, the missing data for U.S. banks during the financial crisis period is relatively low, which helps examining the difference between the crisis and post-crisis periods.

Data retrieved were mostly ratios or variables in levels (which are then converted to ratios) of bank yearly observations. The data were imported to the statistical computer package Stata in order to evaluate the results. Various statistical methods such as trend analysis and regression analysis were employed depending on suitability for each study. Chapter 2 employs a two-step system generalised method of moments (GMM) estimator, which best suits the nature of the research and accounts for persistence in the dependent variables used. Chapter 3, on the other hand, utilises a Tobit model with instrumental variable approach (IV-Tobit), which best suits the analysis of dividend payout policy that normally considers censored dependent variables. For Chapter 4, the empirical analysis relies on a partial adjustment framework to estimate a bank-specific and time-varying target equity capital ratio for each bank. This target capital ratio is then used to construct the actual deviation of each bank from that target by creating capital

[2] It is important to note that at the time of conducting Chapter 2, BVD Orbis Bank Focus database was not able to provide secondary data for more than 7 recent years of observations. Therefore, it was best to choose Datastream.

surplus and shortfall ratios. Then, the two-step system GMM estimator is used in the regression analysis.

1.4 Thesis contribution

This thesis contributes to the banking literature in three dimensions: (i) bank lending and credit risk, (ii) dividend payout and market discipline, and (iii) capital structure adjustment and securitisation. First, it extends the existing empirical studies that examine the lending-risk nexus by analysing it from the loan pricing perspective and borrowersôcreditworthiness. While some papers have investigated the relationship between credit growth and risk-taking, only few have examined the effect of *excessive* credit growth on risk-taking (*e.g.*, Ioannidou *et al*., 2009; Altunbas *et al*., 2010; Foos *et al*., 2010; Jiménez *et al*., 2014; Acharya *et al*., 2018). It also assesses whether bank performance plays a significant role on this relationship. Particularly, it investigates the practice of excessive lending and whether the additional loans granted by banks generate adequate risk premium under strict credit standards. On one hand, Foos *et al*. (2010) argue that abnormal lending before the 2008 financial crisis did not generate adequate income and, at the same time, it did not impede banks from taking higher risk. On the other hand, Acharya *et al*. (2018) show that stress-tested banks follow an opposite approach after the crisis. The evidence provided in this research (Chapter 2) points out to the fact that the implications of excessive lending can be explained by modern financial theories of risk management and moral hazard incentives.

Second, by linking subordinated debt to banks dividend policy in Chapter 3, this thesis makes a key contribution to the dividend payout and market discipline literature. It builds a bridge between the two strands by exploring subordinated debtholdersô ability to monitor, discipline, and force bank managers to cut their dividends during times of stress and/or normal times. The literature on the determinants of banksôpayout policy in terms of risk-shifting and signalling is scant and does not account for uninsured debt, namely subordinated debt (*e.g.*, Kanas, 2013; Onali, 2014; Acharya *et al*., 2017; Cziraki *et al*., 2016; Duqi *et al*., 2020). This is also true for empirical and theoretical studies examining other dividend theories such as the agency theory (*e.g.*, Easterbrook, 1984; Rozef, 1982; Jensen, 1986; Abreu and Gulamhussen, 2013), Fama and French (2001) hypothesis, and life-cycle theory (*e.g.*, De Angelo *et al*., 2006; Fairchild *et al*., 2014). This is because subordinated debt is mainly highlighted in the market discipline, providing evidence that suggests that it curbs banksô excessive risk-taking (Goyal, 2005; Niu, 2008; Chen and Hasan, 2011; Nguyen, 2013). Keeping this in mind, an important implication of this line of research is that the value of subordinated debt may lie in its ability to discipline bank mangers not only in what regards to gambling activities but also wealth expropriation activities.

Third, this research also makes two main contributions to the capital structure adjustment and securitisation research (Chapter 4) by building a bridge between these two strands of the literature. This final empirical chapter explores how securitisation changes the way banks adjust their target capital and how such changes alter the traditional link between loan supply and liquidity holdings. Several previous studies tied capital structure adjustments to credit supply and other items on banksô balance sheets (*e.g.*, Flannery and Rangan, 2008; Lepetit *et al*., 2015). In addition, another strand in the literature addressing the use of secondary loan sales and securitisation markets documents that securitisation provide capital relief for banks and helps boost their credit supply (*e.g.*, Goderis *et al*., 2007; Hirtle, 2007; Jiménez *et al*., 2010), but may also force them to cut down lending during stress periods (*e.g.*, Carbó-Valverde *et al*., 2012; Irani, 2011). This research in turn extends the previous strands of the literature by attempting to determine the impact of capital structure adjustments in the presence of securitisation, which is deemed as an additional source of funds and capital relief. More specifically, we investigate the cross-variations and asymmetries in banksô optimal target capital by highlighting the role of securitisation and its implications on lending capacity and liquidity holdings.

This thesis also contributes to the debate revolving around the post-crisis regulatory capital reforms, which in general have raised a concern of adverse effects, due to negative side effects on banksô operations. Some scholars argue that while holding more capital could prevent potential future crises, it could also jeopardise banksô performance and lead to less lending as a way of building up more capital (Cornett *et al*., 2011; Gambacorta and Marques-Ibanez, 2011; Lepetit *et al*., 2015). The results provided in this thesis are consistent with securitisation being an additional key source of liquidity against capital shocks, which in turn provides key indications on banksô reactions during and after the financial crisis. Therefore, it contributes not only to the capital structure adjustment and securitisation literature, but also provides important policy implications for the implementation of Basel III and the debate ensued on capital requirement and bank lending.

Overall, this thesis provides an overarching contribution to the banking literature by providing bank-level analyses on the implications of micro-prudential regulations from different aspects. The related literature typically examines important questions relating to the effectiveness of the post-crisis changes in regulation, supervision, and bank risk management (*e.g.*, Goyal, 2005; Flannery and Rangan, 2008; Niu, 2008; Ioannidou *et al*., 2009; Altunbas *et al*., 2010; Foos *et al*., 2010; Kanas, 2013; Onali, 2014; Jiménez *et al*., 2014; Lepetit *et al*., 2015; Acharya *et al*., 2017; Acharya *et al*., 2018). We provide an insight on banksô behaviour in response to the financial crisis and the regulations that have been in place as a result. We, therefore, provide an extension to the literature by examining these factors through three empirical studies that fit the banking literature from different strands, all of which narrow down to the channel of micro-prudential regulations.

1.5 Thesis structure

The remainder of this thesis examines the role of the financial crisis on three inter-related topics in the banking industry and is structured as follows: Chapter 2 addresses: *The Relationship between Excessive Lending, Risk Premium and Risk-Taking: Evidence from European banks*. Chapter 3 focuses on the analysis of *Banksô Dividend Payout Policy during and post 2007-09 Financial Crisis: The role of subordinated debt on U.S. banks*. Chapter 4 looks at the relationship between *Capital Adjustment and Banksô Balance Sheets: The role of securitisation*. Finally, Chapter 5 provides an overall conclusion and elaborates on a set of policy implications that can be derived from this thesis and suggests potential avenues for future research.

Chapter 2
The Relationship between Excessive Lending, Risk Premium and Risk-Taking: Evidence from European banks

2.1. Introduction

The 2007-09 global financial crisis brought to the surface a variety of issues including how bank core activities are closely interlinked to one another. Scholars and policy-makers addressed different factors that triggered the financial crisis. Some researchers argue that the lack of regulations in the financial markets led to an increase in subprime mortgages provided to risky borrowers, which in turn led to a bust in the home prices and amplified the turmoil by derivatives and securitisation. In addition, there are also two commonly cited causes for the crisis in the literature, the counterparty risk and an increased demand for liquidity (Acharya and Skeie, 2011). As the global financial crisis unfolded, banks chose to remain liquid and reduced lending due to high default rates (Andrianova *et al.*, 2015). The U.S. banks experienced a dramatic deterioration in their lending ability that led them to tighten their credit standards for commercial and industrial loans (Mimir, 2016). As a result, firms found it difficult to obtain external funds, making the cost of borrowing rise substantially (Ivashina and Scharfstein, 2010). This was preceded by a boom period clouded with lax credit standards that included overly risky market participants and rapid credit growth. Public authorities immediately provided unprecedented liquidity injections to help contain the broad systemic damage. With the severe defaults of many big corporations, the viability of banks was called into question. The Basel Committee issued a reform package ï Basel III ï to better encourage resilience in the banking industry and improve its ability to absorb shocks arising from financial stress (BCBS, 2010).

As potentially destabilising to the banking industry, a key matter for regulators is whether banks providing high quantities of loans undertake efficient loan pricing and risk mechanisms. This is because risk premium demanded by banks represents a significant channel to promote economic growth in the long-term (Adusei, 2019). At the same time, excessive lending may damage banksô abilities to maintain certain lending standards, leading to higher credit risk (Altunbas *et al*., 2017). In addition, low interest rates arising during boom periods are likely to deteriorate banksô profitability (Bikker and Vervliet, 2018). For example, low interest rates and lax credit standards that coincided with the booming U.S. housing market prior to the year 2008 led to an extreme growth in mortgage lending. This resulted in unprecedented losses for the banking industry due to high default rates that, ultimately, triggered the financial crisis, highlighting the seriousness of the credit growth and risk relationship (DellôAriccia *et al*., 2008).

While the literature provides ample evidence about the association of bank lending with credit risk, few empirical studies analyse it from the loan pricing perspective and borrowersô creditworthiness. To put things in context, the activity of bank lending is not constrained by the need to remain profitable. In fact, it is even incentivised by the presence of banksô ability to diversify asset portfolios and potential cross-selling of loans. This leads banks to underestimate the associated credit risk, thereby, under-pricing the lending rates they charge (*e.g.*, Lepetit *et al.*, 2008; Foos *et al*., 2010). This means that banks are capable of growing internally and expanding their activities beyond the macroeconomic forces. For example, they may expand credit supply to seize new growth opportunities and gain higher market value. At the same time, they may need to lower their interest rates or relax their credit standards, or both, to attract more customers and as a way of ósearching for yieldô. This may represent a key explanation for why the additional loans provided by banks might be under-priced in terms of return and underestimated in terms of default risk. Keeping this in mind, this study seeks to contribute to an empirical evaluation of the influence of excessive lending on banksô credit risk and loan pricing.

Some authors and regulators raised the question of how efficient loan pricing is (*e.g.*, Lepetit *et al.*, 2008; Foos *et al.*, 2010). For example, Foos *et al*. (2010) suggest that the additional income generated from abnormal lending should be carefully checked to see whether it reflects an adequate compensation for the additional risk taken. Lepetit *et al.* (2008) and Rossi *et al*. (2009) document that the lending-risk nexus at the individual bank-level contributes little to understand how the effect runs from one side to the other. Altunbas *et al*. (2010) state that when analysing the lending channel, the examination should consider bank risk simultaneously. More recently, Acharya *et al*. (2018) highlight the importance of credit supply for stress-tested banks and its association with loan pricing and credit risk. They also suggest two key hypotheses: (i) the *moral hazard hypothesis*, under which these banks provide credit supply to relatively risky borrowers that pay high spreads, thereby increasing their credit risk, and (ii) the *risk-management hypothesis,* under which these banks decrease their credit risk by reducing credit supply to relatively risky borrowers.

Building on previous literature, the aim of this study is to empirically examine the impact of excessive credit supply on two dimensions of bank performance ï loan pricing and credit risk ï over different time periods and bank sizes. More specifically, it tests whether banks practising excessive lending charge adequate premium and whether these banks apply an adequate trade-off between the amounts of loans created and the amount of risk accumulated in their asset portfolios. We first test whether banks exercising excessive lending expand the additional loans for adequate risk premium. Next, we test whether banks practising excessive lending reduce their risk-taking, which could be in the form of cutting lending to the riskiest borrowers. In addition, to develop a better understanding of the association between excessive lending and risk, we develop a prediction that bank performance is a key driver for our results.

For example, banks with poor performance approaching minimum capital requirement may ógamble to surviveô by taking more risk in the form of lending to riskier borrowers to rebuild their capital buffer. Alternatively, banks with good performance may maintain their target level of performance by increasing risk as a means of ósearching for yieldõ. Thus, this key channel is identified by introducing an interaction term between excessive lending and (centred) profitability. We also examine whether the crisis has strengthened or weakened its impact. In an additional sensitivity analysis, we split our 20 countries into core and periphery countries and examine whether our findings sill hold for both groups. To this extent, this study presents rigorous comparisons of banksô behaviour across different sizes and periods at the individual bank-level in a panel of 20 European countries over the period 2001-2016.

The results of all these analyses can be summarised as follows. First, during the pre-crisis period, banks exercising excessive lending did not generate adequate premium that compensates for this aggressive behaviour, and, at the same time, excessive lending did not reduce their credit risk. This key finding is consistent with the *moral hazard hypothesis*. In contrast, during the post-crisis period, banks practising excessive lending reduced their credit supply to risky borrowers and generate adequate premium not only from risky borrowers but also low-risk borrowers. This is another key finding that is in line with the *risk-management hypothesis*.

Second, the results for bank size specifications show that large banks are more likely to apply a trade-off between their abnormal lending and credit risk, which is consistent with the *risk-management hypothesis*. For small banks, excessive lending does not compensate adequate premium and does not impede them from additional risk-taking, which may take the form of extending credit supply to risky borrowers that pay higher premiums.

Third, holding high profitability is a key driver for large banks to increase their credit risk when practising excessive lending but the impact is weakened after the crisis. For small banks, while poor performance induces their gamble for resurrection behaviour by taking more risk, this impact diminishes after the crisis. The results provide evidence on the effectiveness of the Basel III regulation and other post-crisis reforms, which all emphasise the importance of bank risk and lending practices.

The main contributions of this study are twofold. First, it extends the existing empirical studies that examine the lending-risk nexus by analysing it from the loan pricing perspective and borrowersô creditworthiness. Particularly, it investigates the practice of excessive lending and whether the additional loans granted by banks generate adequate risk premium under strict credit standards. While some papers have investigated the relationship between credit growth and risk-taking, only a few have examined the effect of *excessive* credit growth on risk-taking (*e.g.*, Ioannidou *et al*., 2009; Altunbas *et al*., 2010; Foos *et al*., 2010; Jiménez *et al*., 2014; Acharya *et al*., 2018). On one hand, Foos *et al*. (2010) argue that abnormal lending before the 2007-08 financial crisis did not generate adequate income and, at the same time, it did not impede banks from taking higher risk. On the other hand, Acharya *et al*. (2018) show that stress-tested banks follow an opposite approach after the crisis. The evidence provided in our study points out to the fact that the variability of the association between credit supply and risk is sensitive to bank size and to the time period considered.

Second, it extends our comprehension of the lending-risk nexus by examining whether bank performance plays a significant role on this relationship. Altunbas *et al*. (2010) report a nonlinear U-shaped relationship between excessive lending and risk-taking, suggesting that banks with too little or too high credit growth are riskier. We build upon this intuition and test whether the impact of excessive credit growth on risk-taking is dependent upon bank performance, which in turn would induce a ógamble to surviveô or ósearch for yieldô behaviour. To assess this particular link, an interaction term between excessive credit growth and profitability is used. To the best of the authorsô knowledge, no prior studies have examined the effect of excessive lending on premium rate and the interaction effect between excessive credit growth and profitability on risk.

The remainder of this study is organised as follows. Section 2.2 presents the literature review and hypotheses development. Section 2.3 presents the data, methodology and summary statistics. Section 2.4 presents the empirical models and econometric results. Section 2.5 presents the robustness checks conducted in this study and Section 2.6 concludes and derives some policy implications from this study.

2.2. Literature Review and Hypotheses

This section first reviews some of the previous literature that examines credit supply and bank risk. Then, it puts forward the key hypotheses to be tested in this study.

2.2.1 Literature review

Prior research has examined credit supply extensively but only few questioned its implications on loan pricing and credit risk. A branch of the literature focuses on the costs and benefits of credit supply to predict banksô risk management efficiency. Perhaps the most closely related work to ours is, Foos *et al*. (2010), who argue that abnormal lending that is not compensated by higher profitability did not impede banks from taking risk during the period preceding the financial crisis (1997-2007). Lepetit *et al.* (2008) argue that lending to riskier borrowers does not add up to higher premium and suggest that the default risk is under-priced. Our analysis expands upon these studies by focusing exclusively on whether the additional loans provided generate adequate risk premium, and whether excessive lending reduces bank risk-taking, which could be in the form of cutting lending to the riskiest borrowers, before and after the 2008 financial crisis.

Another stream of the literature has examined credit supply by focusing on new regulations, *e.g.*, Stress Tests and the Dodd-Frank Act, and changes in monetary policy in response to the recent financial crisis. The most closely related work to ours is Acharya *et al*.

(2018), who analyse credit supply for stress tested banks in the U.S. The authors find that such banks reduce lending to risky borrowers consistent with the *risk-management hypothesis,* under which banks reduce credit supply to risky borrowers, and contrary to the *moral hazard hypothesis*, under which banks provide loans to relatively risky borrowers that pay higher spreads.

In a similar vein, Bouwman *et al*. (2018) examine the implications of the Dodd-Frank Act on credit supply and observe that some banks have incurred additional regulatory costs, which they attempt to avoid, and therefore led them to charge higher loan spread. Similarly, Martynova (2015) argues that higher capital requirements may result in raising lending rates charged by banks, which in turn slow down economic growth. Ioannidou *et al.* (2009) and Jiménez *et al*. (2014) find that banks increase credit supply to risky borrowers and, at the same time, reduce their lending rate under low monetary policy as a means of ósearch for yieldô. Andreou *et al*. (2016), however, state that banks are aware about their strategy to increase their profit with their moderate risk appetite by maintaining a loan portfolio that reflects a trade-off between risk and performance in a unique way.

Our work is also related to the literature that has used cross sectional or panel data analysis that highlights the lending-risk nexus in different ways. Berger *et al*. (2014) and Kapounek *et al*. (2017) document that banks that are active in lending business are less stable and have riskier investments. Similarly, DellôAriccia *et al*. (2008) and Igan and Pinheiro (2011) show that credit growth increases banksô overall risk and therefore decreasing bank soundness, whereas Thakor (1996) state the opposite. Altunbas *et al*. (2010), on the other hand, argue that the relation between credit supply and bank risk is not necessarily linear. They state that while banks exercising excessive lending aggressively tend to be riskier, banks with a very low credit growth, which might not reach economies of scale, are also risky banks. In a similar spirit, we consider non-linearity in our study and examine whether the economic role of excessive credit growth is dependent on bank profitability. Therefore, we provide further evidence for the complicated relation between credit risk and credit supply, and how it stimulates a ógamble to surviveô or ósearch for yieldô behaviour depending on bank performance.

2.2.2 Development of hypotheses

Given the divergent views in the extant literature, the issue of the effect that credit supply has on bank risk, its association with loan pricing, and how it might vary across time periods and bank sizes boils down to three key hypotheses we test in this study. This examination allows us to depict any changes on credit supply, any corresponding changes in credit risk, and whether a future financial crisis is more or less likely. Accordingly, the analysis focuses on the following three hypotheses:

H1. Excessive lending is associated with a higher risk premium that compensates this aggressive practice.

Since lending is one of the riskiest practices banks undertake, banks expand their credit supply and charge interest rate that compensates for this risk. This means that banks exercising excessive lending should ideally generate adequate premium to compensate such aggressive practice. On the other side of the coin, the activity of bank lending is not constrained by the need to remain profitable. Bank managers may practise aggressive lending strategies because the amount of loans provided could be used as a benchmark for their performance compensations (Acharya and Naqvi, 2012). In addition, potential motives associated with such aggressive lending might be the ability to diversify loan portfolios or loans cross-selling (*e.g.*, Lepetit *et al.*, 2008; Rossi *et al*. 2009). As such, banks may use the mechanism of lowering interest rates or increase credit supply to riskier borrowers that pay higher interest. They may also offer lower lending rates to keep borrowers that are potential customers for fee generating products (Lepetit *et al.*, 2008). Therefore, we test whether the additional loans provided by banks practising aggressive lending are effectively priced and reflect an efficient risk-return trade-off.

H2. Excessive credit growth restrains banks from increasing their risk.

On one hand, from a theoretical standing point, banks with aggressive lending behaviour are likely to trade-off the amount of loans created by the amount of risk piled up in their assets portfolios. More specifically, a bank with excessive lending practices might cut down other risky investments represented in its assets portfolio (*i.e.* higher collateral standards, reduce supply to risky borrowers, and lower participation in derivative markets). On the other hand, when the rate of return for banks is generally low, banks may take higher risk in form of increasing credit supply to riskier borrowers that pay higher interest (Bahaj and Malherbe, 2017; Acharya *et al*. 2018). This refers to a highly aggressive strategy that threatens bank stability. Therefore, it is of paramount importance to test whether the risk-taking channel continues to work when expanding credit supplies aggressively considering bank size and the surrounding environment.

Note that the above hypotheses are complementary to each other. More specifically, if *H1* and *H2* do not hold simultaneously within our specifications, this implies that the results are consistent with the *moral hazard hypothesis,* under which banks exercise lending to relatively risky borrowers to generate higher premium thereby increasing their credit risk. Conversely, if both hypotheses hold, this refers to the *risk-management hypothesis*, in which banks exercise excessive lending with low risky borrowers and generate adequate premium from both high and low risk borrowers. If only one hypothesis holds (*H1* or *H2*), it may still provide some evidence in favour of the *risk-management hypothesis* conditional on other controls, *i.e.* bank risk (*RWATA*) in the first model (Equation 2.1). Nevertheless, *H2* would provide more robust evidence for the *risk-management hypothesis* to hold.

H3. Excessive credit growth translates into higher risk based on bank performance.

Under the premise that banks providing high credit supplies reduce their credit risk exposure by restricting credit supply to specific borrowers, this assumption might be driven by bank performance. On the one hand, weak banks with poor performance and low capital may ógamble to surviveô by taking more risk, *i.e.* by lending to riskier borrowers that pay higher interest rates, as a means to rebuild their capital buffer and maintain their market value (Bahaj and Malherbe, 2017; Acharya *et al*. 2018). This assumption reflects the moral hazard problems of weak banks. On the other hand, banks with good performance may be encouraged to expand their additional loans to risky borrowers that pay higher premium as a means of ósearch for yieldô, which feeds their capital buffer through higher earnings and strengthens their market value. This indicates that they maintain their target level of profitability by increasing risk when profitability increases. This prediction is similar to the argument provided by Jokipii and Milne (2011), who show that well capitalised banks maintain their target level of capital by increasing risk when capital increases. Our argument lies in the fact that income is the first avenue towards strengthening bank capital and gaining higher market share.

2.3. Data, Methodology and Summary Statistics

This section begins by presenting and explaining the dataset and variables used in this study. Next, it discusses the methodology employed, which is a two-step system GMM estimator. Then, it discusses the sample and displays set of summary statistics.

2.3.1 Data

2.3.1.i Samples

The present study examines data collected from Datastream database. The sample consists of unbalanced dataset of all types of banks available in the database (commercial, investment, retail, private and public) that are based in 20 European countries over the period 2001-2016.[3] The intuition of starting our sample period from the year 2001 is because at this year most of the countries in the European Union adopted the Euro as their main currency making them more homogenous, given different levels of financial integration and exposure to sovereign risk. The criterion for including a bank is to have at least four consecutive years of time series observations for all specifications. After excluding all the banks with missing values, the final sample consists of 149 banks. In order to minimise the effect of outliers, the variables are winsorised at the 1% and 99% quantiles.[4] The sample is further divided based on periods (pre- and post-crisis) and size (large and small banks). When divided by size, the sample is split based on the median of the mean values of banksô total assets. For period specifications, the

[3] Note that since we lag our bank-specific variables, we lose one year of observations. The 20 European countries are: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, and the UK. It is also important to note that while some countries were not in the European Union at the beginning our sample period, it could be argued that these countries were forced to gradually follow the rules to join the European Union before joining. We also address the differences between our countries and split them into core and periphery countries in our Robustness Checks Section.

[4] After adjusting the variables, outliers were found in the variables: *RWATA*, ECG, capital buffer, liquidity ratio, loan loss provision ratio, non-interest income ratio, and *ROA*. The remaining variables are not winsorised as their values are in a moderate range.

cut off year is 2008 since the outburst of the European financial crisis reached its peak during that year.[5][6]

2.3.1.ii Variables

This sub-section introduces the dependent and independent variables that are selected for the empirical analysis in this study. Table 2.1 below provides a summary of the variables.

2.3.1.ii.i Dependent variables

The first dependent variable used for loan pricing is risk premium. This is measured by the difference between net interest income to earning assets ratio and 10-year government bond for the bank home country. The computation follows Lepetit *et al.* (2008) who examine the

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[5] Broadly speaking, the crisis began in the summer of 2007 in the U.S when the asset-backed commercial paper (ABCP) market froze in August 2007, the 3rd quarter of 2007 (Ivashina and Scharfstein, 2010; Cornett *et al.*, 2011). This is also in line with the new European Systemic Risk Board crisis data set (Lo Duca *et al.*, 2017) (European Crisis Database of the European Central Bank) which suggests that the systemic crises and severe episodes began to materialise between 2007 and 2008 in countries highly exposed to external shocks and the U.S. Housing market which then affected banking systems in connection to the European banking between 2008 and 2009. Nonetheless, we are guided by similar studies in the literature that use yearly observations panel data for European countries, and they specify the year 2008 as the cut-off year for the period before and after the crisis (*e.g.*, Maudos, 2017; Anastasiou *et al.*, 2019).

[6] Note that since our post-crisis period is from the year 2008-2016, it also includes the European sovereign debt crisis that began in Greece (2009-2010), which in turn initiated strong rise in default risk in Southern European countries making the crisis to peak in late 2011. This crisis mainly raised the awareness of the contagion effect of systemic risk fearing that it would spread to other vulnerable countries, namely Italy and Spain. This crisis primarily highlighted the role of banks to systemic risk in the financial system (De Bruyckere *et al.*, 2013; Black *et al.*, 2016). While this could affect our results, we minimise this assumption throughout the study as we split our sample into core and periphery in a later stage, a classification that split vulnerable countries away from the rest of the European countries.

loan pricing and fee-based service relationship. Later, for a robustness check, an alternative ratio is used for loan pricing: the growth in net interest income to earning assets ratio (without subtracting the 10-year government bond). A shortcoming of this ratio is that it only tests whether excessive lending compensates profitability but without considering a threshold of the risk-free rate that reflects a premium for risk (*e.g.*, Foos *et al*., 2010).

The second dependent variable is risk. This is represented by risk-weighted assets to total assets ratio (*RWATA*). Risk-weighted assets are defined as assets held by a bank weighted for credit risk. The ratio captures the credit risk and assets quality in banking supervision and regulation. It has been widely used in the empirical literature not only because it is computed according to Basel rules but also it allocates banksô assets among risk categories. Therefore, it is considered a valid measure for portfolio risk. However, it does not capture the market risk and captures credit risk only (Berger and Bouwman, 2009).

In some robustness checks, we use the natural logarithm of *Z-Score* (distance-to-default) as an alternative measure for bank risk. It is used extensively in the literature primarily because it reflects the distance from insolvency (*e.g.*, Berger and Bouwman, 2009; Laeven and Levine, 2009; Foos *et al*., 2010; Khan, *et al*., 2017). A lower *Z-Score* indicates that a bank is imminent to default while a higher ratio indicates more stability. It shows how many standard deviations of the bankôs return on assets have to fall below its anticipated value to become insolvent. It is constructed as the sum of return on assets (*ROA*) and equity to assets (*E/A*) divided by the standard deviation of the *ROA*. The intuition for such measure is that the greater *ROA* and *E/A* (numerator) and the lesser the volatility of *ROA* (denominator) indicates a lower probability of insolvency for banks; therefore, it is inversely proportional to risk.[7]

[7] *Z-Score* is computed using the standard deviation of the *ROA* calculated on a rolling-window of four years for all specifications.

2.3.1.ii.ii Independent variables

The main explanatory variable in this study is excessive credit growth and it is constructed in two steps. Initially, the first difference of the natural logarithm of bank total loans to total assets is computed to obtain bank credit growth, following the literature on bank lending channel (*e.g.*, Kashyap and Stein, 1995; Gambacorta and Marques-Ibanez, 2011). Then, following Foos *et al*. (2010), the result from the first step is subtracted from bank *i*'s home country yearly credit growth in order to obtain the required abnormal loan growth rate. The yearly credit growth for each country is obtained from Datastream.[8] The set of independent variables used in this study is described next.

Capital buffer (CapBuff): This is a normalised ratio for the capital ratio expressed by subtracting the bankὃs original capital adequacy ratio from the regulatory minimum capital requirement (8%) under the Basel I and Basel II capital adequacy rules. Capital buffer is also widely used in the literature (*e.g.*, Coffinet *et al.*, 2012; Bui *et al*., 2017; Kim and Sohn, 2017). The importance of this ratio is its informative power of the degree to which a bank possesses adequate capital reserves relative to its activities risk; it is a major factor in the evaluation of bank solvency.

Size: This variable plays a key role in loan pricing and bank risk. Saghi-Zedek and Tarazi (2015) and Molyneux and Thornton (1992) note that credit supply for large banks is more costly to produce and such banks obtain their credit growth through lower margins. They may also engage in risky market-based practices and rely highly on leverage and unstable funding exploiting their size privileges (Laeven *et al*., 2014). It is measured as the natural log of total assets and is excluded when the sample is split based on bank size into large and small banks.

[8] The country yearly credit growth is the loans of monetary financial institutions excluding central banks ratio YOY% (year over year), which is taken from Datastream.

Deposit ratio (DEPAS): Computed as the ratio of total deposits to total assets. The literature shows different effects of deposit growth because of its dependence on other factors such as credit quality, loan demand and the bank efficiency in converting them into income earning assets which could have various effects on banks behaviour. Therefore, its effect on loan pricing and risk might have various results and incentivise risk-taking through moral hazard (Acharya and Naqvi, 2012; Berger and Bouwman, 2013).

Liquidity Ratio (LIQ): Computed as the ratio of liquid assets to total assets. It reflects the cash held alongside other liquid assets to manage liquidity risk by insuring banks against rollover risks, as higher liquidity ratio implies a lower liquidity risk. It exerts a negative effect on risk in different empirical analysis in the literature, particularly during the crisis by hoarding liquidity in order for banks to protect themselves against unforeseen downturns (Cornett *et al.*, 2011; Lee and Hsieh, 2013).

Loan loss provision to total assets ratio (LLPLN): Computed as loan loss provisions over total assets. It reflects a measure for bank credit quality (Dietrich and Wanzenried, 2011; Lee and Hsieh, 2013). A lower ratio indicates a higher credit quality and better monitoring while a higher ratio implies that a bank is taking on more risk with low monitoring.

Diversification (NII): Computed as non-interest income divided by total operating income. The inclusion of this ratio is justified by the fact that such activities have accounted for an increasingly larger proportion of banksô income in recent years (Stiroh, 2004). The empirical studies have shown that diversification has a major contribution for banksô overall performance and risk.

GDP growth: This is the first macroeconomic variable, measured as the annual percentage change of real GDP per capita. It reflects the countryôs macroeconomic environment, a proxy for the business cycle and economic development impact. It is widely used in the literature when examining bank performance and behaviour as it is an important factor for bank risk (*e.g.*, Lee and Hsieh, 2013; Khan *et al*., 2017).

Herfindahl-Hirschman Index (HHI): It is the second macroeconomic variable used for to measure market deposit concentration in the banking sector. It reflects the level of banks competition and it is defined as the sum of the square of market shares of all banks within the industry. A higher value refers to less competition indicating that banks exploits an advantage of the market weakness. On the other hand, it might also refer to a tougher competition in the banking industry. The important role of HHI in accounting for local market concentration has been shown in the literature with various impacts on risk and income (*e.g.*, Dietrich and Wanzenried, 2011; Lee and Hsieh, 2013).

InterestRate: The third macroeconomic variable is the three-month interbank rate that reflects the monetary policy. This variable is important because a change in such rate reflects the effect of monetary policy and, consequently, it affects the deposit and lending rates, which in turn affect premium and loan demands (Kim and Sohn, 2017). In addition, it is found to exert a significant impact on increasing risk-taking as reported by Altunbas *et al*. (2010).[9]

[9] We follow the literature that normally employs *GDP Growth*, *HHI*, and the three-month interbank rate to capture differences in a sample that consists of many countries. It could be argued, however, that other macroeconomic variables could be added such as the volatility index measure (VIX), which is a measure of the level of implied volatility. While it could have an impact, we are not aware of any theoretical or empirical study examining the credit growth and credit risk that highlights its importance. Nevertheless, in the Robustness Checks Section we split our 20 countries into core and periphery countries which would mitigate the concerns of the exclusion of any macroeconomic variable, and our results remain the same. Therefore, our macroeconomic variables can be argued to be sufficient to capture differences between our 20 European countries. Also, note that in unreported test we add the country fixed effect to all our regressions, which in turn eliminates such a concern, and the results remain similar the main results.

Table 2.1 *Description of variables*

Variables	**Description**
Dependent Variable: Loan Pricing	
Premium	The difference between net interest income to earning assets ratio and 10-year government bond
IIEAG	The first difference in the natural logarithm of net interest income to earning assets ratio
Dependent Variable: Risk	
RWATA	Risk-weighted assets to total assets ratio
Z-Score	Return on assets and equity to assets over standard deviation of return on assets
Bank-Specific Variables	
ECG	The first difference in the natural logarithm of bank total loans to total assets minus the bank home country credit growth
CapBuff	The capital adequacy ratio subtracted from the minimum regulatory capital requirement of 8%
Size	The natural logarithm of total assets
DEPAS	Deposits to total assets ratio
LIQ	The ratio of liquid assets to total assets
LLPLN	Loan loss provision to total loans
NNI	Non-interest income to total operating income
Macroeconomic Variables	
GDPGrowth	The annual percentage change of real GDP per capita
HHI	The sum of squares of market shares of all banks within the industry
InterestRate	The three-month interbank rate for each country

Note: The table presents the description of the variables used for all equations in the chapter.
Source: Datastream.

2.3.2 Methodology

As the dependent variables used in this study (premium and risk) tend to be correlated over time, the use of a dynamic model that includes the lagged dependent variable (LDV) is advisable to account for its persistence. By construction, the inclusion of the LDV among the regressors makes ordinary least square (OLS) and other panel data estimators, such as fixed and random effects, biased and inconsistent. Therefore, this study employs the two-step system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (2000), where Windmeijer-corrected standard errors are used to account for standard errors that are severely downward biased (Windmeijer, 2005).

The two-step system GMM estimator corrects for potential endogeneity, autocorrelation and heteroscedasticity, which in turn makes it a superior estimator compared to the conventional estimators. It uses as instruments the lagged values of the dependent variable and the exogenous variables, which prevents the need for external instruments. More specifically, for the level equation, it uses lagged first differences as instruments, whereas in the differenced equation it uses lagged levels as instruments. We also lagged all the right-hand side bank-specific variables to mitigate potential simultaneity problems arising from simultaneity.[10] In addition, we treat *ECG* as endogenous[11] in our models, meaning that the second lag and further are used as instruments in the difference equation, whereas in the level equation the first lag and further are used as instruments. In order to limit instrument proliferation, the option ócollapseô is used (Roodman, 2009). We also report the first order (AR1) and second order autocorrelation (AR2) for the assumption that the error term is not serially correlated, and Hansen J-test for the validity of the instruments.

2.3.3 Summary statistics

Table 2.2 displays summary statistics for all the variables used in this study for all banks, large banks, and small banks. The figures show that *ECG*, the key variable of interest, has an average of -6.01% with a minimum of -42.11% and a maximum value of 25.83%. This indicates that excessive lending is not commonly exercised between our banks. Consistent with

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[10] Perhaps it is worth mentioning that lagging our macroeconomic variables throughout the whole study had no significant impact on our results and, accordingly, we only report the results with contemporaneous macroeconomic variables.

[11] In practice, excessive credit growth is an endogenous choice variable for a bank, so the bankôs premium and credit risk could impact the bankôs choice of excessive lending. Further, it is important to note that lagging one period in the explanatory variables might not be enough to tackle endogeneity due to intertemporal rigidities in these variables. Finally, the estimate appears more robust when *ECG* is treated as endogenous.

expectations, large banks have a higher ratio of *ECG* relative to small banks (albeit negative values for both), -4.99% compared to -7.09%, respectively, suggesting that large banks are more likely to exercise abnormal lending. Small banks have a higher average premium than their large counterparts, -0.25% compared to -1.77%, respectively. Similarly, *IIEAG* shows that small banks have a higher growth in their net interest income to earning assets ratio. Interestingly, while *RWATA* shows that small banks have a higher credit risk in their assetsô portfolio than large banks (63.27% compared to 49.07% respectively), *Z-Score* shows that small banks are safer and more solvent than their large counterparts (4.03 compared to 3.45). Higher profitability for small banks is well reflected in the data as their *ROA* is 0.74% compared to 0.42% for large banks. Consistent with literature, the fact that small banks rely more on capital and have less access to the financial market is well reflected in the data. For the capital buffer, small banks have an average value of 7.61% compared to 5.76% for large banks, whereas for deposit funding small banks have an average value of 61.01% compared to 45.71% for large banks. In addition, large banks are observed to hold liquid assets approximately double the size of small banksô liquid assets, 88.61% relative to 42.02%, respectively. Interestingly, small banks appear to have a slightly higher average value of loan loss provision than their large counterparts. Indicative that large banks have a slightly better screening and monitoring of credit risk than small banks. Finally, large banks hold a higher share of non-interest income relative to small banks, 32.44% compared to 25.80%. This not surprising as it reflects the notion that large banks engage more in securitising their loan portfolios and diversify their activities through non-traditional activities and off-balance sheet activities.

Table 2.2 *Summary statistics*

	Full Sample				Large Banks				Small Banks			
	mean	sd	Min	max	mean	sd	min	max	mean	sd	min	max
Premium	-1.03	2.29	-20.45	9.26	-1.77	2.16	-20.45	3.42	-0.25	2.15	-8.64	9.26
IIEAG	-2.15	16.64	-178.67	125.00	-2.20	16.54	-138.63	89.38	-2.10	16.75	-178.67	125.00
RWATA	55.97	19.21	10.09	110.67	49.07	17.46	10.41	93.38	63.27	18.26	10.09	110.67
Z-Score	3.74	1.15	-3.32	7.99	3.45	1.08	-3.32	6.58	4.03	1.14	-1.17	7.99
ECG	-6.01	10.49	-42.11	25.83	-4.99	11.17	-42.11	25.83	-7.09	9.60	-42.11	25.83
ROA	0.58	0.78	-2.64	3.05	0.42	0.73	-2.64	2.87	0.74	0.81	-2.64	3.05
CapBuff	6.66	3.78	0.00	20.60	5.76	3.62	0.00	20.60	7.61	3.72	0.00	20.60
Size	16.93	2.40	11.11	21.78	18.80	1.46	15.90	21.78	14.96	1.43	11.11	17.49
DEPAS	53.16	17.41	4.17	89.37	45.71	15.91	5.48	84.00	61.01	15.36	4.17	89.37
LIQ	65.94	75.76	10.17	503.29	88.61	81.59	10.44	503.29	42.02	60.53	10.17	503.29
LLPLN	0.75	1.32	-0.37	10.04	0.73	0.98	-0.37	10.04	0.77	1.61	-0.37	10.04
NII	29.20	14.54	0.44	93.72	32.44	13.10	0.85	72.83	25.80	15.20	0.44	93.72
GDPGrowth	1.40	2.39	-9.13	25.56	1.27	2.77	-9.13	25.56	1.53	1.90	-8.27	10.80
HHI	8.39	5.20	1.63	38.80	7.63	5.39	1.63	38.80	9.19	4.86	2.20	38.80
InterestRate	1.89	1.69	-0.78	8.77	1.82	1.69	-0.78	6.91	1.95	1.70	-0.78	8.77

Note: The table presents the summary statistics of the variables used in the regressions. It shows three different specifications: Full Sample, Large Banks, and Small Banks. All variables are obtained from Datastream database. For variable definitions see Table 2.1.

2.4. Empirical Models and Econometric Results

This section discusses the setup of our analyses and displays the results. It focuses first on the impact of excessive lending on premium. Next, it focuses on the impact of excessive lending on credit risk, and finally it examines whether the impact of excessive lending on credit risk is dependent on bank performance.

2.4.1 Excessive credit growth and risk premium

We start by examining whether the additional loans provided by banks are effectively priced and reflect an efficient risk-return trade-off. This leads us to explore whether banks engaging in excessive lending are required to under-price their additional loans and soften their standards. Accordingly, risk premium is regressed on excessive credit growth and risk-weighted assets ratio as well as a set of control variables as modelled below.

$$\begin{aligned} Premium_{i,j,t} &= \beta_1 Premium_{i,j,t-1} + \beta_2 ECG_{i,j,t-1} + \beta_3 Risk_{i,j,t-1} \\ &\quad + \beta_4 \boldsymbol{X}_{i,j,t-1} + \beta_4 \boldsymbol{Z}_{j,t} + \varepsilon_{i,j,t} \end{aligned} \tag{2.1}$$

where i, j, and t represent each individual bank, country, and time, respectively. As discussed in Section 3.2.2, $Premium$ is the difference between net interest income to earning assets ratio and 10-year government bond rate for the bankȏs country at time t. ECG and $Risk$ represent excessive credit growth and *RWATA* ratios, respectively. $\boldsymbol{X}$ is a set of bank-specific control variables that affects the dependent variables, $\boldsymbol{Z}$ is a vector of (contemporaneous) macroeconomic variables (see Table 2.1 for variable definitions), and $\varepsilon_{i,j,t}$ is the error term.[12] Year dummies are also included to capture time fixed effects.

[12] Our equations throughout the study contain a broad set of control variables to avoid a potential omitted variables problem. As discussed earlier in the Independent variables Section, our bank-specific vector includes bank capital

2.4.1.i Econometric results and discussion

Table 2.3 presents the results for the impact of excessive credit growth and credit risk on premium for the full period, sub-periods, and size classifications. We identify two key findings. First, the pre-crisis period shows that while excessive lending does not have a significant impact on premium, credit risk is observed to be a key driver for generating higher premium (Column 2). In contrast, excessive lending after the crisis becomes a significant factor for banks to generate higher premium, whereas credit risk is no longer a key driver for higher premium (Column 3). Second, large banks exercising excessive lending generate high premium without increasing their credit risk, whereby small banks exercising excessive lending decreases their premium and their credit risk plays a substantial role in generating higher premium for them. These results provide evidence in favour of our first hypothesis (*H1*: *Excessive lending is associated with a higher risk premium that compensates this aggressive practice*) for the post-crisis period and for large banks.

With the rapid credit growth episodes that preceded the financial crisis, the lending rates offered by banks were relatively low. This puts unnecessary pressure on all banks to take higher risk to generate higher premium. As a result, in the pre-crisis period premium was highly dependent on the risk profile and riskiness level of the assets portfolio and not on the amount of loans lent out as banks were attempting to compensate for the risk they undertake only for

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buffer to capture capital reserves relative to its risk, bank size to account for the heterogeneity in our banks, bank deposits ratio as a proxy for funding method, liquidity ratio to capture liquidity risk, loan loss provision ratio to capture credit risk and monitoring, and non-interest income ratio as a proxy for income diversification, all of which are lagged one period to mitigate potential endogeneity problems arising from simultaneity. For the macroeconomic vector, on the other hand, we include real GDP growth as a proxy for the business cycle, *HHI* to capture market competition, and the three-month interbank interest rate to capture the monetary policy of each country.

what they perceived as high risk loans. This comes as an indication that the additional loans were both under-priced and underestimated in terms of default risk, and low premiums were provided to most of the borrowers. This can be observed by the insignificant effect of *ECG* and the positive coefficient on risk that is only marginally different from zero (0.003) ï see column 2 in Table 2.3. Banks followed a strategy of lowering interest rates and softening credit standards to increase lending, in an eventual attempt to avoid the higher opportunity cost of not taking advantage of the boom period that preceded the crisis, which might lead to negative market perceptions.

After the crisis, however, banks appear to manage their credit supply and risk more efficiently. This is observed by positive coefficient on *ECG* (0.242), statistically significant at the 10% level (Column 3). Implying that banks have followed an effective strategy in providing loans with high premium not only for risky borrowers but also for safe borrowers. They have become more connected to the money market when setting premium rate and they imposed stricter collateral requirements and tighter credit standards for all additional loans provided in parallel with the risk of lending practice.

When the size classifications are taken on board, we find that the results are sensitive to bank size. For example, large banks exercising excessive lending, are better in managing their credit supply and are more likely to generate higher premium for the additional loans provided than small banks. They follow an effective strategy in providing loans with high premium, not only for risky borrowers but also low-risk borrowers. This is observed by the positive coefficient on *ECG* (0.164), statistically significant at the 10% level, and the negative coefficient of *RWATA*, albeit insignificant (Column 4). This also indicates that the results are not biased by the assumption that large banks ï which on average hold high diversified activities ï lend at very low rates, which is consistent with Lepetit *et al.* (2008)ĝs findings. Small banks, on the contrary, are the banks that generate high premium by providing loans to risky borrowers that pay higher interests and not for all loans provided. This is observed by the negative coefficient on *ECG* (0.158) and positive coefficient on *RWATA* (0.019), statistically significant at the 5% and 10%, respectively. This provides an interesting intuition. It is well known that small banks engage largely in long-term bank-borrower relationships, and such lending relationship is crucial to increase their value. In addition, Lepetit *et al.* (2008) show that banks that engage in such relationships reduce their premium to retain or attract customers that are potential borrowers for generating future income. Therefore, it is not surprising that excessive lending is under-priced for small banks, and these banks, which largely engage in that relationship lending, may not necessarily generate high margins for the additional loans provided. Thus, they generate high premium through risky borrowers, thereby increasing their credit risk. This means that while excessive lending may benefit large banks that are more capable to undertake, this benefit is not easy to be achieved by small banks.

Among the controls, *ROA* is observed to exert a positive impact on premium in all specifications, suggesting that banks with better performance generate higher premium (albeit insignificant for small banks). Well-capitalised banks generate higher premium than their undercapitalised counterparts as observed by positive coefficient on *CapBuff*. Banks reliant on deposit funding generate higher premium than wholesale funding reliant banks as observed by positive sign on *DEPAS*. Interestingly, banks with low credit quality and poor monitoring generate high premium during the pre-crisis period, corroborating the notion that banks charged higher premium for riskier loans before the financial crisis. Consistent with expectations, the impact of income diversification (*NII*) on premium is significantly positive for large banks, providing suggestive evidence to the idea that our results are not biased by the assumption that large banks, which on average hold high diversified activities, lend at very low rates. *HHI* exerts a negative impact during the pre-crisis period, and a positive impact during the post-crisis period, suggesting that banks after the crisis generate higher premium in markets with higher concentration (lower competition). Finally, the three-month interbank rate (*InterestRate*) exerts a negative impact statistically significant for the pre-crisis period and small banks. This indicates that low interest rate would increase the interest rate spread, and such spread is crucial for small banks to generate higher premium.

Table 2.3 *Regression results for premium*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	Premium	*Premium*	*Premium*	*Premium*	*Premium*
$Premium_{t-1}$	0.485***	0.532***	0.602***	0.765***	0.496*
	(0.112)	(0.0698)	(0.0963)	(0.117)	(0.290)
ECG_{t-1}	-0.198**	0.00457	0.242*	0.164*	-0.158**
	(0.0881)	(0.00588)	(0.124)	(0.0945)	(0.0688)
$RWATA_{t-1}$	0.0177***	0.00341**	-0.00172	-0.000948	0.0190*
	(0.00673)	(0.00162)	(0.00606)	(0.00433)	(0.0109)
ROA_{t-1}	0.0192	0.169**	0.673***	0.416**	0.0334
	(0.137)	(0.0682)	(0.251)	(0.186)	(0.169)
$CapBuff_{t-1}$	0.0707***	-0.00350	0.0931***	0.0471*	0.0585*
	(0.0264)	(0.00833)	(0.0305)	(0.0270)	(0.0332)
$Size_{t-1}$	-0.0827***	-0.0844***	-0.0436		
	(0.0218)	(0.0156)	(0.0373)		
$DEPAS_{t-1}$	-0.00601	0.0108***	0.0123*	0.00362	0.00621
	(0.00656)	(0.00284)	(0.00671)	(0.00778)	(0.0119)
LIQ_{t-1}	-0.00379**	0.000745	-0.000560	0.00138	-0.00292
	(0.00188)	(0.000526)	(0.00200)	(0.00179)	(0.00223)
$LLPLN_{t-1}$	0.0295	0.0490**	-0.0241	-0.192	0.120
	(0.0731)	(0.0247)	(0.117)	(0.125)	(0.105)
NII_{t-1}	0.0126**	0.00191	-0.000657	0.0122**	-0.00639
	(0.00587)	(0.00184)	(0.00829)	(0.00591)	(0.00886)
GDPGrowth	0.123**	0.0132	0.109	0.108	-0.132
	(0.0483)	(0.0161)	(0.0830)	(0.0865)	(0.116)
HHI	-0.0337**	-0.0151***	0.0596**	0.0187	-0.0125
	(0.0165)	(0.00445)	(0.0292)	(0.0277)	(0.0132)
InterestRate	-0.667***	-0.117**	0.161	0.0686	-0.624*
	(0.233)	(0.0461)	(0.257)	(0.205)	(0.315)
Observations	1,603	494	1,098	823	780
No of banks	149	100	148	69	80
AR(1)	0.02	0.00	0.04	0.05	0.02
AR(2)	0.07	0.10	0.10	0.07	0.09
Instruments	30	41	26	31	38
Hansen	0.21	0.47	0.54	0.75	0.35

Note: The table presents the estimation results for premium regressions. It shows the estimations results for the full period, sub-periods subsamples, and size subsamples. The full sample period is (2001-2016), pre-crisis period (2001-2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). For variable definitions see Table 2.1. Size is excluded in size specifications. The GMM estimation is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

2.4.2 Excessive credit growth and bank risk

Having established the relationship between excessive lending and premium, we turn the attention to test whether banks practising excessive lending restrain from increasing their credit risk. Such a key question is investigated by regressing *RWATA* on *ECG* and a set of control variables. It is expected that due to regulations, and particularly after the recent financial crisis, banks may be more inclined to reduce their risk and tighten their credit standards by maintaining a trade-off between the amount of loan created and the amount of risk piled up. Accordingly, the following model is estimated:

$$Risk_{i,j,t} = \beta_1 Risk_{i,j,t-1} + \beta_2 ECG_{i,j,t-1} + \beta_3 \boldsymbol{X}_{i,j,t-1} + \beta_4 \boldsymbol{Z}_{j,t} + \varepsilon_{i,j,t} \qquad (2.2)$$

where i, j, and t represent each individual bank, country, and time, respectively. As previously shown, $Risk$ is measured by *RWATA*, ECG represents excessive credit growth, $\boldsymbol{X}$ is a set of bank-specific control variables that affects the dependent variables, $\boldsymbol{Z}$ is a vector of (contemporaneous) macroeconomic variables (see Table 2.1 for variable definitions), and $\varepsilon_{i,j,t}$ is the error term. As before, year dummies are also included to capture time fixed effects.

2.4.2.i Econometric results and discussion

Table 2.4 presents the results from regressing the risk-weighted assets ratio (*RWATA*) on excessive credit growth ratio (*ECG*) and the set of controllers described above. The results are presented separately for the sub-periods and size classifications. Two key findings can be highlighted. First, banks exercising excessive lending increase their credit risk during the pre-crisis period, whereas after the crisis banks that practise excessive lending are more prone to restrain from increasing their credit risk. Second, excessive lending does not necessarily impede large or small banks from increasing their credit risk. These results provide evidence in favour of our second hypothesis (*H2. Excessive credit growth restrains banks from increasing their risk*) for the post-crisis period.

These results provide interesting economic interpretations. Taking the pre-crisis period first, it is well known that the market was overwhelmed by lax credit standards that brought about rapid credit growth episodes between the year 2003 and 2007. This helped banks, say weak banks, to grow as fast as strong banks, which eventually created a big bubble that preceded the crisis. Hence, excessive lending led banks to take higher risk and inflate their credit risk through relaxing their credit standards. This finding is in line with those arguments that higher lending is associated with higher risk. Quantitatively, a one basis point increase in *ECG* during the pre-crisis period leads to approximately 0.24 basis point increase in *RWATA*.

In addition, recall that excessive lending was not generating adequate premium during the pre-crisis period, it could be confirmed that the findings are consistent with the *moral hazard hypothesis* for the pre-crisis period. In other words, banks exercising excessive lending expand their credit supply to relatively risky borrowers that pay higher premium thereby increasing their credit risk. This finding is consistent with Foos *et al*. (2010) who document that abnormal lending that is not compensated by higher profitability did not impede banks from taking risk during the period 1997-2007. After the crisis, however, with the liquidity dry-ups that shaped the market and after the failure of big corporations in the markets, banks were forced to alter their lending behaviour. They have employed a trade-off between the amount of loans created and the amount of risk piled up in their asset portfolios as banks exercising aggressive lending are lowering their credit risk. Quantitatively, a one basis point increase in *ECG* ratio leads to a reduction in credit risk by approximately 0.28 basis points. This may occur by many ways, such as imposing stricter credit standards, higher collateral requirements, not rolling over loans to low credit worthiness borrowers, and decreasing other risky investments. Note that *ECG* has a positive impact on premium in the post-crisis period in the analysis provided in Section 2.4.1.

Therefore, the negative effect of *ECG* on risk for the post-crisis period lends adequate support to the *risk-management hypothesis*, under which banks cut down lending to relatively risky borrowers, consistent with Acharya *et al*. (2018).

When we interpret the results for size specifications, we find that practising excessive lending for both large and small banks does not significantly prevent them from increasing their credit risk. At the same time, it does not induce them to increase their credit risk. This means that the additional loans provided by large and small banks might be lent to risky borrowers. This also indicates that these banks do not necessarily trade off the amount of loans created with the amount of risk piled up in their portfolios. Recall that excessive lending has a positive impact on large banksô premium in our previous Section 2.4.1. When taken together with this section results, it is clear that the insignificantly negative coefficient of *ECG* on risk for these banks weakens the evidence of the *risk-management hypothesis*.[13] By contrast, small banks are less capable of decreasing their credit risk when practising abnormal lending since these banks mainly rely on equity capital and customer deposits as their main sources of funding; contrary to large banks that have more funding options, mainly, the money market and wholesale funding. Their asset portfolios, as discussed earlier, contain many long-term bank-borrower relationship loans that might make their credit risk high *a priori*. Thus, it is intuitive for small banks to have weaker efficient risk management relative to their large counterparts. Importantly, recall that excessive lending has a negative impact on small banksô premium in our previous Section 2.4.1, the positive effect of *ECG* (albeit insignificant) on risk for these small banks provides strong evidence in favour of the *moral hazard hypothesis*, under which banks practising excessive lending provide their loans to relatively risky borrowers that pay higher premium thereby increase their credit risk.

[13] The robustness checks section provides evidence that the *risk-management hypothesis* holds for large banks.

Among the controls, *ROA* exerts a significantly positive impact for small banks, suggesting that profitability is a key driver for these banks to take high risk. Consistent with expectations, bank deposits (*DEPAS*) appear to have a positive impact in all specifications, though only significant in the pre-crisis period and small banks specifications (in addition to the full sample period in Column 1). This is line with the empirical literature that provides evidence and support to the idea that banks with higher deposit funding tend to take higher risk (*e.g.*, Khan *et al*., 2017).[14] Interestingly, bank capital has no significant impact on bank risk in all our specifications. This is in line with Gorton and Winton (2000) who state that bank deposits are more pivotal and have a stronger impact on bank risk and that such deposits would crowd out the effect of bank capital.[15] Loan loss provision ratio (*LLPLN*) is observed to exert a significantly positive impact in all specifications except that for large banks (insignificantly positive), suggesting that banks with lower asset quality and weak credit risk monitoring have riskier asset portfolios. Non-interest income ratio (*NII*) exerts a negative impact on large and small banks, indicative that banks with higher income diversifications have lower credit risk. *GDPGrowth* exerts a significantly positive impact during the post-crisis period. Market concentration (*HHI*) shows that banks take higher risk when market competition is high during the post-crisis period, whereas the 3-month interbank rate (*InterestRate*) shows that small banks

[14] This is also in line with theories predicting that deposits act as a shield for banks against ñrunò risk, and therefore banks holding higher deposits have less funding liquidity risk, which in turn increases banksô incentive to take higher risk and reduces market discipline. This is also beside the fact that deposit insurance would create a moral hazard for higher risk-taking by banks (Keeley, 1990; Khan *et al*., 2017).

[15] In general, a negative sign on capital would refer to a moral hazard behaviour (*i.e.* banks with lower capital takes higher risk), whereas a positive sign would indicate that a bank increases its capital commensurate with the amount of risk taken. While our results are not significant, we do find a significant sign on the post-crisis period for core countries when we split our sample into core and periphery countries, suggesting that the latter assumption holds for core countries. These results are reported in the Robustness Checks Section and Appendix A.

takes higher risk when interest rate is high but this impact is only significant at the 10% level, which may weaken the effect of interest rate on risk-taking in our models.[16]

[16] In general, a higher interest rate may result in higher risk-taking by small banks since such high interest rate would also affect their deposit rates. Therefore, small banks may be induced to offset the increase on their deposit rates by taking higher risk. This is particularly true for small banks relative to large banks since depositors prefer to deposit their money in large banks, which makes it very competitive for small banks to generate deposits.

Table 2.4 *Regression results for RWATA*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.809***	0.866***	0.869***	0.776***	0.434*
	(0.0408)	(0.0698)	(0.0896)	(0.0678)	(0.259)
ECG_{t-1}	-0.0142	0.241***	-0.275*	-0.0120	0.168
	(0.0555)	(0.0805)	(0.159)	(0.0979)	(0.190)
ROA_{t-1}	1.298***	0.980	0.675	0.796	3.721*
	(0.353)	(0.837)	(0.722)	(0.565)	(1.891)
$CapBuff_{t-1}$	-0.0946	-0.140	0.198	-0.147	-0.0758
	(0.0641)	(0.116)	(0.127)	(0.130)	(0.215)
$Size_{t-1}$	-0.124*	-0.138	0.104		
	(0.0659)	(0.157)	(0.156)		
$DEPAS_{t-1}$	0.0818***	0.140***	0.0423	0.113***	0.132**
	(0.0204)	(0.0381)	(0.0553)	(0.0340)	(0.0622)
LIQ_{t-1}	-7.37e-05	0.0244***	-0.00472	0.00574	-0.00819
	(0.00393)	(0.00660)	(0.0119)	(0.00517)	(0.0103)
$LLPLN_{t-1}$	1.030***	1.520***	0.820*	0.584	2.085**
	(0.244)	(0.426)	(0.426)	(0.386)	(0.978)
NII_{t-1}	-0.0414**	-0.0265	-0.0274	-0.0523*	-0.122**
	(0.0159)	(0.0392)	(0.0281)	(0.0282)	(0.0593)
GDPGrowth	0.0111	0.130	0.270**	-0.0129	-0.315
	(0.0993)	(0.389)	(0.128)	(0.111)	(0.423)
HHI	-0.0483*	0.0301	-0.101*	-0.0938*	-0.0744
	(0.0281)	(0.0927)	(0.0569)	(0.0529)	(0.144)
InterestRate	0.589*	0.186	-0.484	0.464	2.552*
	(0.307)	(0.811)	(0.511)	(0.536)	(1.391)
Observations	1,603	492	1,100	824	779
No of banks	149	100	148	69	80
AR(1)	0.00	0.00	0.00	0.00	0.0
AR(2)	0.25	0.20	0.87	0.86	0.20
Instruments	57	42	31	28	32
Hansen	0.45	0.13	0.48	0.77	0.69

Note: The table presents the estimation results for risk regressions. It shows the estimations results for the full period, sub-periods samples, and size samples. The full sample period is (2001-2016), pre-crisis period (2001- 2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). For variable definitions see Table 2.1. Size is excluded in size specifications. The GMM estimation is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

2.4.3 The interaction impact of excessive credit growth and profitability on bank risk

So far, the results have shown that excessive lending prevents banks from increasing their risk except for small banks and the pre-crisis period. A key question posed in this study is whether the effect might be dependent upon bank performance, that is, an interaction impact of excessive credit growth and profitability on risk. Accordingly, to test the final hypothesis, we consider an interaction term between both excessive credit growth and profitability (*ECG*x*ROA*) to investigate whether there is a threshold for profitability that allows banks with excessive credit growth to take on more risk, perhaps, as a means of ‘search for yield’. To do so, the return on assets (*ROA*) is mean-centred (*i.e.* generating a new variable by subtracting its mean) and interacted with *ECG*.[17] Therefore, we regresses bank risk on (*ECG*x*ROA*) as well as a set of controls as indicated in the following models:

$$Risk_{i,j,t} = \beta_1 Risk_{i,j,t-1} + \beta_2 ECG_{i,j,t-1} + \beta_3 c\_ROA_{i,j,t-1} + \beta_4 ECGxROA_{i,j,t-1} + \beta_5 \boldsymbol{X}_{i,j,t-1} + \beta_6 \boldsymbol{Z}_{j,t} + \varepsilon_{i,j,t} \quad (2.3)$$

$$Risk_{i,j,t} = \beta_1 Risk_{i,j,t-1} + \beta_2 ECG_{i,j,t-1} + \beta_3 c\_ROA_{i,j,t-1} + \beta_4 ECGxROA_{i,j,t-1} + \beta_5 ECGxROAxC_{i,j,t-1} + \beta_6 \boldsymbol{X}_{i,j,t-1} + \beta_7 \boldsymbol{Z}_{j,t} + \varepsilon_{i,j,t} \quad (2.4)$$

where i, j, and t represent each individual bank, country, and time, respectively. As before, $Risk$ is *RWATA* and ECG represents excessive credit growth. c_ROA is a mean-centred variable for *ROA* and $ECGxROA$ is an interaction between c_ROA and ECG.[18] $\boldsymbol{X}$ is a set of bank-specific control variables that affects the dependent variables, whereas $\boldsymbol{Z}$ is a vector of

[17] Similar approach used in Kim and Sohn (2017) who examine the interaction effect of capital and liquidity on lending channel.

[18] *ROA* is mean-centred to (i) facilitate more accurate interpretations by assuming that the variables are held on average, that is, providing inference at the mean effect of profitability, and (ii) to reduce the impact of multicollinearity (Delis, 2012).

(contemporaneous) macroeconomic variables (see Table 2.1 for variable definitions). In order to investigate the moderate impact of the financial crisis and whether the joint effect is stable across time, the original interaction is interacted with a crisis dummy in additional specifications. The crisis dummy, C, takes a value of 1 during 2008 ï 2016, and zero otherwise. The interaction $ECGxROAxC$ is used to test whether the crisis has strengthened or weakened its impact as shown in Equation (2.4).

2.4.3.i Econometric results and discussion

The results in Table 2.5 provide some informative findings. Three key results are worth highlighting. First, while lower profitability leads banks to take on more risk during the pre-crisis period, the impact is inversed after the crisis. Second, higher profitability leads large banks to increase their credit risk when practising excessive lending (in all the time periods considered), but the impact is higher in magnitude and significance before the crisis. Third, higher profitability for small banks practising excessive lending does not induce them to increase their risk and the impact is significantly pronounced after the crisis. These results find clear support for *H3* (*excessive credit growth translates into higher risk based on bank performance*), and it holds for the full sample and large banks with a time-varying impact before and after the crisis.

We again interpret these findings in the context of theory. During the pre-crisis period, holding high profitability was not a very important driver for banks to increase their credit risk when practising excessive lending. This was the case because during that credit boom period banks relaxed their credit standards and increased their credit supply to risky borrowers, irrespective to their performance. This assumption reflects the moral hazard problems of weak banks. In fact, most banks that provided high credit supply and increased their credit risk had poor performance and low profitability, precisely the case in which weak banks ógamble to surviveô or grab something from economic booms by taking more risk, *i.e.* creating risker loans in order to survive. This means that not only profitable banks increased their credit risk when expanding their credit supply but also unprofitable banks. In contrast, after the financial crisis, bank performance turns to play a different role in increasing credit risk for banks exercising excessive lending. That is, only banks holding high profitability would soften their credit standards when they practise excessive lending. This is not surprising in the presence of all the corresponding changes that took place in response to the financial crisis, *i.e.* Basel III and other post-crisis reforms such as the Dodd-Frank Wall Street Reform and Consumer Protection Act, which were in place immediately after the 2008 recession that imposed tighter prudential supervision and regulatory constraints on banksô behaviour to protect consumers and regulate the financial sectorôs activities.

When we focus on the results for different bank size, we can observe an extension to the above interpretations. For large banks, excessive lending makes them decrease their credit risk; these banks would soften their credit standards and increase their credit risk when they hold high profitability as a means of ósearching for yieldô. This means that holding high profitability is a key driver for large banks expanding their credit supply abnormally to increase their risk and relax their credit standards. After the crisis, however, and following regulations that imposed market discipline to control bank risk, high profitable large banks decreased their risk-taking to some extent, but the impact of profitability is still there. This is observed by the net coefficient between our original interaction ($ECGxROA$) and second crisis-interaction ($ECGxROAxC$), which is approximately 0.02.[19] This suggests that while the post-crisis regulations reduce banksô risk-taking appetite, such regulations are still inadequate to counterbalance their impact on bank risk, implying that additional supervisory tools might be needed to supplement these new regulations. For small banks, given that excessive lending

[19] -0.83 + 0.846 = 0.016

increases their credit risk, we find that they increase their credit risk whilst their performance was very poor during the pre-crisis period. This suggests that these banks ógamble to surviveô through expanding credit supply aggressively to riskier borrowers to maintain their market value and, more importantly, to generate higher spreads during the boom period. After the crisis, however, they become reluctant to increase their credit risk even when holding high profitability. Rather, they allocate their income to build up their regulatory capital. These results may provide some evidence on how the post-crisis period regulations have varying impacts on both large and small banks. For large banks, while holding high profitability is a key driver for them to increase their credit risk, their risk-taking has significantly dropped after the crisis due to stricter regulations. Whereas for small banks, regulations appear to be effective in both reducing the ógamble to surviveô and, at the same time, curb them from taking risk even when holding high profitability.

Table 2.5 *Regression results for RWATA with interactions*

	Full Sample	Full Sample	Large Banks	Large Banks	Small Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)	(6)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.822***	0.800***	0.849***	0.826***	0.500**	0.473***
	(0.0400)	(0.0418)	(0.0666)	(0.0522)	(0.243)	(0.170)
ECG_{t-1}	-0.0266	0.0495	-0.197*	-0.0685	-0.229	0.0620
	(0.0615)	(0.0886)	(0.102)	(0.0954)	(0.231)	(0.163)
c_ROA_{t-1}	1.146**	0.554	0.978**	1.935*	0.723	0.604
	(0.527)	(0.981)	(0.481)	(0.996)	(1.334)	(1.349)
$ECGxROA_{t-1}$	-0.00644	-0.329*	-0.300	0.846*	-0.721*	-0.719**
	(0.130)	(0.174)	(0.291)	(0.472)	(0.420)	(0.339)
$ECGxROAxC_{t-1}$		0.829*		-0.830*		0.721
		(0.447)		(0.464)		(0.582)
$CapBuff_{t-1}$	0.115	0.0988	-0.171	-0.0218	-0.154	0.172
	(0.0896)	(0.0950)	(0.130)	(0.0964)	(0.193)	(0.161)
$Size_{t-1}$	-0.144*	-0.155*				
	(0.0744)	(0.0853)				
$DEPAS_{t-1}$	0.0803***	0.0728***	0.0951**	0.0820*	0.136*	0.122*
	(0.0227)	(0.0234)	(0.0383)	(0.0412)	(0.0801)	(0.0660)
LIQ_{t-1}	0.00181	-0.00107	0.00666	0.00253	-0.0329	-0.0228**
	(0.00509)	(0.00477)	(0.00572)	(0.00523)	(0.0205)	(0.0107)
$LLPLN_{t-1}$	0.910***	0.924***	0.440	1.116**	2.453*	1.836**
	(0.235)	(0.354)	(0.355)	(0.442)	(1.247)	(0.733)
NII_{t-1}	-0.0371**	-0.0362	-0.0625**	-0.0256	-0.0612	-0.0791
	(0.0173)	(0.0223)	(0.0272)	(0.0282)	(0.0606)	(0.0590)
GDPGrowth	0.143	0.0625	0.0440	0.0650	-1.311	-0.0652
	(0.0879)	(0.115)	(0.103)	(0.0999)	(0.985)	(0.424)
HHI	-0.0466	-0.0651**	-0.0969**	-0.0934*	-0.0924	-0.153
	(0.0321)	(0.0319)	(0.0468)	(0.0506)	(0.139)	(0.130)
InterestRate	0.530	0.995**	0.0527	0.515	1.949	2.532**
	(0.336)	(0.475)	(0.422)	(0.361)	(1.296)	(1.002)
Observations	1,603	1,603	824	824	779	779
No of banks	149	149	69	69	80	80
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.27	0.17	0.59	0.62	0.20	0.29
Instruments	57	62	37	43	30	45
Hansen	0.36	0.82	0.76	0.47	0.69	0.54

Note: The table presents the estimation results for the interaction effect between excessive credit growth and performance on bank risk (*RWATA*). It shows the estimations results for the full sample, large banks, and small banks. *RWATA* is bank credit risk, *ECG* is excessive credit growth, and c_*ROA* is return on assets ratio centred. *ECG*x*ROA* is the interaction between excessive credit growth and centred return on assets, and *ECG*x*ROA*xC is the interaction between excessive credit growth and centred return on assets with a crisis dummy that takes value (1) in the period 2008-2016. Size is excluded in size specifications. The GMM estimation is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

2.5. Robustness Checks

In order to confirm the previous findings, a battery of robustness tests is conducted. First, we substitute the dependent variable of the premium equation with net interest income to earning assets growth ratio (*IIEAG*). The results reported in Table 2.6 corroborate the main findings. Although the effect of *RWATA* appears to change in some specifications, the main conclusion remains unchanged. That is, excessive lending exerts a significantly positive impact on loan pricing except for the pre-crisis period and small banks where banks showed aggressive credit growth with low lending rates.

Second, the dependent variable in the risk equation is replaced by the natural logarithm of *Z-Score* (distance-to-default). Note that *Z-Score* does not merely capture credit risk, it is a proxy for a bankꞌs overall risk representing solvency (risk-taking). It is inversely proportional to risk, that is, a lower *Z-Score* implies that a bank is imminent to default while a higher ratio indicates more stability. The results shown in Table 2.7 indicate that they are broadly similar to the main results except that for the pre-crisis period, we find no significant impact of ECG on *Z-Score*; for large and small banks, the impact of ECG on *Z-Score* becomes significantly positive with a higher magnitude for small banks, suggesting that these banks practising excessive lending restrain from increasing their risk-taking. This is consistent with our expectation since our summary statistics (presented earlier in Section 2.3.3) show that while small banks have on average higher credit risk than large banks, their solvency is larger than large banks as shown by *Z-Score*. Overall, the results herein confirm the *risk-management hypothesis* for large banks, which indicate that the main conclusion remains unchanged.

Third, for risk equations that have interaction terms (Equations 2.3 and 2.4), we substitute the dependent variable with *Z-Score*. Next, we multiply *Z-Score* by -1 in order to facilitate a consistent interpretation. Thus, it follows a consistent interpretation with *RWATA* (increase implies high risk and decrease implies low risk).[20] The findings in Table 2.8 show similar patterns to the main results. More specifically, large banks reduce their risk-taking during the post-crisis period when holding high profitability. Whereas for small banks holding high profitability has no significant impact on bank risk when exercising excessive lending.

Overall, the findings of our robustness tests are highly similar to the main findings. That is, the *moral hazard hypothesis* holds during the pre-crisis period and for small banks, albeit the effect is weakened for small banks; whereas the *risk-management hypothesis* holds during the post-crisis period and for large banks. Importantly, while bank performance is a key driver for banks to increase their credit risk when practising excessive lending, the financial crisis has weakened its impact and eliminated the ógamble to surviveô behaviour.

[20] A similar approach is used by Khan *et al*. (2017) who investigate the impact of deposit on risk-taking, where they multiplied *Z-Score* by -1 to have consistent interpretation with *RWATA* and other risk measures.

Table 2.6 *Regression results for net interest income to earning assets growth ratio (IIEAG)*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	IIEAG	*IIEAG*	*IIEAG*	*IIEAG*	*IIEAG*
$IIEAG_{t-1}$	0.0679	0.0210	-0.0609	0.0439	0.185*
	(0.0540)	(0.121)	(0.0514)	(0.0607)	(0.101)
ECG_{t-1}	1.156**	-0.170	0.897*	0.476**	0.971
	(0.581)	(0.454)	(0.473)	(0.204)	(0.688)
$RWATA_{t-1}$	-0.110*	-0.267*	-0.0584*	-0.0743*	-0.200
	(0.0576)	(0.149)	(0.0302)	(0.0436)	(0.176)
ROA_{t-1}	0.0845	-0.764	0.514	-2.557*	-4.477
	(1.511)	(4.897)	(0.829)	(1.296)	(3.240)
$CapBuff_{t-1}$	0.0482	-0.211	0.204	0.121	0.586
	(0.272)	(0.542)	(0.187)	(0.203)	(0.816)
$Size_{t-1}$	-1.133**	-1.204*	-0.100		
	(0.486)	(0.686)	(0.167)		
$DEPAS_{t-1}$	0.0764	0.0844	0.0674	0.107**	-0.521*
	(0.0652)	(0.109)	(0.0589)	(0.0485)	(0.293)
LIQ_{t-1}	0.0357*	-0.0799	0.0124	0.0144	0.0459
	(0.0189)	(0.0599)	(0.0162)	(0.00930)	(0.169)
$LLPLN_{t-1}$	-1.468**	-1.334**	-0.756	-1.788**	-3.193**
	(0.674)	(0.520)	(0.749)	(0.769)	(1.307)
NII_{t-1}	0.107	0.325**	-0.0396	0.0438	1.141***
	(0.0669)	(0.124)	(0.0444)	(0.0611)	(0.364)
GDPGrowth	-0.296	-0.714	-0.00459	0.135	-1.210
	(0.307)	(0.741)	(0.245)	(0.222)	(1.435)
HHI	0.0986	-0.378**	0.254*	0.100	-3.286***
	(0.119)	(0.149)	(0.145)	(0.0870)	(1.166)
InterestRate	2.855**	2.524**	2.540***	2.012***	0.472
	(1.443)	(1.240)	(0.876)	(0.621)	(5.257)
Observations	1,554	461	1,086	792	762
No of banks	149	100	148	69	80
AR(1)	0.00	0.00	0.00	0.00	0.00
AR(2)	0.14	0.32	0.12	0.17	0.13
Instruments	35	27	58	31	32
Hansen	0.46	0.55	0.38	0.78	0.36

Note: The table presents the estimation results for the growth of net interest income to earning assets ratio regressions (*IIEAG*). It shows the estimations results for the full period, sub-periods subsamples, and size subsamples. The full sample period is (2001-2016), pre-crisis period (2001-2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). For variable definitions see Table 2.1. Size is excluded in size specifications. The GMM estimation is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table 2.7 *Regression results for Z-Score (distance-to-default)*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	Z-Score	*Z-Score*	*Z-Score*	*Z-Score*	*Z-Score*
Z-Score$_{t-1}$	0.703***	0.586***	0.849***	0.578***	0.720***
	(0.0422)	(0.0682)	(0.204)	(0.105)	(0.0583)
ECG$_{t-1}$	0.0234*	0.0441	0.00396	0.0262*	0.0704*
	(0.0119)	(0.0276)	(0.0167)	(0.0143)	(0.0412)
ROA$_{t-1}$	-0.0746*	-0.0209	-0.400***	-0.156*	0.0544
	(0.0389)	(0.0705)	(0.122)	(0.0898)	(0.0619)
CapBuff$_{t-1}$	0.00362	0.00583	-0.0198	-0.00425	0.00215
	(0.00753)	(0.0119)	(0.0209)	(0.0136)	(0.00978)
Size$_{t-1}$	0.000401	0.0499***	0.330***		
	(0.0127)	(0.0177)	(0.0985)		
DEPAS$_{t-1}$	0.00404*	0.00655**	-0.0101	0.00832*	-0.00802**
	(0.00237)	(0.00327)	(0.0120)	(0.00453)	(0.00314)
LIQ$_{t-1}$	0.000901	0.00223	0.00316	0.00162*	0.00168
	(0.000628)	(0.00163)	(0.00490)	(0.000820)	(0.00181)
LLPLN$_{t-1}$	-0.0505**	-0.00786	0.00963	-0.122**	-0.00594
	(0.0218)	(0.0309)	(0.0489)	(0.0590)	(0.0244)
NII$_{t-1}$	-0.00327	-0.00707*	-0.000621	0.00300	-0.00774**
	(0.00226)	(0.00357)	(0.00711)	(0.00327)	(0.00377)
GDPGrowth	0.0262	0.0169	0.0198	0.00509	0.128***
	(0.0199)	(0.0298)	(0.0334)	(0.0190)	(0.0465)
HHI	0.00860**	0.0163**	-0.0718**	0.0115*	0.0108
	(0.00391)	(0.00707)	(0.0356)	(0.00606)	(0.00872)
InterestRate	0.0791**	0.0382	-0.795***	0.169***	0.0977
	(0.0366)	(0.0468)	(0.204)	(0.0555)	(0.0766)
Observations	1,588	492	1,085	811	777
No of banks	148	100	147	69	79
AR(1)	0.00	0.01	0.00	0.00	0.00
AR(2)	0.20	0.32	0.44	0.54	0.11
Instruments	80	31	29	28	32
Hansen	0.14	0.90	0.21	0.80	0.28

Note: The table presents the estimation results for *Z-Score* (distance-to-default) regressions. It shows the estimations results for the full period, sub-periods samples, and size samples. The full sample period is (2001-2016), pre-crisis period (2001- 2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). For variable definitions see Table 2.1. Size is excluded in size specifications. The GMM estimation is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table 2.8 *Regression results for Z-Score (distance-to-default) with interactions*

	Full Sample	Full Sample	Large Banks	Large Banks	Small Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)	(6)
	Z-Score	*Z-Score*	*Z-Score*	*Z-Score*	*Z-Score*	*Z-Score*
Z-Score$_{t-1}$	0.711***	0.697***	0.539***	0.669***	0.789***	0.792***
	(0.0409)	(0.0481)	(0.0926)	(0.154)	(0.0752)	(0.0610)
ECG$_{t-1}$	-0.00362	-0.00231	0.0296**	0.00981	0.0210	-0.0144
	(0.00931)	(0.0209)	(0.0144)	(0.0188)	(0.0254)	(0.0228)
ROA$_{t-1}$	0.177**	0.256**	0.332***	1.057***	0.173	0.201*
	(0.0707)	(0.113)	(0.118)	(0.332)	(0.210)	(0.116)
ECGxROA$_{t-1}$	0.00797	0.0636**	0.0654***	0.424***	0.0841**	0.0684**
	(0.0158)	(0.0321)	(0.0222)	(0.135)	(0.0375)	(0.0285)
ECGxROAxC$_{t-1}$		-0.0710*		-0.429**		-0.0254
		(0.0422)		(0.163)		(0.0340)
CapBuff$_{t-1}$	-0.00488	-0.00116	0.0231	0.00801	0.0132	0.00280
	(0.00814)	(0.00673)	(0.0145)	(0.0135)	(0.0116)	(0.0101)
Size$_{t-1}$	-0.00961	-0.0266**				
	(0.0104)	(0.0119)				
DEPAS$_{t-1}$	-0.00201	-0.00129	-0.00757*	-0.00650	0.00980**	0.00657**
	(0.00202)	(0.00199)	(0.00409)	(0.00494)	(0.00456)	(0.00325)
LIQ$_{t-1}$	-0.000267	0.000273	-0.000862	-0.00126	0.00332**	0.00191**
	(0.000395)	(0.000658)	(0.000716)	(0.00122)	(0.00157)	(0.000745)
LLPLN$_{t-1}$	0.0419**	0.0693**	0.253***	0.307***	-0.00482	0.0346
	(0.0199)	(0.0309)	(0.0777)	(0.0982)	(0.0312)	(0.0243)
NII$_{t-1}$	0.00201	0.00480*	-0.000908	0.00469	0.00184	0.00486
	(0.00212)	(0.00261)	(0.00365)	(0.00642)	(0.00394)	(0.00349)
GDPGrowth	-0.0357**	-0.0278	-0.00110	-0.0141	-0.0516	-0.0759**
	(0.0160)	(0.0195)	(0.0138)	(0.0241)	(0.0434)	(0.0355)
HHI	-0.00292	-0.00299	-0.00279	-0.000916	-0.00142	-0.00415
	(0.00305)	(0.00442)	(0.00557)	(0.00873)	(0.00796)	(0.00808)
InterestRate	-0.0217	-0.0342	-0.0896	-0.0510	0.0532	0.00544
	(0.0344)	(0.0567)	(0.0650)	(0.0936)	(0.0450)	(0.0401)
Observations	1,588	1,588	811	811	777	777
No of banks	148	148	69	69	79	79
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.16	0.37	0.20	0.82	0.94	0.89
Instruments	74	54	37	39	31	37
Hansen	0.13	0.39	0.82	0.59	0.60	0.60

Note: The table presents the estimation results for the interaction effect between excessive credit growth and performance on bank risk (*Z-Score*). It shows the estimations results for the full sample, large banks, and small banks. *Z-score* is bank overall risk (distance-to-default), *ECG* is excessive credit growth, and c_*ROA* is return on assets ratio centred. *ECG*x*ROA* is the interaction between excessive credit growth and centred return on assets, and *ECG*x*ROA*xC is the interaction between excessive credit growth and centred return on assets with a crisis dummy that takes value (1) in the period 2008-2016. Size is excluded in size specifications. The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

In a study on nonperforming loans in the Euro Area, Anastasiou *et al*. (2019) call our attention to the importance of distinguishing between core and periphery countries given the strong rise in cross country heterogeneity associated with the debt crisis and the weak balance sheets of euro area periphery banks (Bijsterbosch and Falagiarda, 2015). Following this line of reasoning, we also split our sample into core and periphery European countries. Due to structural imbalances that have been growing over time between core and periphery countries, our results may provide different patterns and additional insights. For example, periphery countriesô governments have faced budget and structural accounts deficits that led to a build-up of debt which contributed to an economic downturn in Europe since 2009. This in turn led banks of periphery countries to enter a negative spiral of debt and other financial difficulties since the debts issued by their governments were largely held by banks, and therefore affecting their credit and potential for growth. On the contrary, core countries are more likely to have a budget surplus that stimulates their economic growth leading their banks to operate efficiently and grant credit supply to different borrowers (Bartlett and Prica, 2016). To test these ideas, we re-run all our regressions on core and periphery countries separately and contrast the results between the two groups and our main results.[21]

Tables 2.9 ï 2.11 contain the results of all our regressions for core countries (Panel A) and periphery countries (Panel B). We highlight three key results. First, for both core and periphery

[21] The core countries subsample consists of 11 countries that are: Austria, Belgium, France, Germany, Netherlands, UK, Sweden, Switzerland, Czech Republic, Denmark, and Slovakia; whereas the periphery countries subsample consists of 9 countries which are: Greece, Italy, Ireland, Portugal, Spain, Hungary, Poland, Norway, and Finland. See Anastasiou *et al*. (2019) for a similar example of core and periphery classifications. It can be argued that Poland and Finland could be included in the core group. In unreported tests, we run our models including them in the group of core countries. The results obtained were very similar to the ones reported in this paper with the classification given above.

countries, banks exercising excessive lending generate adequate premium for large banks and during the post-crisis period, which is in line with our previous findings. Second, excessive lending impedes banks from increasing their credit risk after the crisis, but only in the core countries; in periphery countries, excessive lending has no significant impact on credit risk and does not necessarily impede banks from taking additional risk. Third, bank performance is the main driver for banks to increase their credit risk when exercising high credit supply in core countries, and the impact is more pronounced for large banks.

Overall, our findings for core countries are very similar to our previous main findings. That is, the *risk management hypothesis* holds for core countries for large banks and (more pronounced) during the post-crisis period, and large banks soften their credit standards and increase their credit risk when they hold high profitability as a means of ósearch for yieldô. The crisis has, however, mitigated such effect. For periphery banks, we find that the *moral hazard hypothesis* holds for small banks, and bank performance is not a key driver for banks exercising excessive lending to take higher risk.[22]

[22] While our results for core and periphery countries are robust, it is worth mentioning that such analyses can be replicated in a future study with a larger sample size as our main sample falls considerably (roughly half) across our specifications after splitting between core and periphery countries. It would also be interesting to distinguish between low- and high-income countries to provide a better insight of banksô strategies. It may be more useful to consider the dividend payout policy alongside to credit transfer activities and other derivatives. These are certainly avenues for future research.

Table 2.9 *Regression results for premium ï Core and periphery European countries*

Panel A: Core Countries					
	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	Premium	*Premium*	*Premium*	*Premium*	*Premium*
$Premium_{t-1}$	0.545**	0.482**	0.871***	0.697***	0.439*
	(0.264)	(0.221)	(0.264)	(0.0973)	(0.222)
ECG_{t-1}	-0.0646**	-0.00931	0.0679**	0.0283*	-0.0370**
	(0.0276)	(0.00915)	(0.0334)	(0.0151)	(0.0162)
$RWATA_{t-1}$	0.00808	0.00457	-0.00159	-0.00297	0.00789*
	(0.00561)	(0.00392)	(0.00387)	(0.00251)	(0.00423)
Observations	816	259	551	398	418
No of Banks	76	51	76	32	44
AR(1)	0.01	0.00	0.04	0.01	0.01
AR(2)	0.11	0.10	0.07	0.13	0.42
Instruments	31	28	28	31	35
Hansen	0.64	0.56	0.74	0.38	0.13

Panel B: Periphery Countries					
	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	Premium	*Premium*	*Premium*	*Premium*	*Premium*
$Premium_{t-1}$	0.422***	0.517**	0.465***	0.531***	0.284**
	(0.0479)	(0.211)	(0.0853)	(0.103)	(0.109)
ECG_{t-1}	0.191***	-0.0199	0.270**	0.174*	-0.175**
	(0.0651)	(0.0169)	(0.115)	(0.0949)	(0.0852)
$RWATA_{t-1}$	0.000765	-0.00126	-0.0104	-0.0145	-0.0127
	(0.00586)	(0.00496)	(0.0106)	(0.0100)	(0.0237)
Observations	787	235	547	425	362
No of Banks	73	49	72	37	36
AR(1)	0.00	0.01	0.01	0.02	0.04
AR(2)	0.12	0.37	0.11	0.32	0.14
Instruments	30	25	25	30	37
Hansen	0.30	0.22	0.76	0.21	0.50

Note: The table presents the estimation results for premium regressions for core countries (Panel A) and periphery countries (Pane B). It shows the estimations results for the full period, sub-periods subsamples, and size subsamples. The full sample period is (2001-2016), pre-crisis period (2001-2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). The additional estimates for the controllers are not reported here to save space but they are available in Appendix A. The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table 2.10 Regression *results for RWATA ï Core and periphery European countries*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
Panel A: Core Countries					
	(1)	(2)	(3)	(4)	(5)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.607***	0.457**	0.818***	0.798***	0.382
	(0.200)	(0.172)	(0.124)	(0.126)	(0.268)
ECG_{t-1}	-0.209	0.349	-0.501*	-0.00870	0.146
	(0.239)	(0.235)	(0.256)	(0.0885)	(0.356)
Observations	815	257	552	399	416
No of Banks	76	51	76	32	44
AR(1)	0.00	0.01	0.00	0.00	0.04
AR(2)	0.89	0.50	0.45	0.36	0.24
Instruments	30	28	25	33	32
Hansen	0.70	0.24	0.74	0.72	0.41
Panel B: Periphery Countries					
	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.601***	0.606***	0.819***	0.674***	0.737***
	(0.142)	(0.204)	(0.0882)	(0.0990)	(0.238)
ECG_{t-1}	0.265*	-0.189	-0.0814	0.113	0.114
	(0.136)	(0.276)	(0.105)	(0.180)	(0.203)
Observations	788	235	548	425	363
No of Banks	73	49	72	37	36
AR(1)	0.00	0.02	0.00	0.00	0.00
AR(2)	0.28	0.43	0.48	0.14	0.74
Instruments	31	20	27	31	28
Hansen	0.72	0.41	0.39	0.75	0.86

Note: The table presents the estimation results for risk regressions for core countries (Panel A) and periphery countries (Panel B). It shows the estimations results for the full period, sub-periods samples, and size samples. The full sample period is (2001-2016), pre-crisis period (2001-2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). The additional estimates for the controllers are not reported here to save space but they are available in Appendix A. The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table 2.11 *Regression results for RWATA with interactions ï Core and periphery European countries*

	Full Period	Full Period	Large Banks	Large Banks	Small Banks	Small Banks
Panel A: Core Countries						
	(1)	(2)	(3)	(4)	(5)	(6)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.730***	0.733***	0.738***	0.779***	0.358*	0.391**
	(0.133)	(0.158)	(0.0959)	(0.156)	(0.190)	(0.185)
ECG_{t-1}	-0.366**	0.0763	0.0474	0.178	0.527*	0.330*
	(0.144)	(0.246)	(0.120)	(0.174)	(0.292)	(0.178)
c_ROA_{t-1}	1.101	-1.433	3.995**	0.495	4.804**	3.914**
	(1.436)	(2.395)	(1.675)	(1.966)	(2.203)	(1.833)
$ECGxROA_{t-1}$	-0.0735	-1.516*	0.586**	-0.599	0.348	0.220
	(0.342)	(0.874)	(0.272)	(0.573)	(0.331)	(0.459)
$ECGxROAxC_{t-1}$		2.019		1.460*		-0.248
		(1.550)		(0.741)		(0.646)
Observations	815	815	399	399	416	416
No of Banks	76	76	32	32	44	44
AR(1)	0.00	0.00	0.00	0.00	0.01	0.02
AR(2)	0.97	0.28	0.51	0.62	0.36	0.27
Instruments	36	39	33	34	37	39
Hansen	0.72	0.76	0.78	0.70	0.26	0.76
Panel B: Periphery Countries						
	Full Period	Full Period	Large Banks	Large Banks	Small Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)	(6)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.737***	0.776***	0.695***	0.709***	0.605***	0.634***
	(0.0847)	(0.0974)	(0.127)	(0.105)	(0.162)	(0.134)
ECG_{t-1}	0.100	0.0543	0.0939	0.0312	0.181*	-0.171
	(0.0814)	(0.145)	(0.275)	(0.201)	(0.104)	(0.179)
c_ROA_{t-1}	0.492	0.0903	1.001	1.515	0.127	1.596
	(0.859)	(1.539)	(0.694)	(2.106)	(0.953)	(2.041)
$ECGxROA_{t-1}$	-0.0407	-0.178	-0.0675	0.253	0.256*	0.382
	(0.262)	(0.317)	(0.250)	(0.915)	(0.149)	(0.303)
$ECGxROAxC_{t-1}$		0.243		-0.320		-0.342
		(0.612)		(1.053)		(0.359)
Observations	788	788	425	425	363	363
No of Banks	73	73	37	37	36	36
AR(1)	0.00	0.00	0.00	0.00	0.01	0.01
AR(2)	0.32	0.37	0.15	0.24	0.41	0.79
Instruments	36	37	32	34	37	38
Hansen	0.65	0.40	0.58	0.58	0.83	0.77

Note: The table presents the estimation results for the interaction effect between excessive credit growth and performance on bank risk for core countries (Panel A) and periphery countries (Panel B). It shows the estimations results for the full sample, large banks, and small banks. Size is excluded in size specifications. The additional estimates for the controllers are not reported here to save space but they are available in Appendix A. The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

2.6. Conclusions and Policy Implications

This study provides evidence for the impact of excessive credit growth on loan pricing and credit risk using a sample of banks for 20 European countries over the period 2001-2016. Employing the two-step system GMM estimator, this study provides results that are consistent with the *risk-management hypothesis*, in particular after the crisis and to some extent for large banks. This means that those banks tend to reduce excessive lending to risky borrowers and supply credit to low-risk borrowers with adequate premium. In contrast, during the pre-crisis period and for small banks, the findings are observed in favour of the *moral hazard hypothesis*, under which those banks tend to practise excessive lending to relatively risky borrowers that pay high premium.

It is worth emphasising that the impact of excessive lending on risk is dependent on performance, as banks with excessive lending tend to increase their risk when their profitability is relatively high. The financial crisis, however, has weakened this impact for large banks and restricted small banks from increasing risk at all levels of profitability. This suggest that post-crisis regulations (*e.g.*, Basel III and Stress Tests) have had a strong impact on all banks to curb their risky practices with varying impacts depending on bank size. In an extra analysis, evidence points out that such findings hold strongest for core countries as credit supply for banks in periphery countries does not play a significant role on their credit risk.

While the studyǿs findings ought to be viewed as part of the larger picture, they are nonetheless interesting and shed light on the effectiveness of the post-crisis changes in regulations, supervisions, and bank risk management. From a policy perspective, the post-crisis period implications show that banks have become more dependent on the conditions of bond and money markets and generate adequate risk premium when expanding credit supply. In addition, the growing concern about curbing bank-risk taking is observed to have taken the form of cutting credit supply to relatively risky borrowers. A goal that may be socially desirable for bank regulators and other market participants.

Another key implication is that the intensive ósearch for yieldô and ógamble to surviveô appear to be necessarily dependent on performance when exercising aggressive lending. For example, the strong effect of post-crisis regulations restrains banks with poor performance from the ógamble to surviveô behaviour. This particularly true for small banks that undertake such a behaviour as a last resort to rebuild their capital. In addition, while large banks maintain their target level of profit by taking more risk as a means of ósearch for yieldô, this behaviour has substantially decreased in response to the financial crisis but, to some degree, it is still in the horizon. Whereas for small banks their performance is no longer a main driver to engage in relatively risker lending even when holding high profitability. This might, however, indicate that the policies are more effective on small banks and, perhaps, less effective where it is most important. Nonetheless, this study underscores empirically the notion that high credit supply does not always imply higher risk. A conclusion that central banks and regulators may rely on as they prioritise financial stability over competition following Basel III.

Chapter 3
Banksô Dividend Payout Policy during and post 2007-09 Financial Crisis: The role of subordinated debt on U.S. banks

3.1 Introduction

Banksô dividend policy has recently moved into the regulatory spotlight, with both the Basel Committee on Banking Supervision (BCBS, 2011) and the Federal Reserve Board (FRB, 2011) emphasising the importance of overseeing banksô dividend payouts. This attracted considerable attention when risky banks that were close to default (or even defaulted) maintained high dividend payments long into the 2007-09 financial crisis, despite accumulating heavy losses (Acharya *et al*., 2011; Acharya *et al*., 2017; Hirtle, 2014). Acharya *et al*. (2011) state two possible reasons for bank managers rarely being proactive in reducing dividends. First, they fear that cutting dividends could signal uncertainty about their financial health and cause subsequent refinancing problems. Second, they might have engaged in wealth expropriation by transferring their bankôs assets (cash) to shareholders, thereby transferring the default risk to creditors and insured depositors. This is known in the literature as the *risk-shifting hypothesis*.

On the other side of the coin, dividend payout has been argued to play a significant role in mitigating the agency conflicts of free cash flow between managers and shareholders (Easterbrook, 1984; Jensen, 1986). In addition, while distributing dividends reduces the agency conflicts between shareholders and managers, it may trigger the role of monitoring by creditors, thereby creating an agency conflict between shareholders and debtholders (*e.g.*, Lepetit *et al*., 2018). This means that bank managers are under pressure to adopt an effective dividend policy since there is an increase in monitoring imposed on them by creditors and, at the same time, they are under pressure to signal their relative strength to investors and other market participants.

While the literature provides evidence on whether dividend payouts are used as a mechanism for signalling and/or reducing agency conflicts, few empirical studies analyse it in terms of risk-shifting and, in particular, whether (uninsured) debtholders have the strength needed to monitor, discipline, and force bank managers to cut their dividends during financial turmoil. This behaviour is linked to what is known in the literature as the *monitoring hypothesis*. To put things in context, the distribution of dividends for (risky) banks obviously entails not just their earnings but also their borrowed funds. This might increase banksô incentives to signal their financial soundness to their long- and short-term debtholders as well as other market participants. At the same time, when creditors are not covered by deposit insurance (*i.e.* subordinated debt), they will have adequate incentives to impose discipline and increase monitoring on banksô managers if solvency is questionable. This might represent a key explanation for why some banks might cut their dividends and other banks might continue to pay dividends during economic downturns. The present study seeks to contribute to an (empirical) evaluation of the influence of subordinated debtholders on banksô dividend policy in this context. It assesses whether subordinated debtholders have the relative strength to discipline risky bank managers from wealth expropriation behaviour, and whether these banks managers breach the priority of debt over equity by favouring equity holders over debtholders.

The literature on the determinants of banksô payout policy does not account for uninsured debt, namely subordinated debt, which is highlighted in the market discipline literature. There has been a handful of empirical and theoretical studies that investigate the influence of subordinated debt on bank risk, documenting that it disciplines bank managers, mitigates their risk-taking, and prevents gambling activities (Sironi, 2003; Gropp and Vesala, 2004; Niu, 2008; Nguyen, 2013). Borrowing from this literature, this study moves forward with a novel analysis of the role of subordinated debt on banks dividend policy testing three key hypotheses:

(i) *Risk-shifting hypothesis* ï Under this hypothesis, shareholders with high default risk are expected to transfer wealth to their private pockets through distributing dividends at the expense of debtholders. This dates back to two early studies by Jensen and Meckling (1976) and Myers (1977) and has been revisited recently by Acharya *et al*. (2011), Onali (2014), Cziraki *et al*. (2016), and Duqi *et al*. (2020).[23] In this context, we argue that if weak banks with a high share of subordinated debt pay high dividends, this reflects a wealth transfer from subordinated debtholders to shareholders through which leaves debtholders holding an empty shell if the bank defaults.

(ii) *Monitoring hypothesis* ï The market discipline literature suggests that uninsured debtholders can exert a substantial influence in disciplining bank managers from taking risk and counteract moral hazard behaviours (Niu, 2008; Nguyen, 2013). They may impose *ex ante* restrictive covenants limiting dividend payments that have the potential to cause a wealth transfer or equity issuance decisions (Kalay, 1982; Acharya et al., 2017). Hence, we anticipate that if subordinated debtholders play a significant role in reducing dividends for risky banks, this represents a significant ability in imposing greater discipline on these banks thereby mitigating wealth expropriation behaviours.

(iii) *Signalling hypothesis* ï This considers that uninsured creditors (among other market participants) may use bank dividends as an important source of information, signalling liquidity and soundness (Kauko 2012; Forti and Schiozer, 2015). In this case, we

[23] It is worth mentioning that this makes the government facing an agency issue since it acts as an agent of its citizens. Therefore, its role is to induce risky banks to retain earnings in order to boost their capital, limiting the risk-shifting and wealth expropriation behaviour. This means that the legal protection of the country would play a key role on the banksô wealth expropriation behaviour (Duqi *et al*., 2020).

conjecture that banks holding a higher share of subordinated debt have a higher incentive to pay larger dividends to signal their financial health.[24]

An important implication of this line of research is that the value of subordinated debt may lie in its ability to discipline bank mangers not only in what regards to gambling activities but also wealth expropriation activities. This is because market discipline is critically important to the stability of the banking industry, helping to boost efficiency and mitigate bank moral hazard behaviour (Flannery and Bliss, 2019). The international Basel Accords, in turn, have established market discipline as the third key pillar of Basel III for effective bank supervision and regulation; complementing the supervisory and capital elements (Berger et al., 2020). With that in mind, we anticipate that market discipline through subordinated debt monitoring can be a useful addition to the existing regulatory instruments to curb wealth expropriations.

Having established our three key hypotheses, we turn our attention to understanding the intuition behind including subordinated debt, and the channels through which it influences dividend policy. Subordinated debt is defined as ó*unsecured debt that has an original weighted average maturity of not less than five years; is subordinated as to payment of principal and interest to all other indebtedness of the bank, including deposits; is not supported by any form of credit enhancement, including a guarantee or standby letter of credit; and is not held in whole or in part by any affiliate or institution-affiliated party of the insured depository institution or bank holding company*.ô Board of Governors (2000, p. 3). This means that when a bank fails, subordinated debt is the first to absorb losses, after equity, because it is the least senior debt compared to other bank liabilities. During bank failure, it is paid back only after

[24] It is important to note that banks may also use share repurchases for signalling and to supplement dividends. However, since share repurchases are less likely to be an ongoing commitment, unlike ordinary dividends, they may not have the same signalling content of dividends (Allen *et al*., 2012). Unfortunately, due to data availability, we could not include share repurchases in our study, but nevertheless, this is a certain avenue for future studies.

depositors are paid back. Thus, subordinated debtholders could not be sure they would be able to withdraw their funds from a bank whose solvency comes into question. As a result, from subordinated debtholdersô perspective, they have high incentives to monitor risk since their funds serve as a loss absorber. However, they do not reap any gains from bank excessive risk-taking. In contrast, equity-holders are also exposed to losses, but they benefit from upside gains that accrue to excessive risk-taking and thus their incentive for risk is stronger than subordinated debtholdersô incentive. Thus, the heightened need of subordinated debt investors to discipline bank managers and curb excessive risk-taking is similar to that of bank supervisors and in contrast to that of equity-holders. In addition, given that subordinated debtholders are likely to be sophisticated investors, they are relatively more capable of accurately evaluating changes in banksô conditions and react accordingly (Kwast *et al*., 1999; Nguyen, 2013). They may also impose ex ante restrictive covenants limiting dividend payments when the bank is financially distressed (Kalay 1982).[25] Finally, the fact that subordinated debt investors are not able to órunô provides the extra benefit for managers to increase their payout policy and for debtholders to act in good faith on behalf of the bankõs best interest and monitor risk especially during times of stress.[26]

[25] In practice, however, while dividends restricting covenants may be used to limit payments that cause wealth transfer, they can be of limited number and ineffective. Creditors may lack the monitoring incentives alongside with the difficulties in writing complete ex ante contracts. Creditors and shareholders may also underestimate the probability of distress. More importantly, banks may not fully internalise the externalities of their policies which makes it harder to gauge the true economic leverage and financial conditions of the banks (Acharya et al., 2017).

[26] It is important to note that in the post 1988 Basel Accord, bank regulators have standardised subordinated debt contracts, and debt qualified as Tier 2 capital (*i.e.* subordinated debt) could not be redeemed without the approval of Federal Deposit Insurance Corporation (FDIC). Hence, banks issuing subordinated debt became more likely to avoid including covenants that accelerate the repayment of the principal. This, in turn, weakened the relation between the bankõs financial health (or charter value) and contract restrictiveness (Goyal, 2005).

Given these characteristics, some economists have formulated a number of proposals requiring financial institutions to issue a minimum amount of subordinated debt to enhance market discipline. They argue that this can impose direct and indirect market discipline on financial institutions. For example, investorsô monitoring alongside to the increasing cost of subordinated debt issuance may impose direct discipline on a bank when the perceived risk of that bank rises. Indirect market discipline, on the other hand, can be imposed by supervisors from observing the debt price and yield as a trigger for regulatory actions such as: restricting a bankôs activities; cutting dividends (or raising capital requirements); or conducting frequent on-site examinations. Such penalties are anticipated to provide the banking sector with additional incentive to restrain from excessive risk-taking (Nguyen, 2013).

This study tests the impact of subordinated debt on bank dividend policy using Tobit regressions with an instrumental variable (IV) approach (IV-Tobit) to account for endogeneity. We regress our continuous dependent variable dividend-to-equity ratio (*DivEq*) on banksô subordinated debt ratio interacted with a risky-banks dummy and safe-banks dummy, and a broad set of control variables. Constructing a sample of 684 BHC and commercial banks (listed and unlisted), we run all regressions over two distinct macroeconomic periods, the crisis period (2007-2009) and post-crisis period (2010-2015). This helps us draw a key comparison between times of stress and normal times.[27] Then, we rerun comparable regressions for unlisted banks and listed banks separately to contrast our results and reduce the problems associated with our sample heterogeneity. In introducing our key interaction terms, we aggregate risky/weak banks

[27] Previous literature shows that the crisis began in the US in the third quarter of 2007 when the asset-backed commercial paper (ABCP) market deteriorated and ended in the second quarter of 2009 (Ivashina and Scharfstein, 2010). Nonetheless, the present study is guided by Abreu and Gulamhussen (2013) among others in specifying the crisis period 2007-2009.

and treat them as a group, and aggregate safe/strong banks and treat them as another group.[28] Such an approach allows us to draw a key conclusion about the role of subordinated debt across strong banks and weak banks. Recognising that the coefficients on the interaction terms in nonlinear models are not clearly captured by their signs and magnitude (Norton *et al*., 2004), we compute the marginal effects to determine the impact of subordinated debt on dividend payouts. In Section 5, a variety of robustness checks is conducted by mainly substituting the dependent variable by dividend to asset ratio (*DivAs*) alongside to other robustness tests. Our key findings stand up to all our robustness checks.

Our findings corroborate the *monitoring hypothesis* for unlisted banks during the crisis: a higher share of subordinated debt is negatively associated with dividend payouts. However, for listed banks, we find that subordinated debt is a significant facilitator for them to pay larger dividends as a means of wealth expropriation when they are close to default, either during or after the 2007-09 financial crisis. This is in line with the *risk-shifting hypothesis*. Subordinated debt is also associated with larger dividends for safer banks, which is a means of signalling their financial strength. This impact is more pronounced for unlisted banks during the crisis period. In addition, listed banks appear to distribute dividends to signal their future growth opportunities, but the impact is stronger during the crisis period relative to normal times. Taken together, our results suggest that while subordinated debtholders have a vested interest in disciplining risky banks from paying dividends during the crisis, they relax their disciplinary restrictions and have less monitoring incentive during normal times. The discipline exerted by subordinated debtholders is only effective on unlisted banks.

[28] Risky/weak banks are in the lowest 10th percentile based on their solvency (*z-score*), whereby strong/safe banks are above the 25^{th} percentile. This is further elaborated throughout the study.

By examining the impact of subordinated debt on dividend policy, we contribute to two growing strands of literature: the literature on the determinants of banksô payout policy and the literature on market discipline. First, our paper is closely related to a handful of theoretical and empirical studies that examine bank dividend policy in terms of risk-shifting and signalling (*e.g.*, Kanas, 2013; Onali, 2014; Acharya *et al*., 2017; Cziraki *et al*., 2016; Duqi *et al*., 2020). These studies provide mixed evidence on whether banks signal their financial strength (signalling) or exercise wealth transfer behaviour (risk-shifting). They, however, do not account for subordinated debt in their analyses. To the best of our knowledge, our paper is the first to explore the effect of external subordinated debt on payout policy. We also contribute to other studies that examine other dividend theories such as the agency theory (e.g., Easterbrook, 1984; Rozef, 1982; Jensen, 1986; Abreu and Gulamhussen, 2013), Fama and French (2001) hypothesis, and life-cycle theory (*e.g.*, De Angelo *et al*., 2006; Fairchild *et al*., 2014). Our contribution, however, is to extend this literature by accounting for the impact of bank debtholders on bank dividend payouts.

Second, by revealing the role of subordinated debt on dividend policy, we complement previous studies in the market discipline literature calling for the increase use of subordinated debt as a complement to regulatory monitoring, since it is supposed to increase bank monitoring and discipline bank managers and, thus, curb wealth expropriation activities (*e.g.*, Niu, 2008; Chen and Hasan, 2011; Nguyen, 2013). Therefore, our study fits well in the dividend payout and market discipline literature as it builds a bridge between the two strands by exploring subordinated debtholdersô ability to monitor, discipline, and force bank managers to cut their dividends during times of stress and/or normal times.

The remainder of this paper is organised as follows. Section 2 presents a brief review of the literature; Section 3 introduces the methodology, variables and data used in the paper; the main results are provided and discussed in Section 4; robustness checks are presented in Section 5; and Section 6 concludes debating some policy implications.

3.2 Literature Review

The key purpose of this paper is to empirically assess whether subordinated debt has an impact on bank dividend policy. Previous studies on subordinated debt have dealt with the monitoring of banksôrisk-taking to enhance market discipline and, hence, curb excessive moral hazard behaviour. In general, they call for the increasing use of subordinated debt to provide more discipline and help regulators in measuring bank risk. Among these studies, Niu (2008) develops a theoretical model showing that subordinated debt can reduce banksô gambling incentive, providing suggestive evidence that banks should be required to issue a small amount of subordinated debt. Other theories provided by Decamps *et al*. (2004) and Distinguin (2008) document that while subordinated debt helps discipline bank managers and mitigate risk-taking, the disciplinary effect is crucially dependent on national regulations and institutional and legal conditions. Early studies such as Black and Cox (1976), Gorton and Santomero (1990) and Kwast *et al*. (1999) show that since subordinated debt may lose its value if asset risk rises, it renders subordinated debtholdersô incentive to monitor bank risk-taking similar to regulatorsô incentive and contrary to equity holders. Some empirical studies such as Sironi (2003), Gropp and Vesala (2004) and Nguyen (2013) show that a high level of subordinated debt is associated with a low level of bank risk. Similarly, Chen and Hasan (2011) study whether subordinated debt induces investors to monitor bank risk and show that it can be an effective tool to discipline bank managers and to mitigate banksô moral hazard problems. Hence, while the existing literature on subordinated debt provides suggestive evidence on how it alleviates bank risk-taking, the impact of such debt on bank dividend policy remains an open question that we aim at addressing in this paper.

The literature on dividend payout policies, on the other hand, comprises a vast array of studies for the industry sector but little evidence on how payout policy works for banks. Some influential studies emphasize the role of dividends as a risk-shifting mechanism that impinges on the capital structure of the firm (*e.g.*, Acharya *et al*., 2011; Onali, 2010). In the few studies for the banking sector, Kanas (2013) and Onali (2014) investigate bank risk and bank risk-shifting and show that banks with high default risk tend to pay higher dividends, which supports the *risk-shifting hypothesis*. Chu (2018) finds that the shareholder-creditor conflict induces firms to pay out more at the expense of creditors; such effect is stronger for firms in financial distress. More recently, Pugachev (2019) and Koussis and Makrominas (2019) show that risk-shifting is the dominant driver of banksô payout policy. In contrast, Cziraki *et al*. (2016), De Cesari *et al*. (2019) and Duqi *et al*. (2020) find evidence contrary to the *risk-shifting hypothesis*, suggesting that it is unlikely that banks used their payout policy to engage in an active and deliberate wealth transfer as a response to the crisis.

In an attempt to address the risk-shifting concern, Srivastav *et al*. (2014) find that executive incentives, like inside debt, can help in addressing risk-shifting concerns by documenting that CEOs with more inside debt are more likely to cut payouts. Looking at other incentives, De Cesari and Ozkan (2015) show that executive stock option holdings and stock option deltas are associated with lower dividend payments in a sample of European countries. Similarly, Burns *et al*. (2015) find a negative relationship between both option and restricted stock compensation and dividends.

Other researchers have advanced with additional theories on the dividend policy. While Miller and Modigliani (1961) view dividends as irrelevant, dividend policy may be important for signalling or agency cost reasons. For example, Miller and Rock (1985) develop a dividend information model in which dividend announcement effects emerge from the asymmetry of information between owners and managers. Easterbrook (1984) and Jensen (1986) support the free cash flow hypothesis and suggest that dividends help address agency problems between managers and outside investors. Rozeff (1982) examines the agency conflict and finds a negative relation between payout ratios and insider holdings for his unregulated sample. Aivazian *et al*. (2006) consider the incentive conflict between lenders and managers/shareholders by contrasting the relation between dividend smoothing policy and public debt holdings versus bank debt. They find that firms with public debt are more likely to pay dividends than firms with private debt. More recently, Turner *et al*. (2013) provide evidence that the information content of dividends for signalling is more important than agency, catering or behavioural determinants of dividend policy. Moreover, Abreu and Gulamhussen (2013) find that BHCs in the U.S. followed the agency cost and *signalling hypothesis* during the 2007-09 financial crisis.

The importance of the signalling motive in banking is supported in an early study by Bessler and Nohel (1996) who provide evidence of stronger negative effects of dividend cuts in banking with respect to non-financial firms. In the same line, Forti and Schiozer (2015) and Kauko (2012) hypothesize that banks use dividends as signals of stability and growth prospect to depositors. Dividend changes are also important to provide information about the level of future profitability, as documented by Nissim and Ziv (2001). The *signalling hypothesis* is also supported by Goddard *et al*. (2006); however, they argue that the relationship between dividends, corporate earnings, and stock prices is very complex and therefore cannot be explained by a single theory of dividend determination. However, Li and Zhao (2008) find evidence contrary to the signalling theory of dividends. They document that firms that are more subject to information asymmetry are less likely to pay, initiate, or increase dividends, and tend to disburse smaller amounts.

Another traditional approach to dividend policy pioneered by Lintner (1956) argues that dividends are dependent on past and current earnings, and states that managers are very reluctant to omit dividends once they begin. For example, a survey conducted by Lintner (1956) shows that the firmÕs past dividends are the main determinant of current dividend policy, in which a dividend payments series reflects a degree of smoothing. Baker *et al*. (1985) surveyed NYSE firms and find that firmÕs future earnings are a key determinant of dividend policy. In a survey for 384 financial executives, Brav *et al*. (2005) document that the changes in past payout policy are the dominant driver of current dividend payout policy. In addition, Brav *et al*. (2008) document in a survey examining the 2003 dividend tax cut that initiating dividend is highly dependent on the stability of future cash flows.

DeAngelo *et al*. (2006) pay attention to the fact that dividends are paid usually by mature and established firms. They argue that firms with a high earned/contributed capital mix are mature firms with large cumulative profits and thus more likely to pay dividends. Consistent with their financial life-cycle theory, they find that the probability of paying dividends tends to increase with the earned/contributed capital mix. Fairchild *et al*. (2014) find that firms in Thailand considerably support the life-cycle hypothesis rather than the *signalling hypothesis*. Floyd *et al*. (2015) compare the payout policies of US banks to those of industrials and non-bank financial firms over a thirty-year period. They document that banks have a higher and more stable propensity to pay dividends relative to other firms. Meanwhile, Hirtle (2014) documents a different behaviour between large and small BHCs with regard to dividends and repurchases. They find that banks with higher levels of repurchase before the financial crisis reduced dividends later and by smaller amounts.

Identifying the impact of different determinants of dividend policy unambiguously is a daunting challenge. The empirical literature has produced mixed results with only a handful of studies examining the banking sector. The present paper contributes to the discussion of payout policy in the banking sector and disentangles the *risk-shifting hypothesis* by highlighting the role of subordinated debt, which yet has not been examined. This study explores the motives behind the banksô payout policy and whether paying dividends has been used as a means for wealth expropriation in this sector.

3.3 Methodology and Data

This section describes the methodology, data and variables that will be used in the empirical analysis provided in next section.

3.3.1 Empirical approach and description of risk levels

This study focuses on the impact of subordinated debt on dividend policy, aiming at distinguishing between the signalling effect on the one hand, and risk-shifting and monitoring effects on the other hand. A key issue to be addressed is how to examine subordinated debt beyond the signalling level, *i.e.* also accounting for the risk-shifting and monitoring effects. The approach we use pools the data to treat both strong and weak banks as different groups.

Empirically, we begin by introducing our baseline model that investigates the impact of subordinated debt on dividend payouts (see equation 3.1 below). We run our regressions over two different periods, the crisis period (2007-2009) and the post-crisis period (2010-2015). By running our models over two different periods, we investigate whether the strength of debtholders monitoring effort is invariant across different periods, and whether the signalling motive towards debtholders is required in times of crisis and normal times.[29] The estimation of the first model is expected to provide a general idea about the impact of subordinated debt on dividend payouts during different time periods. In our second model, we extend the baseline model by pooling our banks into two groups, on the basis of their risk level (see equation 3.2

[29] We run a Chow test for the crisis and post-crisis periods and the results obtained support the decision to analyse these two time periods separately. The p-value = 0.000 (F = 15.20) rejects the null hypothesis of a stable structure. This justifies separating the data into crisis and post-crisis periods as the parameters will be different for each. See Abreu and Gulamhussen (2013) for a similar example.

below). Specifically, we interact the subordinated debt ratio (*SND*) with two dummy variables that represent risk level, *RiskH* for banks with high risk and *RiskL* for banks with low risk. Hence, for reasons explained below, the second model contains two interactions: *SND*RiskH* and *SND*RiskL*. The equations are expressed as follows:

$$\begin{aligned} Div_{i,t} = {} & \beta_1 SND_{i,t} + \beta_2 AGrowth_{i,t} + \beta_3 Size_{i,t} + \beta_4 ROA_{i,t} + \beta_5 OWNSHIP_{i,t} \\ & + \beta_6 RETE_{i,t} + \beta_7 DDEPAS_{i,t} + \beta_8 CAP_{i,t} + \beta_9 ZScore_{i,t} \\ & + \beta_{10} Pressure_{i,t} + \beta_{11} TBTF_{i,t} + \beta_{12} Loss_{i,t} + \beta_{13} BHC_{i,t} \\ & + \beta_{14} PLC_{i,t} + \mu_{i,t} \end{aligned} \tag{3.1}$$

$$\begin{aligned} Div_{i,t} = {} & \beta_1 SND_{i,t} * RiskH_{i,t} + \beta_2 SND_{i,t} * RiskL_{i,t} + \beta_3 AGrowth_{i,t} + \beta_4 Size_{i,t} \\ & + \beta_5 ROA_{i,t} + \beta_6 OWNSHIP_{i,t} + \beta_7 RETE_{i,t} + \beta_8 DDEPAS_{i,t} \\ & + \beta_9 CAP_{i,t} + \beta_{10} ZScore_{i,t} + \beta_{11} Pressure_{i,t} + \beta_{12} TBTF_{i,t} \\ & + \beta_{13} Loss_{i,t} + \beta_{14} BHC_{i,t} + \beta_{15} PLC_{i,t} + \mu_{i,t} \end{aligned} \tag{3.2}$$

where i and t represent bank and time, respectively. Div is dividend-to-equity ratio (*DivEq*) during the reference year. Our key variable is SND, *i.e.* the bankȏs subordinated debt ratio, measured as the ratio of subordinated debt to total assets. In Equation 3.2, $RiskH$ is a dummy variable that takes the value of one if the bankȏs level of risk, based on *Z-Score* measure, is at the lowest 10th percentile, and zero otherwise. Conversely, $RiskL$ is another dummy that takes the value of one if the bankȏs level of risk is higher than the 25th percentile and zero otherwise.

Interacting those dummies with subordinated debt, we contrast the effect of subordinated debt for high- and low-risk banks, disentangling different hypotheses simultaneously.[30]

More specifically, we examine three key hypotheses: (i) *risk-shifting hypothesis*, (ii) *monitoring hypothesis,* and (iii) *creditors-signalling hypothesis*. A significantly positive coefficient on the first interaction term $SubDebt * RiskH$ ï which pools risky banks in one group ï provides evidence in favour of *risk-shifting hypothesis*, whereas a negative sign lends support to the *monitoring hypothesis*. On the other hand, a significantly positive coefficient on the second interaction term $SubDebt * RiskL$ ï which pools safe banks as another group ï provides evidence consistent with the *signalling hypothesis*, whereby a negative sign might indicate that these banks have no incentives to send signals to their creditors.

3.3.2 Control variables

The two equations contain a similar broad set of control variables to avoid a potential omitted variables problem. At the same time, they are proxies for the additional hypotheses tested in this study, namely Fama and French (2001) hypothesis, agency cost of equity, life-cycle theory, and depositors-signalling hypothesis. In addition, we add the *Z-Score* variable to capture banksô risk, *TBTF* dummy to capture systemic banks, *Loss* dummy to capture monitoring by different stockholders, and *BHC* and *PLC* to control for bank type and the heterogeneity in the sample.

3.3.2.i Fama and French hypothesis

This hypothesis states that large banks that are more profitable and have lower growth opportunities are more likely to pay dividends. Therefore, we include *AGrowth* (historical

[30] It would be a naïve approach to have only the risky banks interaction and assume that the other category (base category) is the group of strong banks. Therefore, we exclude banks between the 10^{th} and 25^{th} from the strong banks group. Importantly, our findings remain the same when we exclude the safe-banks dummy.

growth), which is assets growth, measured as the difference in the natural logarithm of total assets in year *t* and year *t-1*, *Size* measured as the natural logarithm of the bankὂs total assets, and *ROA* is the return on assets ratio and reflects bank profitability. For this hypothesis to hold, the coefficient on both *Size* and *ROA* should be significantly positive, whereas *AGrowth* has to be significantly negative.

3.3.2.ii Agency theory of equity (managers-shareholder conflict)

Banks incur agency costs of equity when shareholders demand higher dividend payouts fearing that managers may allocate the available cash on negative NPV projects or in their own private benefits. Therefore, dividends can be viewed as a potential solution that reduce the agency conflict and force managers to raise external funds from the financial market that, in turn, subject them to higher monitoring from the outsiders. We use a dummy variable *OWNSHIP* that takes the value of unity if there is a shareholder having more than 25% of total or direct ownership, and zero otherwise. A negative coefficient indicates that the agency theory hypothesis holds.

3.3.2.iii Life-cycle theory

This theory states that dividend payouts become increasingly desirable by shareholders as banks mature. As profits accumulate and growth opportunities decline, this renders banks largely self-financing and less reliant on external capital; thus, good candidates to distribute dividends. The study uses the retained earnings as a proportion of total equity (*i.e. RETE* ratio) to address this hypothesis. A positive coefficient implies that banks with high earned/contributed capital mix ï which are mature banks ï are more likely to pay dividends, supporting the life-cycle theory.

3.3.2.iv The depositors-signalling hypothesis (also charter value hypothesis)

One of the main reasons why banks pay dividends is to signal financial strength to their depositors (Kauko, 2012). At the same time, bank depositors are keen to deal with financially stable institutions. Hence, the announcement of dividend omission or even reduction might induce them to review their relationship with the dividend-cutting bank. Accordingly, we include demand deposit to asset ratio (*DDEPAS*) to control for the share of deposits. A positive sign suggests that banks with a high share of deposits are more likely to distribute dividends, possibly triggering the signalling assumption.

It is also important to note that bank deposits have been used in the literature as a measure for banksô charter value, which is also named *franchise value* in the banking literature (De Cesari, 2019; Onali, 2014). The charter value hypothesis states that banks with a high ratio of core deposits curb their risk-taking and risk-shifting via high dividend payments. Specifically, when the threat of market contestability (*e.g.*, new entrants) increases, the charter value of banks decreases, leading them to increase their risk-taking. Hence, shareholders require cash distribution that shifts default risk to creditors (Onali, 2014; Acharya *et al*., 2017). Accordingly, a negative coefficient indicates that banks with high charter values are discouraged from distributing dividends to maintain the charter, consistent with the *charter value hypothesis*.

3.3.2.v Bank capital and regulatory pressure hypothesis

In order to capture the heterogeneity of banksô capital, we include bank capital ratio *CAP*, measured as equity-to-asset ratio.[31] Note that undercapitalised banks in the U.S. are prohibited from paying dividends due to capital adequacy regulations provided in the Prompt Corrective Action (PCA), which curbs banks from distributing cash if close to the regulatory minimum. To capture such effects, the study adds a dummy variable *Pressure* that takes the value of unity if the bank lies in the lowest 5th percentile using *CAP* (equity-to-asset ratio), and represents regulatory pressure imposed on undercapitalised banks. A negative sign on *Pressure* dummy

[31] Due to data availability the study could not use Tier1 ratio or capital adequacy ratio.

implies that banks with low capital tend to retain earnings rather than distributing dividends, consistent with regulatory pressure hypothesis.

3.3.2.vi Other controls

This study also includes some additional control variables. The *Z-Score* (distance-to-default) is used as a measure for bank risk. As discussed earlier, we use *Z-Score* to create our two key dummies that group our banks into two groups, *RiskH* and *RiskL*. Including *Z-Score* captures bank solvency which reflects the stability of bankös performance and capital relative to its income volatility. It shows how many standard deviations of the bankös return on assets have to fall below its anticipated value to become insolvent.[32] We also include *TBTF* dummy, which takes the value one if the bankös total assets is USD 50 billion or above and zero otherwise, to capture systemic banks that play an important role on dividend policy in the market. We also include *Loss* dummy, which takes the value one if the bankös net income is negative and zero otherwise, to help capture monitoring by different stockholders since it also triggers attention (Schaeck *et al.*, 2012). As our sample constitutes a heterogeneous set of banks, we include *BHC* and *PLC* dummy variables to mitigate any problem associated with unobserved heterogeneity. The former, *BHC*, is a dummy that takes a value one if the bank is a bank holding company and zero otherwise, and the latter, *PLC*, is a dummy that takes a value of one if the bank is listed on a stock exchange and zero otherwise. In section 3.4.2.2 we split our sample between unlisted and listed banks to identify any relevant differences between

[32] Note that *Z-Score* is computed using the standard deviation of the *ROA* calculated on a rolling-window of three years including the year 2006 to calculate the value of *Z-Score* for the year 2007. Also note that each period is calculated separately. We still however have the year 2009 overlapping between both periods. To overcome this problem, we substitute *Z-Score* with the ratio of loan loss reserves (*LLP*) and our results remain strongly similar to the main results as will be referred to in Footnote 45.

them. The presence of outliers is minimised by winsorising some variables at the 1% and 99% quantiles.[33] See Table 3.1 for a complete description of the variables and respective sources.

Robust standard errors, clustered by banks, are used to control for heteroscedasticity and any possible correlation between observations of the same bank. In addition, since our dependent variable (dividend-to-equity ratio) cannot have a negative value ï but can have a substantial proportion of zeros (no dividends paid) ï it makes the distribution censored to the left thereby making OLS biased and inconsistent (Wooldridge, 2002). Our dependent variable is zero in 23.3% of the observations for the crisis period and 26.3% for the post-crisis period. Hence, the estimation of an IV-Tobit model arises as the best procedure to deal with this kind of censored dependent variable.

[33] Extreme values/outliers were observed in the following variables: *DivEq*, *AGrowth*, *RETE*, and *CAP*. The remaining variables are not winsorised as their values are in a moderate range.

Table 3.1 *Description of variables*

Variable	Definition
Dependent variables	
DivEq	Dividends-to-total equity ratio for the reference period (%)
DivAs	Dividends-to-total assets ratio for the reference period (%)
Independent variables	
SND	The ratio of subordinated debt-to-total assets for the reference period (%)
MBV (listed banks)	Bank market value (total assets minus the book value of equity plus market capitalisation) over total assets (%)
OWNSHIP	Dummy takes the value one if there is a shareholder having more than 25% of direct or total ownership, and zero otherwise
AGrowth	Assets growth measured as the difference in the natural logarithm of total assets (%)
Size	Bank size measure as the natural logarithm of total assets
ROA	Bank profitability measured as the earnings before tax-to-total asset (%)
DDEPAS	Demand deposit-to-total asset ratio for the reference period (%)
RETE	Retained earnings to total equity ratio for the reference year (%)
CAP	Capital ratio measured as total equity-to-total asset ratio (%)
Z-Score	Bank solvency measured as (*ROA+EA*) over the standard deviation of *ROA* (natural logarithm)
Pressure	Dummy takes the value one if the bank lies in the lowest 5th percentile using *EA*, it represents regulatory pressure
TBTF	Dummy takes the value one if the bankǿs total assets is USD 50 billion or above, and zero otherwise for the reference period
Loss	Dummy takes the value one if the bank's net income is negative and zero otherwise for the reference period
BHC	Dummy takes the value of one if the bank is a bank holding company, and zero otherwise
PLC	Dummy takes the value of one if the bank is publicly listed and zero otherwise
RiskH	Dummy takes the value of one if the banks lies in the lowest 10th percentile using *Z-Score*, and zero otherwise
RiskL	Dummy takes the value of one if the banks lies in the 25th percentile or higher using *Z-Score*, and zero otherwise

Note: The table displays the variables used in this paper. Variables are obtained from BvD Orbis Bank Focus database. Market capitalisation used for calculating *MBV* is obtained from Thomson Reuters.

3.3.3 Endogeneity problem

A key econometric issue that needs to be addressed is the potential endogeneity of a regressor. From a theoretical point of view, there is a causal link from subordinated debt to dividend payout. However, it is acknowledged that subordinated debt is an endogenous choice of a bank. For example, low capital banks or large banks may find it more expensive to increase their capital ratio, leading them to increase their subordinated debt to offset against capital shortages. Similarly, if only strong and sound banks choose to issue subordinated debt, this renders subordinated debt not to be exogenous. Also, by paying higher dividends, banks are exposing themselves to the need to issue more debt to raise money to invest in new and eventually expensive projects. Not addressing these issues leads to inconsistent coefficient estimates and clouds the interpretation of the direction of causality. To tackle this endogeneity problem, the present paper uses an instrumental variables (IV) approach within the IV-Tobit estimations.

In Equation 3.2, since our regressions do not include subordinated debt *per se*, but subordinated debt interacted with two risk level dummies, there are two endogenous variables requiring an instrument each. We employ two instruments in each regression. We use the commercial paper spread (*CPSpread*), *i.e.* the yield on U.S. 3-Month Treasury Bills deducted from the yield on U.S. 3-Month Non-finance Commercial Papers, as instrument for subordinated debt in Equation 3.1 and interact it with the two risk dummies (*i.e.* *CPSpreadxRiskH* and *CPSpreadxRiskL*) to construct the respective instruments.

The instrumentation strategy assumes that *CPSpread* is correlated with subordinated debt (instrument relevance) without directly affecting dividend payout.[34] Therefore, it affects dividend payout indirectly through an impact on subordinated debt (exclusion restriction). *CPSpread* gauges aggregate funding conditions and reflects the cost of short-term borrowing (Birchler and Hancock, 2004). It has a predictive power on default risk perception during macroeconomic uncertainty and, in general, reflects the insured and uninsured debt. For example, subordinated debt held by banks increases when the *CPSpread* is low since at such times uninsured rates offer higher return than insured rates or, in other words, insured rates are quite low at the time. Therefore, banks shift to subordinated debt that generates higher return for their investors and, importantly, low capitalised or large banks would wish to raise their capital through subordinated debt since it is relatively cheaper. During uncertainty, in contrast, *CPSpread* will be high forcing investors to avoid direct risky investments and induce them to

[34] The *CPSpread* is obtained from Datastream over the period 2007-2015.

switch to insured investments (*e.g.*, bank deposits) as a ‘flight to quality’. This, as a result, affects subordinated debt negatively since it is a junior debt and its investors become apprehensive of the risk in the corporate sector (Gatev and Strahan, 2006; Acharya and Naqvi, 2012).[35]

3.3.4 Sample and summary statistics

The dataset used is retrieved from BvD Orbis Bank Focus database. The raw data consists of 775 BHC and commercial banks over the period 2006-2015.[36] We first exclude banks with missing values. Then, we remove banks with negative equity value to avoid negative dividend payout ratio (*DivEq*). Finally, we exclude banks with zero deposit ratio to avoid having nonbank banks, which typically operate a completely different business model to a typical bank. Accordingly, our final sample consists of 684 banks (315 BHCs and 369 Commercial), 451 of which are unlisted banks and 233 are listed banks, over the period 2007-2015. Using *DivEq* as dependent variable (and *DivAs* in the robustness check), we run Equations 3.1 and 3.2 over two different periods: the 2007-09 financial crisis period; and the post-crisis period 2010-2015.

Table 3.2 presents a set of summary statistics for all the variables used in this study for three different periods: full period (2007-2015), crisis period (2007-2009) and post-crisis period (2010-2015). Dividends as a percentage of equity (assets) decreased from 4.66% (0.48%) during the crisis period to 3.6% (0.45%) post-crisis, which is consistent with the evidence in the literature that banks paid larger dividends during the crisis. Subordinated debt

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[35] For every first stage regression, the Angrist-Pischke first-stage F-statistic of excluded instruments is calculated to test whether the instruments coefficients are zero (Angrist and Pischke, 2009). The associated F-statistics in all first stage regressions indicate that our instruments are not weak. See Appendix B, Table B4, to view the F-statistics results.

[36] The year 2006 is included in the raw data to compute *Z-Score* for the year 2007.

appears to have decreased in the post-crisis period, from 0.86% during the crisis period to 0.64%. This is not surprising since the ratio of bank deposits are observed to increase dramatically after the crisis (9.51% versus 14.72% for the post-crisis period), which reflects the fact that banks increased their insured liabilities after the crisis that led to a drop in other liabilities. Consistent with expectations, the growth in banksô assets is higher during the crisis period (12.12% versus 9.96% for the post-crisis period). The deterioration of profitability during the crisis period is well reflected in the data as *ROA* is observed to increase dramatically from 0.75% to 1.26% after the crisis. Consistent with expectations, banksô capital increased a little after the crisis reaching 10.90% compared to 9.95% during the crisis period. In addition, banksô solvency appears higher during the post-crisis relative to the crisis period (3.88 versus 3.49 for the crisis period). Finally, the number of banks with negative net income is higher during the crisis relative to the post-crisis period, which reflect the crisis shock on banksô profitability (18% versus 6% after the crisis in *Loss* dummy).

Table 3.2 *Summary statistics*

Variable	Full Period: 2007-2015					Crisis Period: 2007-2009					Post-Crisis Period: 2010-2015				
	# of obs.	mean	sd	min	max	# of obs.	mean	sd	min	max	# of obs.	mean	sd	min	max
DivEq	5696	3.97	4.89	0.00	26.69	1770	4.66	5.25	0.00	26.69	3926	3.66	4.68	0.00	26.69
DivAs	5696	0.46	1.92	0.00	110.88	1770	0.48	1.10	0.00	25.21	3926	0.45	2.19	0.00	110.88
SND	5696	0.71	1.09	0.00	7.47	1770	0.86	1.24	0.00	7.19	3926	0.64	1.01	0.00	7.47
OWNSHIP	5696	0.60	0.49	0.00	1.00	1770	0.59	0.49	0.00	1.00	3926	0.61	0.49	0.00	1.00
AGrowth	5696	10.63	18.43	-15.86	113.57	1770	12.12	21.03	-15.86	113.57	3926	9.96	17.08	-15.86	113.57
Size	5696	15.25	1.58	9.75	21.67	1770	15.01	1.62	9.75	21.53	3926	15.36	1.54	11.47	21.67
ROA	5696	1.10	2.59	-12.31	119.30	1770	0.75	1.76	-12.31	22.65	3926	1.26	2.87	-11.89	119.30
DDEPAS	5696	13.10	10.60	0.00[37]	86.03	1770	9.51	6.73	0.00	50.18	3926	14.72	11.58	0.00	86.03
RETE	5696	45.70	36.70	-79.86	110.54	1770	49.58	35.10	-79.86	110.54	3926	43.95	37.26	-79.86	110.54
CAP	5696	10.60	3.00	5.21	23.12	1770	9.95	3.13	5.21	23.12	3926	10.90	2.88	5.21	23.12
Pressure	5696	0.05	0.22	0.00	1.00	1770	0.05	0.21	0.00	1.00	3926	0.05	0.22	0.00	1.00
Z-Score	5696	3.76	1.30	-4.43	11.87	1770	3.49	1.45	-4.12	10.42	3926	3.88	1.21	-4.43	11.87
TBTF	5696	0.09	0.29	0.00	1.00	1770	0.09	0.28	0.00	1.00	3926	0.10	0.29	0.00	1.00
Loss	5696	0.10	0.29	0.00	1.00	1770	0.18	0.38	0.00	1.00	3926	0.06	0.23	0.00	1.00
BHC	5696	0.44	0.50	0.00	1.00	1770	0.42	0.49	0.00	1.00	3926	0.45	0.50	0.00	1.00
PLC	5696	0.32	0.47	0.00	1.00	1770	0.30	0.46	0.00	1.00	3926	0.33	0.47	0.00	1.00
RiskH	5696	0.10	0.30	0.00	1.00	1770	0.09	0.29	0.00	1.00	3926	0.10	0.30	0.00	1.00
RiskL	5696	0.75	0.43	0.00	1.00	1770	0.76	0.43	0.00	1.00	3926	0.75	0.43	0.00	1.00

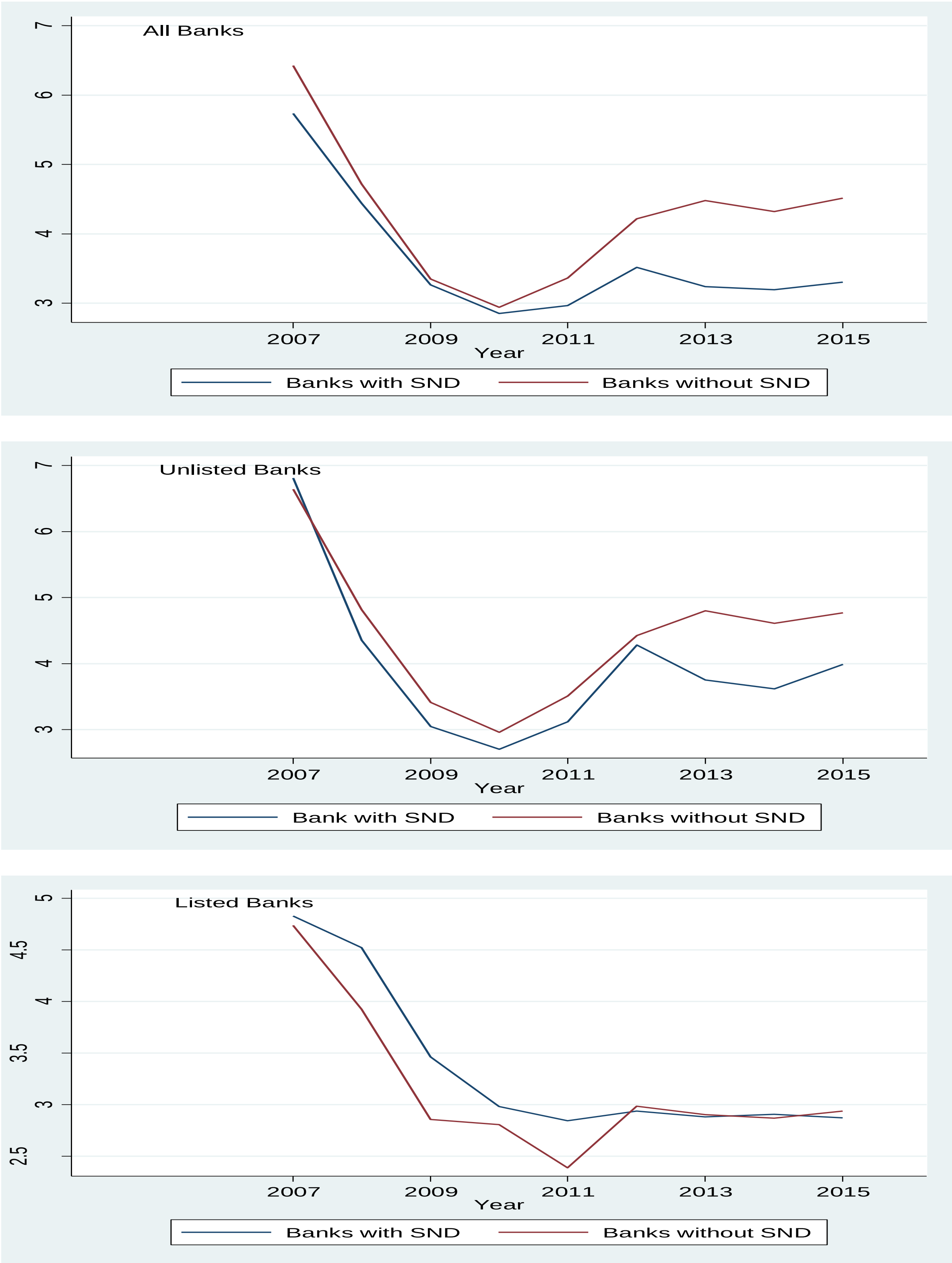
Note: This table displays means, standard deviations, minimums, and maximums for all the variables used to examine the impact of subordinated debt on banksôdividend policy. It distinguishes between the full period (2007-2015), crisis period (2007-2009), and post-crisis period (2010-2015). See Table 1 for variable definitions. Variables winsorised are *DivEq*, *AGrowth*, *RETE*, and *CAP* at the 1% level.

[37] While we exclude all banks with zero demand deposit, the minimum value of zero throughout our classifications is merely a very small ratio that is close to zero (around 0.0002).

To further elucidate the impact of subordinated debt on dividend policy, we split the sample into two groups, (i) banks with subordinated debt and (ii) banks without subordinated debt, both of which are graphed in Figure 3.1. Surprisingly, banks holding subordinated debt pay on average lower dividends than those that do not hold subordinated debt during the full sample period (2007-2015). The average payout ratio for banks that do not hold subordinated debt is observed to increase dramatically after the year 2010, whereas banks holding subordinated debt have their average payout increased slightly in 2011. This might provide evidence consistent with the notion that banks holding subordinated debt have higher monitoring imposed on them by creditors as opposed to their counterparts. This is particularly true for unlisted banks.

However, when we look at listed banks, we observe that banks holding subordinated debt pay higher dividends than those that do not hold subordinated debt. This may provide some evidence in favour of the idea that dividends could be an important source of information that signals to uninsured creditors the banksô liquidity and performance (Kauko, 2012), especially in listed banks. While this is merely a prediction based on graphing the data, the impact of subordinated debt remains an econometric question to be addressed below.

Figure 3.1 *Evolution of dividend payout ratio (DivEq)*



Note: The figure displays three subfigures for the evolution of dividend payout ratio (*DivEq*) over the period 2007-2015 for all banks, unlisted banks and listed banks. The blue line shows the evolution of the dividend payout ratio for banks holding subordinated debt, and the red line shows the dividend payout ratio for banks that do not hold subordinated debt.

3.4 Results and Discussion

This section discusses our main results. First, we investigate the effect of subordinated debt on banksô dividends for all banks (unlisted and listed) and analyse its effect based on grouping strong banks and weak banks. The results are reported in Table 3.3. Then, we discuss our results for unlisted banks and listed banks separately and report the results in Table 3.4.

3.4.1 Does the impact of subordinated debt vary between crisis and post-crisis periods?

Table 3.3 presents the dividend payout findings for subordinated debt during the crisis and post-crisis periods, respectively (see Column 1 and 2). The marginal effects of interest to our analysis are reported in square brackets. Two main results are worth highlighting. First, subordinated debt helped banks to pay higher dividends during the crisis period, as indicated by the positive coefficient on *SND*. Quantitatively, a one percentage point increase in subordinated debt increases banksô dividend payouts, on average, by approximately 0.09 percentage points (see Column 1). Second, subordinated debt strongly explains banksô dividend payout during the post-crisis period, as observed by the positive sign for the post-crisis period. On average, a one percentage point increase leads banks to increase their dividend payout by approximately 0.18 percentage points (see Column 2).

These results provide general interpretations on the economic role of subordinated debt on dividend payouts. A higher share of subordinated debt can help banks to pay larger dividends with an impact more pronounced in significance during the crisis period. This suggests that banks holding high shares of subordinated debt are eager to signal their solvency to creditors by paying higher dividends. However, the difference in magnitude between our periods shows that the effect for the crisis period is very low. Banks used cash distributions to either signal solvency to creditors or as a risk-shifting behaviour. After the crisis, however, such motives have become stronger for banks, indicative that the signalling motive or risk-shifting (or both) might be stronger during normal times. These results do not account for the level of risk, hence not providing evidence in favour of our hypotheses. Nonetheless, they provide evidence on the significant role that subordinated debt plays on bank dividend policy.

Regarding our control variables, the results show that Fama and French (2001) characteristics explain dividend payouts for the post-crisis period, as observed by the negative coefficient on *AGrowth* and the positive coefficients on both *Size* and *ROA* (Column 2). In addition, the life-cycle theory holds in the post-crisis period, as evidenced by the positive sign on *RETE* (Column 2).

Regulatory pressure is observed to be an effective tool in limiting dividend distributions by undercapitalised banks during the crisis, as evidenced by the negative effect on *Pressure*. That is, undercapitalised banks are less likely to distribute their earnings, rather they use them for recapitalisation during stress. Interestingly, bank capital (*CAP*) has a significantly negative impact during the post-crisis period, suggesting that banks with low equity capital pay higher dividends, or alternatively, banks holding higher equity capital pay less dividends.

The dummy *TBTF* exerts a significantly negative impact on dividend payouts and more pronounced during the crisis, suggesting that systemic banks had a strong pressure imposed on them to cut dividends. *BHC* has a negative sign during the crisis period, suggesting that commercial banks are more likely to distribute dividends than their BHC counterparts. Finally, the coefficient on *Loss* dummy shows that banks that incurred net losses reduced their dividends only during the post-crisis period with no impact during the crisis period.

Table 3.3 *Regression results for the effect of subordinated debt on dividend payouts*

	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)
	DivEq	*DivEq*	*DivEq*	*DivEq*
SND	19.51***	-3.915*		
	(5.902)	(2.220)		
	[0.088]	[0.177]		
SNDXRiskH			5.947***	-0.941
			(1.280)	(0.781)
			[0.435]	[0.520]
SNDXRiskL			3.222***	0.599
			(0.764)	(0.723)
			[0.053]	[0.132]
OWNSHIP	6.001**	0.919	1.705**	1.243**
	(2.673)	(0.766)	(0.720)	(0.567)
	[0.284]	[0.569]	[0.325]	[0.587]
AGrowth	-0.0462**	-0.0298***	-0.0441***	-0.0188**
	(0.0218)	(0.0104)	(0.0106)	(0.00759)
	[-0.028]	[-0.008]	[-0.026]	[-0.008]
Size	-2.511**	1.035***	0.242	0.671***
	(1.090)	(0.260)	(0.227)	(0.177)
	[0.342]	[0.312]	[0.340]	[0.324]
ROA	1.771***	0.529**	2.196***	0.512**
	(0.434)	(0.213)	(0.241)	(0.212)
	[1.125]	[0.244]	[1.183]	[0.244]
DDEPAS	0.0304	-0.0222	0.0886**	-0.0316**
	(0.107)	(0.0175)	(0.0344)	(0.0133)
	[0.050]	[-0.014]	[0.051]	[-0.013]
RETE	0.0385	0.0190**	0.0233***	0.0214***
	(0.0272)	(0.00825)	(0.00783)	(0.00673)
	[0.006]	[0.010]	[0.007]	[0.010]
CAP	0.313	-0.488***	-0.227**	-0.295***
	(0.333)	(0.134)	(0.0908)	(0.0820)
	[-0.204]	[-0.139]	[-0.201]	[-0.140]
Pressure	-11.86**	0.638	-2.588**	-0.295
	(5.117)	(1.439)	(1.005)	(1.006)
	[-0.753]	[-0.306]	[-0.761]	[-0.360]
Z-Score	0.797	-0.0266	-0.158	0.324**
	(0.513)	(0.367)	(0.161)	(0.136)
	[-0.168]	[0.234]	[-0.144]	[0.181]
TBTF	-21.19***	-0.454	-4.684***	-3.283***
	(8.013)	(2.002)	(1.289)	(1.024)
	[-1.156]	[-1.578]	[-1.144]	[-1.602]
Loss	0.226	-2.234**	0.714	-2.453***
	(1.790)	(1.034)	(0.845)	(0.858)
	[0.633]	[-1.241]	[0.361]	[-1.160]
BHC	-18.49***	3.065	-3.869***	-0.641
	(5.818)	(2.179)	(0.910)	(0.725)
	[-0.869]	[-0.404]	[-0.801]	[-0.361]
PLC	-1.873	0.574	0.376	0.715
	(2.718)	(0.849)	(0.626)	(0.575)
	[0.500]	[0.345]	[0.475]	[0.326]
Observations	1,770	3,926	1,770	3,926
No of Banks	610	684	610	684
Exogeneity test (Prob>chi2)	0.001	0.055	0.000	0.058

Table 3.3 *Regression results for the effect of subordinated debt on dividend payouts (cont.)*

	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)
	DivEq	*DivEq*	*DivEq*	*DivEq*
p value: Effect of SND for RiskH = effect of SND for RiskL (Wald test)			0.039**	0.074*

Note: The table displays our results of the impact of subordinated debt on dividend payouts during the crisis period (2007-2009) and post-crisis period (2010-2015). The dependent variable is the dividend-to-equity ratio (*DivEq*). See Table 3.1 for variable definitions. Column 1-2 display the results for our baseline model (Equation 3.1), whereas Column 3-4 display the result for our extended model (Equation 3.2). For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Column 3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

3.4.2 Does the impact of subordinated debt vary between risky and safe banks?

Having established that subordinated debt affects banksô dividend payout policy, we now turn our attention to the level of risk through which this effect operates. In this section, we first discuss our results for all banks (listed and unlisted); then we rerun comparable regressions for unlisted banks and listed banks separately to contrast our results.

3.4.2.i Subordinated debt and risk: all banks

Before discussing the results of our extended model, it is important to address a methodological issue arising from the interaction terms between subordinated debt and risk. While the interaction effect in linear regressions can be clearly captured by the sign and magnitude of its coefficient, this is not true in nonlinear models (Norton *et al*., 2004; Berger and Bouwman, 2013). In fact, Ai and Norton (2003, p123) clearly state that ó*the magnitude of the interaction effect in nonlinear models does not equal the marginal effect of the interaction term*.ô On the top of that, it may also be ó*of opposite sign*.ô Accordingly, to ensure correct inferences, we employ a different methodology that accounts for the interactions to compute precise estimates. Specifically, we calculate the marginal effects to show the magnitude of the respective variable, at the mean value of our explanatory variables, for each group of banks separately. For risky banks, the marginal effects are given by $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0, RiskH = 1, RiskL = 0)$; for safe banks, they are obtained from $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0, RiskH = 0, RiskL =$

1).[38] Hence, we estimate the impact of a unit change in an explanatory variable on the dependent variable, conditional on the bank paying dividends ($Y_{i,t} > 0$), given that the bank is either risky ($RiskH = 1, RiskL = 0$) or safe ($RiskH = 0, RiskL = 1$).[39]

Columns 3-4 in Table 3.3 report the results for our extended model (Equation 3.2). We observe two key results. First, during the crisis period, subordinated debt strongly explains bank dividends for both risky and safe banks, as indicated by the positive and significant coefficients on the interaction terms. More specifically, a one percentage point increase in subordinated debt leads to an increase of approximately 0.44 p.p. and 0.05 p.p. on average in dividend payouts of weak and strong banks, respectively (see Column 3). The magnitude of weak banksô interaction term implies that the risk-shifting incentive is quite stronger than the signalling incentive, with a marginal effect being approximately 8 times larger for weak banks. Second, subordinated debt does not have a significant impact during the post-crisis period. These results, when taken together, support two of our three hypotheses: the *risk-shifting hypothesis* and the *signalling hypothesis* hold only during the crisis period, and importantly, no evidence is found in favour of the *monitoring hypothesis* during both periods.

When interpreting these results in the context of theories, meaningful economic interpretations can be provided. Taking the crisis period for example, the role of subordinated debt plays a significant role for both: (i) banks that are safe and (ii) their counterparts that are close to default. The latter seem to use dividend payments to exercise significant wealth transfer from creditors to shareholders. Managers chose to escape the burden of debt and distribute their assets in the form of cash payments, thereby leaving subordinated debtholders holding an

[38] Note that the mean value of subordinated debt is conditional on the level of bank risk. Therefore, the average of subordinated debt for risky banks is conditional on risky banks, and the same applies for safe banks. The results do not vary significantly if this is not conditioned, leaving our main conclusion unchanged.

[39] It is worth mentioning that the marginal effects are calculated using the *predictnl* command in Stata.

empty shell. They employ an asset substitution under which they favour equity holders over debtholders and breach the priority of debt over equity, resulting in substantial negative externalities, especially in periods of economic slowdown. This provides evidence in favour of the *risk-shifting hypothesis*. Another plausible explanation might be that these banks continue paying dividends fearing the adverse effects of dividend cuts that subsequently result in more refinancing problems and uncertainty signals, which is consistent with Acharya *et al*. (2011). Regarding the former (safe banks), subordinated debt appears to have a significant impact on payout policy during the crisis. Acharya *et al.* (2017) show that paying dividends by risky banks has a negative externality on all other banks, leading them to pay higher dividends during an economic downturn. Our results may provide evidence in favour of this argument. While subordinated debt increases the incentive of safe banks to distribute higher dividends as a way of signalling their financial health, it is not surprising that a high share of subordinated debt ï during bank runs and when there is also risk-shifting practised by risky banks ï increases the burden of safe banks to pay larger dividends resulting in an inefficient signalling incentive. The results are further supported by the positive and significant effect of bank deposits on dividend payouts, which is consistent with Kauko (2012), who shows that dividends are used to signal solvency to bank creditors and insured depositors.

When we consider the post-crisis period, we observe that subordinated debt does not have a significant impact on both risky and safe banks. This is especially true because strong banks are relatively less eager to signal their financial health during normal times since there is no bank run or pressure imposed on them to pay larger dividends. In general, these results indicate that subordinated debt is not an effective instrument to monitor risky banks and reduce wealth expropriation behaviour during times of stress. Rather, it provides evidence in favour of the *risk-shifting hypothesis* during the crisis period. Overall, while the results provide a meaningful economic intuition for our main sample, it is important to bear in mind that such findings may be subject to problems associated with considerable heterogeneity across our banks. We address this issue in the next section and restrict the sample to unlisted banks and listed banks separately to represent the influence of subordinated debt for more robust results.

It is also worthwhile to test whether the effect of *SND* on dividend payouts significantly differs across different level of bank risk. For this purpose, we use Wald tests and show the results in Table 3.3 (last row). For both periods, the effect of subordinated debt for risky and safe banks significantly differs from each other. Hence, the impact of subordinated debt seems strong at all times for banks of different risk groups.

Turning to the control variables, the results are consistent with the ones obtained with our baseline model. Some coefficients become more pronounced in magnitude and significance, such as bank deposits *DDEPAS* which appears to have a positive impact during the crisis period, whereby after the crisis it becomes significantly negative at the 10% level, providing evidence in favour of charter value hypothesis.[40] *Size*, however, loses its significance during the crisis period which weakens the assumption of the Fama and French (2001) hypothesis during times of stress. In general, the impact of our control variables remains consistent with the theories and corroborates the conclusions with our key variables.

3.4.2.ii Subordinated debt and risk: unlisted banks versus listed banks

As mentioned earlier, we should be aware of the heterogeneity in our main sample and of the fact that publicly listed banks may have a different impact on our results since their

[40] It is also important to note that during times of stress bank depositors are keen to deal with financially stable institutions. Hence, the announcement of dividend omission or even reduction might induce them to review their relationship with the dividend-cutting bank (Bessler and Nohel, 1996). During normal times, however, banks with a high ratio of core deposits (charter value) curb their risk-taking and risk-shifting via high dividend payments. Therefore, banks with high charter values when there is no bank run are discouraged from distributing dividends to maintain the charter, consistent with the charter value hypothesis.

likelihood to pay dividends is significantly higher than their unlisted counterparts. Therefore, one may wonder whether the results hold in these two sub-sets of banks. Moreover, subordinated debt might not provide the same relative strength of monitoring between unlisted and listed banks (PLC, thereafter). This is because while the problem of information asymmetries exists between lenders and borrowers, as well as between bank managers and bank stockholders (Bessler and Noehl, 1996), unlisted banks may face greater information asymmetries between managers and investors. Therefore, we would expect that subordinated debt have a stronger effect on disciplining unlisted banksô from distributing dividends. Accordingly, we re-estimate our regressions on a subsample of unlisted banks and on a subsample of PLC banks. In some additional estimations, we add *MBV* ratio to further examine the *signalling hypothesis* for our PLC subsample. *MBV* is measured as the market value of bank assets over their book value and account for future growth (see Table 3.1 for further details). It is a key measure to test the *signalling hypothesis* for PLC banks since banksô potential future growth opportunities and performance are well reflected in their market value. It has been used in the literature to test the *signalling hypothesis* (*e.g.*, Li and Zhao, 2008; Allen *et al*., 2012).[41]

The results are reported in Table 3.4; for brevity, the results are only reported for our key variables of interest.[42] Columns 1-2 report the results for unlisted banks and Columns 3-6 report them for listed banks. Interestingly, the results for our subsample show different patterns relative to our previous findings. We obtain three main results. First, a higher share of subordinated debt significantly reduces unlisted weak banksôdividend payouts during the crisis period (see Column 1), whereas for PLC banks it increases their dividends (see Column 3 and 5). In contrast, the post-crisis period shows that subordinated debt induces both unlisted and

[41] Note that due to missing values in market value of banksô assets, our subsample falls to 189 banks in the regressions that include *MBV* (149 during the crisis period and 189 during the post-crisis period).

[42] See Appendix B, Table B3, for the full estimation results.

PLC weak banks to pay larger dividends as a means of wealth expropriation (Column 2, 4, and 6). Second, a higher share of subordinated debt increases dividend payouts for unlisted strong banks during the crisis (Column 1) with no impact on their strong PLC counterparts (Column 3 and 5), whereas after the crisis it only affects those PLC banks (Column 4 and 6). Third, a higher market value explains larger dividend payouts for PLC banks during and after the crisis, with a stronger impact during the crisis period (Column 5-6).[43] Our results indicate that the *risk-shifting hypothesis* and *signalling hypothesis* holds for PLC banks during and after the crisis, while for unlisted banks the *monitoring hypothesis* and *signalling hypothesis* hold during the crisis and the *risk-shifting hypothesis* holds after the crisis.

[43] The marginal effect on the *MBV* ratio shows that a one percentage increase in this variable leads to an approximately 12.73 p.p increase in dividends during the crisis period and a 11.65 p.p increase in the post-crisis period.

Table 3.4 *Regression results for unlisted and listed banks*

	2007-2009 (1) *DivEq*	2010-2015 (2) *DivEq*	2007-2009 (3) *DivEq*	2010-2015 (4) *DivEq*	2007-2009 (5) *DivEq*	2010-2015 (6) *DivEq*
SNDXRiskH	10.70***	-4.104**	2.553***	0.876**	1.317***	1.138***
	(3.522)	(2.020)	(0.886)	(0.371)	(0.427)	(0.427)
	[-0.218]	[0.431]	[0.244]	[0.528]	[0.224]	[0.988]
SNDXRiskL	7.618***	-0.875	0.633*	1.209***	0.276	1.721***
	(1.881)	(1.892)	(0.336)	(0.300)	(0.332)	(0.322)
	[0.247]	[0.114]	[-0.059]	[0.113]	[-0.014]	[0.037]
MBV					16.00***	19.16***
					(2.905)	(3.593)
					[12.727]	[11.647]
Observations	1,237	2,632	533	1,294	427	1,023
No of Banks	422	451	188	233	149	189
Exogeneity test (Prob>chi2)	0.000	0.044	0.005	0.004	0.089	0.000
p value: Effect of SND for RiskH = effect of SND for RiskL (Wald test)	0.385	0.169	0.031***	0.390	0.049**	0.184

Note: The table displays our results of the impact of subordinated debt on dividend payouts during the crisis period (2007-2009) and post-crisis period (2010-2015) for unlisted and listed banks subsamples. The dependent variable is the dividend-to-equity ratio (*DivEq*). See Table 3.1 for variable definitions. Column 1-2 display the results of our extended model (Equation 3.2) for unlisted banks, Column 3-4 display the result of our extended model for listed banks before adding *MBV* ratio, and Column 5-6 displays the results when we add *MBV* ratio. For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Column 3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

We interpret our results with care to view their linkage with theories and the previous findings. PLC banks largely engage in paying dividends, and the amounts of dividends distributed are crucial for potential investors in the market to convey their future growth opportunities. This means that they highly gravitate towards delivering good news to the market as a way of boosting their stock price, benefiting the existing shareholders and attracting new investors. This is contrary to unlisted banks that are likely to focus more on the financial market access and other interbank relations such as risk-mitigation resorts. This also means that the problem of information asymmetry is stronger for unlisted banks relative to their PLC counterparts. Keeping this in mind, our results show that when a bankȏs solvency is questionable, subordinated debtholders appear to have a strong monitoring effect that prohibits only unlisted banks from distributing dividends during stress. In other words, shareholders of these banks cannot take advantage of subordinated debtholders during stress that takes the form of distributing dividends. During normal times, however, subordinated debtholders are observed to relax their monitoring, which in turn induces unlisted banks to pay larger dividends. PLC banks, in contrast, always choose to prioritise equity holders over debtholders and increase their dividend payouts as a means of wealth expropriation. Taken together, this means that subordinated debt is in fact a significant facilitator that can be used by risky PLC banks to pay larger dividends at all times, and by unlisted banks during normal times. Another plausible explanation might be that PLC banks are highly reluctant to subject themselves to negative and destabilising market signals that might result from reducing dividends irrespective to the macroeconomics condition.

Regarding strong banks, a higher share of subordinated debt plays a significant role for unlisted banks to increase their dividend payouts in order to signal their financial strength, but only during the crisis period. Whereas after the crisis, subordinated debt has no significant impact on these banksôdividend policy, possibly because they are relatively less eager to signal their financial health during normal times. Interestingly, subordinated debt for PLC banks does not significantly induce them to pay dividends during the crisis, as opposed to the post-crisis period. This is particularly true when the *MBV* ratio is included in the regression. This is because PLC banks have a lower degree of information asymmetry and they do not need to signal their financial health to their creditors as their market value is a credible signal for the market. In addition, PLC banks with higher market value pay significantly larger dividends to signal their future growth and the impact is higher during the crisis. Guntay *et al.* (2017) show that the power of the informational content in dividends becomes weaker during stress, thereby triggering the signalling incentive for other banks to signal their solvency and future growth opportunities by paying larger dividends. Acharya *et al.* (2017) provide similar notion in favour of this argument. Accordingly, our results show that banks with high market value distribute larger dividends during the crisis period when other risky banks follow a risk-shifting approach.

Whereas during normal times, PLC banks signal their future growth opportunities moderately and focus on signalling their financial health to long-term investors and other creditors as a way of boosting their credibility.

As before, to test whether the impact of subordinated debt on dividend payouts significantly differs across different level of bank risk, we use the Wald test and report the results in Table 3.4 (last row). The results show that for unlisted banks, the effect of subordinated debt does not significantly differs across different level of bank risk during both periods. For listed banks, however, the effect of subordinated debt is significantly different between risky and safe banks in during the crisis period. Hence, the effect for banks of different level of risk seems strongest during times of stress for listed banks.[44]

3.5 Robustness Checks

In order to assess the robustness of our results, we replace our dependent variable dividend-to-equity ratio (*DivEq*) by dividend-to-asset ratio (*DivAs*) and re-estimate our regressions.[45] We begin by running the models to the main sample and report the results in Table 3.5. The results for both unlisted and listed banks are presented in Table 3.6.

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[44] It is important to note that the results for Wald tests are different when the dependent variable is *DivAs*. That is, for both unlisted and PLC banks, the effect of subordinated debt significantly differs across different level of bank risk in both periods. Hence, the effect for banks of different level of risk seems strong at all times for unlisted and PLC banks.

[45] It is worth mentioning that in unreported tests, we addressed eventual endogeneity concerns between dividends and risk and rerun the model with *Z-Score* lagged one year. The results obtained were similar to the main ones reported in the text, suggesting that endogeneity is not really an issue in this case. See Appendix C for the estimation results. In addition, in order to overcome the overlapping year (2009) in computing the *Z-Score*, we replaced it with the ratio of loan loss provision (*LLP*) and obtained similar results. The results are reported in Appendix D.

The results in Table 3.5 are broadly consistent with our main results except that for the crisis period, we find that the for the main sample the impact of subordinated debt for safe banks is still significant but turns negative, weakening our assumption of the *signalling hypothesis* during the crisis period; for the post-crisis period, we find that the impact for risky banks is still insignificant but the effect for safe banks becomes significantly pronounced, giving credit to the signalling assumption. In fact, our results indicate that the *signalling hypothesis* is highly sensitive to the dividend measure used, whereas the *risk-shifting hypothesis* still holds for the crisis period for all banks sample.

Table 3.5 *Robustness Check: All Banks*

	2007-2009 (1) *DivAs*	2010-2015 (2) *DivAs*	2007-2009 (3) *DivAs*	2010-2015 (4) *DivAs*
SND	2.850***	-0.527		
	(0.997)	(0.331)		
	[-0.007]	[0.013]		
SNDXRiskH			1.134***	0.00639
			(0.313)	(0.0970)
			[0.070]	[0.045]
SNDXRiskL			0.326**	0.291***
			(0.138)	(0.105)
			[-0.008]	[0.010]
Observations	1,770	3,926	1,770	3,926
No of Banks	610	684	610	684
Exogeneity test (Prob>chi2)	0.004	0.091	0.000	0.058
p value: Effect of SND for RiskH = effect of SND for RiskL (Wald test)			0.014**	0.017**

Note: The table displays our robustness check results of the impact of subordinated debt on dividend payouts during the crisis period (2007-2009) and post-crisis period (2010-2015). The dependent variable is the dividend-to-asset ratio (*DivAs*). See Table 3.1 for variable definitions. Column 1-2 display the results for our baseline model (Equation 3.1), whereas Column 3-4 display the result for our extended model (Equation 3.2). For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Column 3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

For the second robustness check that examines unlisted banks, we report the results in Table 3.6 (Column 1-2). The results are also consistent with our main findings except for the post-crisis period where we find that impact of subordinated debt on dividend payouts for weak banks loses its significance, albeit still positive, hence weakening our evidence for the *risk-shifting hypothesis* after the crisis. Overall, our findings show that the *monitoring hypothesis* and *signalling hypothesis* strongly hold during the crisis period, whereas the *risk-shifting hypothesis* does not hold during the post-crisis period.

Finally, for PLC banks, the results in Table 3.6 (Column 3-6) are in line with our earlier findings. Specifically, the *risk-shifting hypothesis* holds during both periods. The *signalling hypothesis* holds both during and after the 2007-09 financial crisis. The effect of subordinated debt is more pronounced during the post-crisis period, whereas the impact of *MBV* has proved to be stronger during the crisis. Overall, most of our results hold up in our robustness check analysis and thereby confirming our key conclusions.[46]

[46] While our results are robust, one might wonder whether they are sensitive to the regulatory capital ratio (*i.e.* Tier 1 ratio) and the portfolio risk ratio (risk-weighted assets ratio), given that subordinated debt is also classified as bank capital under Tier 2 capital. While this is a possibility, we are not aware of any empirical anecdote or theories supporting this. In fact, a closely related empirical study by Nguyen (2013) shows that the results do not vary when subordinated debt is scaled by risk-weighted assets. We also argue that our model strongly captures adequate variables that would eliminate such concerns. That is, the inclusion of PCA (*Pressure*) which applies to undercapitalised US banks and the alternative risk measure *LLP* in our Appendix D (see Footnote 45) mitigate these concerns and provide similar results, leaving our main conclusion unchanged. Nevertheless, these are certainly avenues for future research.

Table 3. 6 *Robustness Check: Unlisted banks and listed banks*

	2007-2009 (1) *DivAs*	2010-2015 (2) *DivAs*	2007-2009 (3) *DivAs*	2010-2015 (4) *DivAs*	2007-2009 (5) *DivAs*	2010-2015 (6) *DivAs*
SNDXRiskH	2.049***	-0.322	0.225***	0.0511**	0.120***	0.0743***
	(0.731)	(0.232)	(0.0756)	(0.0242)	(0.0350)	(0.0275)
	[-0.038]	[0.028]	[0.023]	[0.002]	[0.016]	[0.010]
SNDXRiskL	0.796**	0.346	0.0630**	0.107***	0.0241	0.168***
	(0.353)	(0.266)	(0.0281)	(0.0288)	(0.0282)	(0.0320)
	[0.001]	[0.006]	[-0.007]	[0.009]	[0.003]	[0.001]
MBV					1.567***	1.843***
					(0.278)	(0.360)
					[1.279]	[1.191]
Observations	1,237	2,632	533	1,294	427	1,023
No of Banks	422	451	188	233	149	189
Exogeneity test (Prob>chi2)	0.000	0.028	0.001	0.008	0.053	0.000
p value: Effect of SND for RiskH = effect of SND for RiskL (Wald test)	0.059*	0.030**	0.030**	0.055*	0.024**	0.003***

Note: The table displays our robustness check results of the impact of subordinated debt on dividend payouts during the crisis period (2007-2009) and post-crisis period (2010-2015) for unlisted and listed banks subsamples. The dependent variable is the dividend-to-asset ratio (*DivAs*). See Table 3.1 for variable definitions. Column 1-2 display the results of our extended model (Equation 3.2) for unlisted banks, Column 3-4 display the result of our extended model for listed banks before adding *MBV* ratio, and Column 5-6 displays the results when we add *MBV* ratio. For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Column 3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

3.6 Conclusion

This paper evaluates the impact of subordinated debt on the dividend payout policy over a panel of 684 US BHCs and commercial banks during the financial crisis (2007-2009) and the post-crisis period (2010-2015). An IV-Tobit model is used to estimate this relationship. Our results show that a higher share of subordinated debt is associated with a strong monitoring effect that prohibits weak unlisted banks from distributing dividends during the crisis period (*monitoring hypothesis*). We also find that the *risk-shifting hypothesis* holds during and after the crisis for publicly listed banks, whereas for unlisted banks it holds only during the post-crisis period. Regarding the *signalling hypothesis*, evidence points out that subordinated debt is used by unlisted safe banks to signal their financial strength during the crisis period. For publicly listed banks, on the other hand, while the *signalling hypothesis* holds at all times through higher market value, the impact of subordinated debt is only pronounced after the crisis. Interestingly, our results provide suggestive evidence that subordinated debt exert a stronger effect on unlisted banks in what regards to disciplining bank managers. The results are robust to a battery of tests to identify the of role subordinated debt on banksô dividend policy.

Our findings shed light on the economic role of subordinated debt on the payout policy and on how it differs between times of crisis and normal times depending on bankôs risk level. From a policy perspective, our findings show that subordinated debt is a double-edged sword. While it provides a mechanism through which it imposes discipline on weak banks by forcing them to reduce their dividends during financial turmoil (when the market suffers from moral hazard behaviour and contagion effects), this is surprisingly not true for listed banks. In fact, in such circumstances, subordinated debt is used by risky PLC banks as a significant facilitator to pay larger dividends during stress. This is the case because these banks would be more reluctant to reduce dividends as the consequences for them could be more severe than for their unlisted counterparties. In addition, the fact that subordinated debt is used by weak banks to pay higher dividends after the crisis suggests that subordinated debtholders might relax their screening and have less incentive to monitor risky banksô managers during normal times. More importantly, subordinated debt may increase unlisted safe banksô incentives to pay higher dividends during economic downturns due to the heightened need of signalling a stronger stance to the market.

Future studies on the economic role of dividend policy ought to account for the debt component, particularly uninsured debtholders, since the strength of debtholders to affect dividend policy may be greater than that for shareholders. Our paper is in line with regulatory proposals calling for banks to hold a minimum threshold of subordinated debt to reduce moral hazard behaviours, especially for unlisted banks. Moreover, our findings are also in line with studies calling for not only a minimum but also maximum threshold for subordinated debt being a compulsory part in bank capital since it is exploited by banks during normal times as a dividends facilitator. Overall, our findings advise against a one-size-fits-all approach to regulate banks.

Chapter 4
Capital Adjustment and Banksô Balance Sheets:
The role of securitisation

4.1 Introduction

Banksô capital has moved into the regulatory spotlight recently and has received considerable attention since the 2007-09 global financial crisis due to its critical importance for the linkage between financial conditions and real activity. It is considered a powerful tool for developing the resilience of the financial system that oversees objectives related to credit supply. In the past few decades, tremendous changes occurred in the banking sector that led regulators to respond with extensive regulatory reforms to bank activities and capital requirements (*e.g.*, BCBS, 2012; BCBS, 2014). Like any other type of firm, banks adjust their capital to meet a pre-specified target level and their speed of adjustment is inherently higher than non-financial firms (Lepitit *et al.*, 2015). Moreover, as banks are highly regulated firms, the way they meet their target capital causes significant changes to their balance sheet items (*e.g.*, cut lending, deplete liquidity).

However, with the advent of securitisation, the way banks provide and hold liquidity has changed. Unlike illiquid real projects, securitisation has made loans more liquid because banks can pool them together and sell that package to a separate legal entity known as special purpose vehicle (SPV). In theory, this transfers the credit risk off of banksô balance sheets and diversifies the risk over different investors in securitisation markets through a mechanism normally referred to as risk-sharing. Nowadays, more than 60% of outstanding mortgages are securitised, a growth which has increasingly shifted banks from the originate-to-hold model to the originate-to-distribute model. In fact, in the run-up to the global financial crisis, about 40%

of all loans outstanding were financed through securitisation by the year 2007 (Loutskina, 2011). This is mainly due to the fact that securitisation not only boosts banksô lending ability, but also influences economic growth both in the long-run and short-run (Nazir et al., 2018).

This study revisits the issue of how a bankôs capital adjustment affects credit supply and liquidity holdings for banks engaging in securitisation markets. In theory, potential motives associated with the increasing reliance on securitisation are liquidity funding, risk-sharing, profitability, and capital relief. This means that securitisation transactions, in addition to transferring risk off of banksô balance sheets, provide liquidity inflow for banks to either increase their liquidity holdings or fund new loans and, perhaps, engage in riskier lending. With that in mind, banks will also change their optimal target capital to which they adjust whilst proactively adjusting their loan growth and other balance sheet items.

While the literature provides some evidence about whether bank capital and the use of securitisation may impact banksô assets, few empirical studies analyse it from the perspective of either the target capital ratio or the bankôs deviation from that target in the presence of securitisation activities. A clear advantage of using the target capital approach is that it captures the fact that banks have preferences for particular capital ratios that affect their lending and other items on their balance sheets even if the ratios otherwise appear intact (Carlson *et al.*, 2013). This means that it would be inadequate to evaluate the effect of capital regulatory requirements on bank performance using bank capital ratio or the growth of capital ratio. This is the case because banks tend to set their optimal target capital well above regulatory capital thresholds making capital regulatory requirements unbinding (Ayuso *et al.*, 2004). Consequently, these regulations may have less impact on banksô capital adjustment (Berger *et al.*, 2008). Moreover, potential future balance sheet expansions are well reflected in the banksô (unobserved) target capital. This implies that throughout the process of adjusting towards a target capital structure, banksô assets and the size of their operations are likely to expand or shrink at the expense of one another (Lepetit *et al*., 2015). Therefore, in an effort to study the way banks adjust their capital on their operations, this study attempts to determine what would be the impact of such target capital ratios in the presence of securitisation. This allows us to evaluate the role securitisation plays on the way banks react to adjust to their target capital or to meet capital requirements, particularly after the global financial crisis.

To put things into context, an internal shock to bank capital, whether positive or negative, entails not only their credit supply, but also their liquidity holdings. In the presence of securitisation ï an extra source of funding and capital relief ï banks may become less sensitive to such internal shocks. For example, negative shocks (capital shortage) might induce banks to adjust their lending and liquidity holdings at the expense of one another. In addition, a bank might be proactively managing its assets to maintain a constant capital ratio without issuing equity, perhaps, fearing ownership dilution. In this case, a bank might be compelled to reduce the size of its operations in one way or another. However, by engaging in securitisation they might be able to absorb such shortages without the need to shrink their assets. Therefore, it is of paramount importance to test the sensitivity of banksô capital adjustment in the presence of securitisation activities as it remains an open empirical question that has not been accounted for in the extant literature.

The literature contains some empirical studies showing that when banks face difficulties with their capital ratios, they reduce their lending in order to build up their liquidity holdings. It is also established that since the cost of equity is normally perceived by banks to be higher than the cost of debt ï as it is often too costly to raise new shares ï banks may tend to cut down lending rather than increasing capital (*e.g.*, Berger and Udell, 1994; Hancock *et al*., 1995; Thakor, 1996; Jacques and Nigro, 1997; Aggarwal and Jacques, 2001; Dionne and Harchaoui, 2008; Cornett *et al*., 2011). Consequently, if banks can securitise the existing loans as easily as converting liquid assets into cash, they may tend to hold less liquid assets, assuming that loan originations continue to generate higher returns than liquid assets (Loutskina, 2011). The opposite can be anticipated by banks under which they choose to reduce their credit supply and increase their liquidity holdings (*e.g.*, Cornett *et al*., 2011). At the same time, this can also be affected by the bankôs level of capital, *i.e.* whether it is low capitalised or well capitalised. Low capitalised banks are likely to adjust their lending more frequently to absorb output shocks (Gambacorta and Mistrulli, 2004). In contrast, well capitalised banks would be able to absorb capital losses without needing to shrink their assets, and thus lending. For these reasons, the present study also examines the degree of bank capitalisation and the role of the global financial crisis to allow variations on the link between internal capital adjustment and securitisation.

The empirical analysis in this study relies, first, on a partial adjustment framework to estimate a bank-specific and time-varying target equity capital ratio. Hence, we start by determining the bankôs initial position relative to that target by constructing our two key variables of interest: (i) capital surplus ratio and (ii) capital shortage ratio. Next, employing the Blundell and Bond (1998) two-step system GMM estimator, we look at the impact of these variables on two dimensions of bank performance ï asset management and equity capital ï and evaluate the role of securitisation on such relations. For asset management, we examine how banksô liquidity holdings and credit supply change in response to banksô capital adjustment and securitisation. Whereas for equity capital, we look at the changes on the growth ratio of equity to assets in response to these internal capital shocks. Finally, we examine banksô level of capitalisation and the global financial crisis by first introducing a dummy variable for low capitalised banks and then by replacing it with a crisis dummy for the period 2007-2009.

The results of these analyses can be summarised as follows. First, non-securitising banks facing target capital shortages issue equity without cutting lending, whereby highly securitising banks choose to cut their on-balance sheet lending rather than issuing equity; this more pronounced for low capitalised banks. In the case of capital surplus, however, these (securitising) banks prefer to increase their liquidity holdings and, in some cases, may reduce their on-balance sheet lending. During the global financial crisis, banks highly engaged in securitisation raised their equity and reduced their on-balance sheet lending against capital shortages. By extension, banks making use of securitisation increase their commercial and industrial (C&I) loans, and, most importantly, such banks do not significantly reduce their consumer loans to continue granting C&I loans when they are low capitalised. Overall, our findings provide important implications for the implementation of Basel III and the debate on bank lending, liquidity holdings, and capital regulations.

Our study makes three main contributions to the capital structure adjustment and securitisation literature. First, it builds a bridge between the two strands of the literature by exploring how securitisation changes the way banks adjust their target capital and how such changes alter the traditional link between loan supply and liquidity holdings. The literature contains several studies that tied capital structure adjustments to credit supply and other items on banksô balance sheet (e.g., Bernanke and Lown, 1991; Gambacorta and Mistrulli, 2004; Flannery and Rangan, 2008; Berger and Bouwman, 2009; Gambacorta and Marques-Ibanez, 2011; Carlson *et al*., 2013; Lepetit *et al*., 2015; Kim and Sohn, 2017). We extend the previous literature by attempting to determine what would be the impact of capital structure adjustments in the presence of securitisation. Perhaps the most closely related study to our work in this strand of the literature is Lepetit *et al*. (2015), who examine banks asset management, in terms of lending and asset growth, and equity capital growth. The focus on their study, however, is the impact of shareholdersô excess control rights on capital adjustment, whereas our focus is the role securitisation has on these banksô behaviour in response to internal capital shocks.

Second, we contribute to the debate revolving around the post-crisis regulatory capital reforms, which in general have raised a concern of an adverse effect due to negative side effects on banksô operations. More than a decade later ï now in the midst of the COVID-19 crisis ï such concerns still spur significant controversy and debate. Some scholars argue that while holding more capital could prevent potential future crises, it would also jeopardise banksô performance and lead to less lending in order to build up more capital. (Cornett *et al*., 2011; Gambacorta and Marques-Ibanez, 2011; Lepetit *et al*., 2015). The results in this research work are consistent with securitisation being an additional key source of liquidity against capital shocks, which in turn provides key indications on banksô reactions during and after the financial crisis. Therefore, it provides policy implications for the regulatory capital in Basel III and the incentive of banks to comply with these new regulations whether through issuing equity or other asset management tactics.

Third, we also add to the literature that addresses the use of secondary loan sales and securitisation markets. It is well established in this strand that securitisation helps banks to boost their credit supply (e.g., Goderis *et al*., 2007; Hirtle, 2007; Jiménez *et al*., 2010), but may also force them to cut down lending during stress periods (e.g., Carbó-Valverde *et al*., 2012; Irani, 2011). In addition, there has been some empirical predictions arguing that securitisation may reduce banksô liquidity holdings in order to increase lending (e.g., Loutskina and Strahan, 2009; Altunbas *et al*., 2009; Loutskina, 2011; Frankel and Jin, 2015). Alternatively, banks may choose to reduce credit supply and to build up liquid assets (e.g., Cornett *et al*., 2011). Similarly, Di Tommaso (2020) documents that banks use securitisation activities to reconstitute their liquidity or reduce leverage rather than to increase credit supply. The results in our study provide a clear extension over such previous work as we examine the link between target capital and securitisation and its implication on a number of bank indicators, credit supply and liquidity holdings as well as equity issuance. To the authorsô best knowledge, there has been no empirical study examining the impact of target capital and securitisation on such indicators of bank performance for commercial banks.

The remainder of this study is organised as follows. Section 4.2 discusses the theoretical background of securitisation and presents the related literature; Section 4.3 discusses the partial adjustment framework that we use to obtain our target capital ratios; Section 4.4 describes the data, variables used in the regressions, and presents some summary statistics; Section 4.5 introduces the econometric methodology; Section 4.6 explains the results and provides a discussion of the key findings; A battery of robustness tests is conducted in Section 4.7; Section 4.8 concludes and provides important policy implications.

4.2 Theoretical Background and Related Literature

This section provides a brief discussion about securitisation and presents a review of the literature related to securitisation and banksô capital.

4.2.1 Securitisation background

Broadly speaking, securitisation can be defined as a product of a financial engineering process where a group of assets, particularly heterogeneous and illiquid loans, are bundled together and transformed into highly liquid tradable securities and merged into relatively homogenous pools. These pools are then sold to a separate legal entity, the so-called SPV; this SPV is óbankruptcy-remoteô from the assetsô originator, which finances the purchase through issuing new securities backed by the pool. In general, various types of fixed or nearly fixed income contractual debt including, for example, residential mortgages, commercial loans, trade receivables, credit card debt obligations, auto loans, and leases can be securitised and sold to investors. The largest and most well-known example of securitisation is mortgage-backed security (MBS), which is largest segment of the asset-backed securities (ABS) secured by a collection of mortgages.[47] This is because the U.S. Congress created home mortgage agencies (government sponsored enterprises) that issue or guarantee, but not originate, ABS in order to facilitate securitisation and enhance mortgage market liquidity (Altunbas *et al*., 2009).

The two key government sponsored enterprises (GSEs) are the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation or (Freddie Mac). The dramatic growth in the U.S. mortgage market is mainly attributed to the role such GSEs have played. For example, while the U.S. market for all MBS issued (agency and non-agency issued MBS) accounted for approximately USD 6.5 trillion at the end of 2006, MBS issued by GSEs (agency issued) accounted for USD 4 trillion in the same period (Altunbas *et al*., 2009). These GSEs purchase loans either under swap or cash programs (Fabozzi and Dunlevy, 2001; Ambrose *et al*., 2005). In the former, the process consists of a single lender swapping a large pool of loans in return for an MBS collateralised by the collection of loans in the same pool. The cash program, on the other hand, is when smaller pools of loans are purchased by the agency and combined into larger multi-lenders pools in order to issue securities backed by them. Nonetheless, both programs increase liquidity for the loan-originating bank. The swap program, for example, provides the originator a highly liquid asset in the form of an MBS, whereby the cash program generates cash proceeds for the lender to reinvest or allocate them to other internal purposes. In addition, MBS issued under non-GSEs structure generates cash proceeds, which is the net proceeds of transaction costs of selling multi-class securities issued.

[47] It is important to note that the term ABS might be falsely used to refer to securities issued by SPVs backed by non-mortgage assets. The truth is that the term ABS inherently means all issues of securities including not only securities issued by SPVs backed by non-mortgage assets, but also government agency guaranteed MBS and non-government guaranteed MBS (Thomas, 1999).

This means that the financial innovation of securitisation, irrespective to the mode or outlet, generally increases liquidity for the originator (Ambrose *et al*., 2005).

For banks, in general, securitisation helps them to reduce the level of regulatory capital required, particularly, under the implementation of Basel I and II. Since the global financial crisis, however, regulations ruling securitisation markets have changed considerably. A revised securitisation framework, as part of Basel III, was introduced in December 2014 addressing the limitations of previous frameworks (Basel I and II) and reinforcing capital requirements for securitisation exposures. Some of the limitations addressed include insufficient risk coverage, inappropriate risk weights for securitisation exposures, perfunctory dependence on credit ratings, and some weaknesses in capital requirements (BCBS, 2014). Originators and sponsors, for example, must keep a minimum of 5% net economic interest in the originated securitisations, and they are also prohibited from hedging or selling the retained assets (Kara *et al*., 2016). In favour of this notion, recent studies document that banks undertake a more prudent risk behaviour when retaining a securitisation instrument that retains risk relative to instruments that only transfer risk (Carbó-Valverde *et al*., 2015). Some researchers also provide suggestive evidence in favour of the 5% óskin in the gameô rule by effectively reducing the issue of informational asymmetry. In a very recent theoretical paper, Daley *et al*. (2020) develop a model showing that banks apply stricter credit standards and a reduction in credit supply when banks have more óskin in the game.ô Additional limitations addressed stipulate that investors must be aware and informed about the degree of commitment with regards to retention. Banks are also required to disclose any implicit funding support provided to the securitised assets and the capital implications of this provision. The ultimate goal of these regulations is to strengthen banksô resilience to future financial downturns and reduce excessive risk and information asymmetry concern.

4.2.2 Related literature on securitisation and banksô capital

A large volume of the literature examines the general effects of bank capital ratios on banksô loan growth and other items on balance sheets. Some researchers undertake the approach of employing the actual ratios of bank capital (*e.g.*, Bernanke and Lown, 1991; Gambacorta and Mistrulli, 2004; Berger and Bouwman, 2009; Gambacorta and Marques-Ibanez, 2011; Carlson *et al*., 2013; Kim and Sohn, 2017), whereas other researchers employ a second approach where they employ banksô (unobserved) internal target capital ratios (*e.g.*, Hancock and Wilcox, 1993, 1994; Berger and Udell, 1994; Flannery and Rangan, 2008; Berrospide and Edge, 2010; Carlson *et al*., 2013; Lepetit *et al*., 2015). So far, these studies have provided inconclusive evidence about the effects of bank capital and capital requirements, but they also agree in showing some implications on banksô activities. Using the former approach, Bernanke and Lown (1991) find that an increase in equity capital ratio is associated with higher loan growth ratio. Berger and Bouwman (2009) show that higher capital increases large banksô liquidity creation but reduce it for small banks. Kim and Sohn (2017) highlight the important role of bank liquidity on lending capacity and find that liquidity plays a significant role in the relationship between capital and loan growth. Cornett *et al*. (2011), however, document that while more capital has a larger impact on loan growth, these banks may tend to increase their liquidity and decrease lending. Other studies using the same approach (estimated target capital), such as Berrospide and Edge (2010) and Carlson *et al*. (2011), show that an increase in the target capital ratio is associated with a stronger loan growth. In an early study, Hancock and Wilcox (1993) examine the absolute value of bank capital and lending and find that a $1 decrease in bank capital below the regulatory capital led banks to reduce their lending by $3.10. Lepetit *et al*. (2015) include excess control rights in their examination and find that the relationship between target capital and lending is highly affected by control rights.

Following the 2007-09 global financial crisis, details of the impact of securitisation on bank capital requirements and its implications on bank lending behaviour is growing. Part of the literature puts forward the theory of regulatory capital arbitrage, particularly under the implementation of Basel I and to some extent Basel II, that prevailed prior the global financial crisis. Several researchers find evidence in favour of regulatory arbitrage (*e.g.*, DeMarzo, 2005; Karaoglu, 2005; Jackson *et al*., 1999; Calomiris and Mason, 2004; Jobst, 2005; Ambrose *et al*., 2005; Kashyap *et al*., 2008; Parlour and Plantin, 2008; Shin, 2009; Greenlaw *et al*., 2008), while another group of researchers provides evidence that suggests that banks do not necessarily intend to follow a regulatory arbitrage behaviour (*e.g.*, Minton *et al*., 2004; Martín-Oliver and Saurina, 2007). In fact, researchers in the extant literature are not entirely unanimous about the definition of regulatory capital arbitrage. Some scholars point to the opportunistic behaviour arising with a malicious intent to circumvent regulatory capital requirements (*e.g.*, Jackson *et al*., 1999; Jones, 2000; Jobst, 2005; FSF, 2008; BIS, 2008; Borio, 2008). Examining the establishment of conduits by commercial banks, Acharya *et al*. (2013) find evidence in favour of regulatory capital arbitrage by showing that banks did not transfer risk to outside investors making losses remain on banksô balance sheets, and importantly, banks reduced their risk-weighted assets while maintaining the same level of total assets. Ambrose *et al*. (2005), however, argue that banksô incentive might be a reputational concern and not regulatory capital arbitrage. Martín-Oliver and Saurina (2007) also provide evidence to suggest that banks undertake forms of securitisation that do not provide regulatory capital relief and do not shift risk. In this study, while it mainly examines the role of (target) equity capital for banks making use of securitisation, it does not deal with the regulatory capital arbitrage issue per se as it requires an ad hoc analysis. More importantly, the sample period used forms the crisis period and Basel III period where such an issue became less of a concern.[48]

Another strand of the literature that examines securitisation looks at the funding and liquidity motive of why banks perform securitisation and its implications on credit supply and liquidity position. An examination of Spanish banks, by Martìn-Oliver and Saurina (2007) and Cardone-Riportella *et al*. (2010), and of Italian banks, by Affinito and Tagliaferri (2010), provides evidence showing that securitisation is mainly driven by liquidity needs and as a means of alternative funding source. Casu *et al*. (2013) provide a similar conclusion on a sample of U.S. commercial banks. Similarly, Bannier and Hänsel (2008) and Farruggio and Uhde (2015) examine European banks and show that securitisation is mainly triggered by a weak liquidity position.

Numerous studies also look at the role that securitisation has on lending capacity and its link with liquidity holdings. They provide suggestive evidence that securitisation stimulates credit supply by enhancing banksô liquidity position and risk absorption capacity (*e.g.*, Wagner and Marsh, 2006; Duffie, 2007; Frankel and Jin, 2015). Other empirical studies argue that while securitisation has a positive influence on banksô lending ability, it reduces their holdings of liquid securities (Loutskina and Strahan, 2009; Altunbas¸ *et al*., 2009; Loutskina, 2011). For example, Loutskina (2011) finds that while securitisation boosts banksô capacity to supply credit, such banks are observed to reduce their liquid assets holdings. Another strand of empirical studies such as Cebenoyan and Strahan (2004), Goderis *et al*., 2007, Hirtle (2007),

[48] Under Basel I regulations, banks were more prone to engage in regulatory capital arbitrage through securitisation. With the introduction of Basel II in 2006, however, banksô opportunities to engage in regulatory arbitrage has significantly reduced, if not diminished, by applying a óśsubstance over form principleőô (Farruggio and Uhde, 2015). Importantly, Basel III has further eliminated the opportunities to exercise regulatory capital arbitrage for banks with low capital.

and Jiménez *et al*. (2010) provide clear evidence that banks active in securitisation report larger loan growth than their non-active counterparts. In contrast, In contrast, Di Tommaso (2020) shows that securitisation is associated with a reduction in credit supply. Similarly, Irani (2012) and Carbó-Valverde *et al*. (2015) show that banks with higher engagement in securitisation are less willing to increase credit supply during stress periods.

In line with this strand of the literature, recent studies have examined the effects of securitisation markets on credit supply, and in particular what concerns terms of credit quality and risky lending. Keys *et al*. (2010) and Purnanandam (2011), for example, provide suggestive evidence that securitisation leads banks to grant low-quality mortgages. Many studies confirm this view by showing that banks sharply reduced their lending standards in the period leading to the financial crisis (*e.g.*, Mian and Sufi, 2009; Keys *et al*., 2010; Bord and Santos, 2012; DellôAriccia *et al*., 2012; Nadauld and Sherlund, 2013). In line with this conclusion, Calem *et al*. (2010) provide clear evidence of ócream-skimmingô behaviour during the subprime boom period, *i.e.* banks using information not observed by outsiders transfer risk to uninformed, naïve investors. In a similar vein, other studies provide evidence in favour of the argument that banks sell their high-quality loans and retain poorer quality assets on their balance sheets (*e.g.*, DeMarzo and Duffie, 1999; Ambrose *et al*., 2005; Dionne and Harchaoui, 2008; Krainer and Laderman, 2011). By contrast, Wang and Xia (2010), Shivdasani and Wang (2011), and Benmelech *et al*. (2012) examine corporate lending and fail to show that securitisation leads to poor-quality loans. Similarly, Carey (1998) studies the default rates of loans kept in the originatorôs portfolio and find that banks tend to retain loans with lower default rates relative to their securitised loans. Agarwal *et al*. (2012) also show that banks securitised mortgages with higher prepayment risk relative to the ones retained in their portfolios.

Given the previous literature, one may conjecture that understanding the relationship between bank capital and securitisation and the implication of such relationship on banksô balance sheets is still being explored. Furthermore, no study has yet addressed the impact of target capital and securitisation on banksô balance sheets in particular since the global financial crisis. This, in turn, leads to check if and how securitisation enhances banksô liquidity position and lending capacity under different capital shocks. Essentially, this ensures that banks remain viable and continue lending under unobserved capital shocks and future adverse conditions, such as another global recession. To address this gap, the present study uses U.S. commercial banks data from 2007-2018 to empirically quantify the effect of banksô target capital in the presence of securitisation on banksô loan growth and liquidity holdings.

4.3 Empirical Framework: Partial Adjustment Model

This section describes the partial adjustment framework we use to estimate an optimal target capital ratio for each bank and to determine the bankôs initial position relative to that target. In general, the partial adjustment framework presumes that banks set an internally optimal capital target to which they adjust over time. The approach used is similar to the one used by Lepetit *et al*. (2015). More specifically, we start by estimating the target capital ratio for each individual bank to calculate the capital ratio surplus and shortage relative to the estimated target. Then, we examine how banks respond to these capital shocks depending on securitisation involvement.

Empirically, the (unobserved) target capital ratio is a linear function of bank-specific and macroeconomic characteristics (*e.g.*, Hancock and Wilcox, 1993, 1994; Flannery and Rangan, 2008; Berrospide and Edge, 2010; Lepitite *et al*., 2015). Building on previous work, the model can be written as follows:

$$k^*_{i,t} = \varphi X_{i,t-1} + \rho GDPGrowth_{t-1} + \Omega Crisis_t + \tau Year_t + u_{i,t} \qquad (4.1)$$

where k^* is the target level of the bankôs equity capital ratio (equity-to-asset); X is a vector of bank-specific variables that includes the return on assets ratio (*ROA*) to capture profitability since it leads to a higher accumulation in retained earnings and bank capital, the log of total assets to capture bank size (*Size*) and the diversification in banks, and loan loss provision to total loans ratio (*LLPLN*) as a proxy for bank risk since it plays a critical role for regulators as they require higher capital against risky assets (Berrospide and Edge, 2010).

In addition to the aforementioned variables, vector X also includes a dummy variable for securitisation engagement (*SecActive*) to capture the fact that such banks may tend to be large in size and have lower capital since securitisation markets provide banks additional sources of funds; net loans to total assets ratio (*LNTA*) to capture the bankôs engagement in lending activity that require higher capital to offset against different types of loans that in turn affect banksô target capital; the ratio of bank liquid assets (*LIQAS*) as a proxy of liquid funds available to protect banks capital from external negative shocks. GDP growth ratio is also included (*GDPGrowth*) as a proxy for macroeconomic conditions, which captures the fact that there might be pro-cyclicality and counter-cyclicality in banksô behaviour, *i.e.* banks holding lower capital during boom periods and holding additional capital during stress periods, precisely when the credit quality of loans declines. Note that all time-varying regressors are lagged one year to avoid reverse causality. We also include the $Crisis$ dummy that takes the value one for the years 2007-2009 to capture the period of the global financial crisis and its implications on bank capital structure. Finally, $Year$ and u are time and bank fixed effects, respectively.[49]

[49] Note that the year dummies cover the period 2011-2018 thereby making the base year (removed dummy) 2010. It is also worth mentioning that our results remain the same if our year dummies cover the entire period, *i.e.* excluding the crisis dummy.

The model outlined above (Equation 4.1) assumes that banks establish an internal capital target level at which they maintain their equity capital ratio. This is, however, obtained only in a frictionless world, which implies that over time banks adjust only partially to their internal capital target, which results in banks adjusting their equity and assets. Therefore, we employ a partial adjustment framework to account for adjustment costs, under which banks move a constant portion, λ, of the gap between targeted equity capital and the lagged actual equity capital ratio.

$$k_{i,t} - k_{i,t-1} = \lambda({k^*}_{i,t} + k_{i,t-1}) + \eta_{i,t} \qquad (4.2)$$

Note that λ determines the speed of adjustment of equity capital, with a value that lies between 0 and 1; a value close to 1 indicates faster adjustment whereas a value close to 0 indicates slow speed of adjustment, both of which reflect the costly and/or infeasible instantaneous adjustment to the optimal target level. Substituting Equation 4.1 into Equation 4.2 and rearranging yields the model that is estimated as a first step:

$$\begin{aligned} k_{i,t} = (1-\lambda)k_{i,t-1} + \lambda(\varphi X_{i,t-1} + \rho GDPGrowth_{t-1} + \Omega Crisis_t \\ + \tau Year_t + u_{i,t}) + \eta_{i,t} \end{aligned} \qquad (4.3)$$

Employing Blundell and Bond (1998) methodology, Equation 4.3 is used to estimate an average adjustment speed, $\hat{\lambda}$, alongside to a vector of coefficients, which is replaced in Equation 4.1 in order to calculate the fitted values of the targeted equity capital ratio ($\hat{k}^*$) for all banks every year. Next, the actual equity capital ratio is used to calculate its deviation from the estimated target (Gap) as follows:

$$Gap_{i,t-1} = {\hat{k}^*}_{i,t} - k_{i,t-1} \qquad (4.4)$$

In the last step, we distinguish between banks above the target (capital surplus) and banks below the target (capital shortage) by creating a ratio for each separately. More specifically, and following Lepetit *et al*. (2015), we create two variables for Gap: (i) capital surplus ratio and (ii) capital shortage ratio. The former takes the value of Gap for all banks above the target and zero otherwise. In a similar vein, the latter takes the value of Gap for all banks below the target and zero otherwise. For easier interpretation, the absolute value of both variables is taken. Such an approach provides a more comprehensive view of banksô behaviour when they face positive and negative shocks to their internal capital.

4.4 Data, Variables, and Summary Statistics

This section first describes the data and the criteria used to build the sample. Next, it explains the variables used throughout the study. Finally, it discusses the sample and provides summary statistics.

4.4.1 Sample

The data in this study are bank-level data retrieved from BvD Orbis Bank Focus, a commercial database maintained by Fitch and Bureau van Dijk. The process began by constructing a sample of commercial banks located in the U.S. over the period 2007-2018, a period covering the 2007-2009 global financial crisis and the post-crisis period under which new regulations and Basel III are implemented. Whilst constructing the data, all banks with missing values were excluded. Next, the sample was restricted to banks involved in lending, excluding all banks with a ratio of loans to assets below 10% (following, for example, Lepetit *et al.*, 2015). Then, banks with at least 5 consecutive years of available data are kept, for which to have at least 3 years of observations in the final regressions.[50] We end up with a sample of 375 U.S. commercial banks, 299 of which are observed to be active in securitisation and 174

[50] One year of observations is lost for each bank when conducting the partial adjustment framework because the study lags the explanatory variables by one period. Furthermore, another year of observations is lost in the final regressions for the same reason, thereby making the minimum observations equal to three, which makes the GMM estimator viable for instrumenting.

observed non-active (many banks are active at some years and non-active at others). To eliminate the effect of outliers, variables with extreme values are winsorised at the 1% level.[51]

4.4.2 Variables

This section provides a brief description of the dependent variables, key explanatory variables, and other independent variables employed as controls. The three dependent variables are first explained, and then the rest of the variables. Table 4.1 displays all the variables used in this study.

4.4.2.i Dependent variables

This study shows that the way banks react to move towards their target capital or to meet capital requirements matters in the presence of securitisation. This is because capital structure adjustments influence not only their lending capacity but also their liquidity holdings and even equity issuance. Accordingly, this study employs three dependent variables that represent credit supply, liquidity buffer and equity capital. It examines their response to capital shocks in the presence of securitisation. In other words, the aim is to examine whether banks making use of securitisation respond to a capital ratio surplus (shortage) by expanding (shrinking) illiquid loans or liquid assets or by decreasing (increasing) their equity capital. In extreme cases, banks may simply reduce their equity capital by granting more loans or increase it by cutting lending. Banks may also rely on their liquidity buffer and reallocate their assets to adjust their capital and continue lending.

Accordingly, the first dependent variable that captures bank lending is *CGrowth*, measured as the annual change of net loans scaled by total assets (on-balance sheet loans). This computation is very informative and complies with numerous studies in the literature that

[51] The variables winsorised are *CGrowth*, *CCGrowth*, *LIQGR*, *LIQASGR*, *EAGrowth*, *SHETAGr*, *CostIncome*, *NII*, *CIGrowth*, and *ConsumerGr*. See Table 4.1 for variable definitions.

examine banksôlending channel and credit growth. In the robustness checks, this study includes off-balance sheet credit commitments to the computation of bank lending (numerator and denominator) to account for lending occurring off-balance sheet. This is because a credit commitment becomes an on-balance sheet loan once withdrawn by the borrower. Importantly, commercial banks are argued to undertake roughly half of their liquidity creation through off-balance sheet commitments (*e.g.*, Berger and Bouwman, 2009). Therefore, it is of paramount importance to test lending occurring both on- and off-balance sheet.

The second dependent variable that captures bank liquidity buffer is *LIQASGR*, measured by the annual change in liquid assets excluding trading securities, scaled by total assets. In the robustness checks, trading securities are included in the calculation of the *LIQASGR* ratio to examine whether such securities are treated the same way as cash and other liquid assets. This intuition comes from arguments predicting that securitisation reduces banksôholdings of those highly liquid securities (Loutskina and Strahan, 2009; Altunbas *et al*., 2009; Loutskina, 2011).

The third dependent variable is *EAGrowth*, measured as the annual change in total equity including retained earnings and non-controlling interest (if any). Such growth ratio reflects both external recapitalisation (equity issuance or repurchases) and internal recapitalisation (higher or lower earnings retention) of banks (*e.g.*, Lepetit *et al*., 2015). In the robustness checks, this study substitutes it by *SHETAGr*, measured as the growth rate of shareholder equity, which excludes retained earnings and any other non-controlling interest (if any). This ratio better captures external recapitalisation since it accounts only for equity issuance and share repurchases.

4.4.2.ii Independent variables

The key explanatory variables are capital *surplus* ratio and capital *shortage* ratio. As explained in Section 3, these ratios are calculated by estimating a partial adjustment framework using a two-step system GMM estimator (Blundell and Bond, 1998; Roodman, 2009). Each variable takes the value of the gap between the (unobserved) target capital and lagged actual equity capital. Capital *surplus* ratio takes the value of the gap if the bank is above the target and zero otherwise, whereby capital *shortage* ratio takes the value of the gap if the bank is below the target and zero otherwise (*e.g.*, Lepetit *et al*., 2015).

Turning to other explanatory variables, the present study builds on earlier literature and account for securitisation by creating two dummy variables that are used one at a time (*e.g.*, Kara *et al*., 2016): the *Active* dummy that takes the value one if the bank is active in securitisation, and zero otherwise; the *High* dummy that takes the value one if the bankǿs level of securitisation activity (as a percentage of total assets) is above the median value of all banks active in securitisation (*e.g.*, excluding non-active banks), and zero otherwise.[52] Such an approach provides a better picture for the contrast between banks that make use of securitisation and those that do not, on the one hand, and between those that rely heavily on securitisation and those that rely less heavily on securitisation, on the other hand. This is in line with the evidence provided in the literature, which show that the level of engagement in securitisation market is important. Kara *et al*. (2016), for example, show that banks that are less active in securitisation markets lower their lending standards more aggressively relative to their peers that are highly active in securitisation. Therefore, for the purpose of our analysis, we use these dummies since they provide us more scope for interpretation. More precisely, this study first insulates the behaviour of banks making use of securitisation from their non-active counterparts. Then, to ensure better inference for the effect of securitisation, it insulates banks

[52] The use of the median might be argued to be arbitrary, but it is still considered a practical threshold and the present study follows earlier studies in the literature that apply a similar approach. See Kara *et al*. (2016) for similar example.

making high use of securitisation from the rest of banks since these banks may have different attributes, *i.e.* they can be larger in size and lower capital buffer.

The control variables also include other bank-specific and macroeconomic regressors. Non-interest income ratio (*NII*), measured as non-interest income to operating income, is a proxy for banking activity diversifications. It reflects how banks that heavily rely on non-interest income as a principal source of revenue ï and are able to securitise ï generate higher income that allows them to increase their liquidity or stimulate their comparative lending capacity and, thus, achieve economies of scale (Affinito and Tagliaferri, 2010).

The ratio of customer deposits (*CDEPAS*) is a proxy for funding structure and liquidity funding risk, measured as customer deposits to total assets. The literature shows the important role of bank deposits on different bank indicators. Some theories predict that banks relying more on deposit funding are less likely to reduce lending much less than wholesale funding (Ivashina and Scharfstein, 2010). In addition, other theories suggest that bank with higher capital may crowd out deposits and impact liquidity creation (Berger and Bouwman, 2009). Therefore, it is of paramount importance to account for the share of deposits in our regressions.

The ratio of cost to income (*CostIncome*) is included to account for performance and risk management efficiency since banks with lower cost to income ratio are more prone to profit more and expand their assets (Farruggio and Uhde, 2015). Therefore, it is anticipated that banks with higher efficiency are more able to raise and provide liquidity and less likely to issue capital.

PLC is a dummy variable for public listed banks, which takes the value one if the bank is listed on stock exchange, and zero otherwise. This variable is important to differentiate public banks from private banks since the former are assumed to have higher transparency with easier access to the financial market, which in turn plays a significant role on their liquidity management and equity issuance. *TBTF* is a dummy variable for too-big-to-fail banks, which takes the value of one if the bankôs gross total assets exceed USD 50 billion. It captures the fact that these banks have more privileges knowing that they are more likely to be bailed out when needed. This implies that such banks are less likely to issue equity, and being TBTF also plays an ambiguous role on the way banks provide and hold liquidity since they are also subject to stricter supervision relative to their non-TBTF counterparts (Berger and Bouwman, 2013).

Finally, two macroeconomic variables are used to account for the economic environment: *GDPGrowth* and *IBRate*. The former is the growth rate of real GDP that captures the market conditions and changes in loan demand Berrospide and Edge (2010). The empirical literature has confirmed its significant role on banksô assets and its indirect role to assess the pro-cyclicality of bank capital. It also allows capturing loan demand across year (*e.g.*, Loutskina, 2011). The latter macroeconomic variable is the three-month interbank rate that captures the actual cost of external funding and monetary policy. It tests how aggregate funding shocks impact the supply of loans and liquidity holdings (Loutskina and Strahan, 2009). Therefore, it significantly impacts banksô liquidity and the cost of issuing new equity relative to debt financing.[53]

[53] Note that the *Fed Rate* was used and the results obtained were similar to the main results.

Table 4.1 *Description of variables*

Variable	Definition
CGrowth	The first difference in the natural logarithm of loans to total assets ratio
CCGrowth	The first difference in the natural logarithm of loans to total assets ratio including committed credit line
LIQASGR	The first difference in the natural logarithm of liquid asset to total assets ratio
LIQGR	The first difference in the natural logarithm of liquid asset to total assets ratio including trading securities
EAGrowth	The first difference in the natural logarithm of total equity to total assets ratio
SHETAGr	The first difference in the natural logarithm of equity to total assets ratio excluding retained earnings
Surplus	The absolute value of the difference between the fitted and the lagged values of the ratio equity capital to total assets when the bank is above the target and zero otherwise (see Section 4.3)
Shortage	The absolute value of the difference between the fitted and the lagged values of the ratio equity capital to total assets when the bank is below the target and zero otherwise (see Section 4.3)
SecActive	Dummy takes the value one if the bank is active in securitisation during the reference year
High	Dummy takes the value one if the bank's level of securitisation is above the median value of all banks active in securitisation during the reference year
NII	Non-interest income to operating income ratio
CDEPAS	Customer deposits to total assets ratio
CostIncome	Cost to income ratio
PLC	Dummy variable that takes the value one if the banks is listed in a stock exchange
TBTF	Dummy variable that takes the value one if the bank's total assets equals or exceeds USD 50 billion - Too-Big-To-Fail
EA	Total equity to total assets ratio
ROA	Net income before tax to total assets ratio (Return on asset ratio)
Size	Natural logarithm of the bank's total assets
LLPLN	Loan loss provision to total loans ratio
LNTA	Net loans to total assets ratio
LIQAS	Liquid assets to total assets ratio
LIQAFT	Liquid assets to total assets ratio including trading securities
GDPGrowth	The annual percentage change of real GDP per capita
IBRate	The three-month interbank rate
CIGrowth	The first difference in the natural logarithm of commercial and industrial loans to total assets ratio
ConsumerGr	The first difference in the natural logarithm of consumer loans to total assets ratio

Note: The table displays the variables used in this study. The variables are obtained from BvD Orbis Bank Focus database except for *GDPGrowth* and *IBRate*, which were obtained from Datastream.

4.4.3 Summary statistics and trends

As a preliminary step towards the main analyses, this section provides some summary statistics and contrasts the characteristics of banks active in securitisation with their non-active counterparts. Table 4.2 shows that both loan growth ratios, *i.e. CGrowth* and *CCGrowth*, are higher for banks that do not rely on securitisation: 16.19% versus 12.36% for securitising-banks; and 0.54% versus 0.40% for securitising banks, respectively.[54] Looking at C&I loans ratio and consumer loans ratio, we observed that securitising banks, in addition to having higher consumer loans, grant commercial loans well above non-securitising banks. More specifically, the mean value of *C&ILoans* is 0.69% for securitising banks versus -1.54% for non-securitising banks, whereas for *ConsumerGr* it is -4.22 for securitising banks versus -5.91% for non-securitising banks. These results are in favour of theories predicting that securitisation allows banks to indulge in greater and riskier credit supply since commercial loans are normally harder to securitise and their amount is larger in nature with a higher risk-weight and risk of default rate. For example, this is in line with James (1988) who shows that banks engage in off-balance sheet activities increase their commercial loans as they shield banks from the ''under-investment'' issue for banks granted risky debt a *priori*. Moreover, it is observed that securitising banks have lower liquid assets than non-securitising banks, respectively, -0.90% versus -0.80%. However, this is not true when trading assets are included in the ratio as shown by the mean value on *LIQGR*, -0.76% versus -0.83% for non-securitising banks. This suggests that securitising banks do not reduce their highly liquid trading securities inasmuch as they reduce their cash and other liquid assets. Another significant difference is the growth rate of equity capital, with the mean value of total equity-to-asset growth (1.20%) being approximately twice larger than non-securitising banks (0.61%). This is observed in both of our equity capital growth ratios, *EAGrowth* and *SHETAGr*.

Consistent with expectations, the ratio of non-interest income (*NII*) shows that banks making use of securitisation have higher non-traditional income ratio (25.77% versus 21.15%

[54] We examine each year growth for lending and liquid assets (including securities) and find that the reason why non-securitisation banks have higher credit growth than their active counterparts is because banks active in securitisation reduced their lending much more than non-securitising banks and substantially increased their holdings of securities as a response to the crisis, which is in line with Cornett *et al*. (2011).

for non-securitising banks). Further, the ratio of cost-to-income appears higher for securitising banks (62.37% versus 61.01% for non-securitising banks), suggesting that non-securitising banks are slightly more efficient relative to their securitising counterparts. The ratio of customer deposit shows that non-securitising banks have a very slightly higher ratio than securitising banks (79.34% versus 78.50% for securitising banks). Interestingly, bank profit for securitising banks is not necessarily higher than non-securitising banks as the return on assets ratio is even higher (albeit slightly) for non-securitising banks (1.46% versus 1.28% for securitising banks). Finally, it is observed that a notable difference is bank size, with the mean value of total assets for securitising banks ($41 billion) roughly 6 times larger than non-securitising banks ($6 billion). This is consistent with the literature documenting that larger banks are more likely to engage in securitisation markets to achieve economies of scale (Minton *et al*., 1997; Minton *et al*., 2004; Jiangli and Pritsker, 2008).

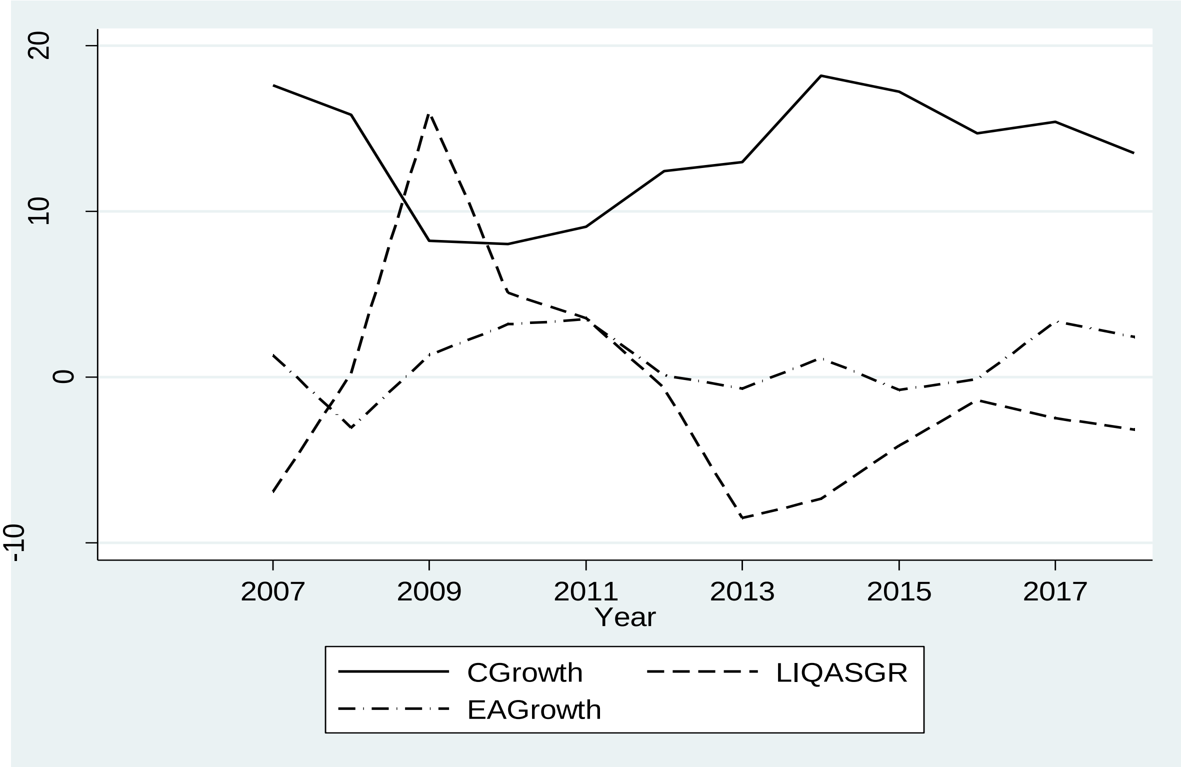
Figure 4.1 presents the evolution of the three key dependent variables over the period 2007-2018. The solid line shows the trend of banksô credit growth (*CGrowth*), the dashed line shows the trend of banksô liquidity holdings (*LIQASGR*), and the dashed-dotted line shows the evolution of banksô equity capital ratio (*EAGrowth*). Credit growth and liquidity holdings growth show a different trend relative to each other. Note that while banks liquidity holdings reach its peak during the global financial crisis (around 2009), banksô credit growth is observed to plunge during the same period. This is consistent with theories that banks cut down lending and increased their liquidity holdings during the crisis period. Additionally, the growth in banksô equity capital ratio is well reflected throughout the crisis until the year 2011, which reflects the fact that banks were urged to increase their capital in response to the financial crisis.

Table 4.2 *Summary statistics*

	All Banks				Securitisation Active Banks				Non-Securitisation Banks			
	mean	sd	min	Max	mean	sd	Min	max	mean	sd	min	max
CGrowth	13.65	24.98	-19.18	191.58	12.36	23.37	-19.18	191.58	16.19	27.72	-19.18	191.58
CCGrowth	0.44	7.37	-25.74	27.60	0.40	6.71	-25.74	27.60	0.54	8.53	-25.74	27.60
LIQASGR	-0.86	25.52	-76.53	98.73	-0.90	23.41	-76.53	98.73	-0.80	29.26	-76.53	98.73
LIQGR	-0.78	22.02	-68.92	84.97	-0.76	20.24	-68.92	84.97	-0.83	25.18	-68.92	84.97
EAGrowth	1.00	11.43	-38.88	41.40	1.20	10.67	-38.88	41.40	0.61	12.81	-38.88	41.40
SHETAGr	1.09	10.95	-40.73	39.41	1.29	10.23	-40.73	39.41	0.70	12.22	-40.73	39.41
Surplus	0.72	2.18	0.00	57.89	0.66	1.77	0.00	47.01	0.85	2.81	0.00	57.89
Shortage	0.76	0.99	0.00	10.25	0.72	0.93	0.00	6.41	0.86	1.10	0.00	10.25
SecActive	0.66	0.47	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00
High	0.33	0.47	0.00	1.00	0.50	0.50	0.00	1.00	0.00	0.00	0.00	0.00
NII	24.22	15.56	-3.31	86.18	25.77	14.38	-3.31	86.18	21.15	17.26	-3.31	86.18
CDEPAS	78.78	9.85	0.00	94.42	78.50	8.31	0.09	94.11	79.34	12.32	0.00	94.42
CostIncome	61.92	14.98	14.84	126.74	62.37	13.30	14.84	126.74	61.01	17.82	14.84	126.74
PLC	0.05	0.21	0.00	1.00	0.03	0.17	0.00	1.00	0.08	0.27	0.00	1.00
TBTF	0.08	0.26	0.00	1.00	0.10	0.30	0.00	1.00	0.03	0.17	0.00	1.00
EA	11.16	3.72	4.15	91.70	11.16	3.32	4.23	50.33	11.17	4.40	4.15	91.70
ROA	1.34	1.66	-15.27	36.37	1.28	1.49	-15.27	36.37	1.46	1.95	-11.35	17.11
Assets	29501297	1.63e+08	41802	2.22e+09	41053494	1.99e+08	77624	2.22e+09	6627311	16866717	41802	1.59e+08
Size	15.14	1.53	10.64	21.52	15.39	1.58	11.26	21.52	14.63	1.27	10.64	18.89
LLPLN	1.55	1.20	0.00	20.71	1.56	1.23	0.01	20.71	1.52	1.14	0.00	10.97
GDPGrowth	1.65	1.46	-2.54	2.93	1.71	1.42	-2.54	2.93	1.52	1.54	-2.54	2.93
IBRate	1.23	1.44	0.23	5.30	1.22	1.40	0.23	5.30	1.26	1.52	0.23	5.30
CIGrowth	-0.03	19.99	-66.15	79.28	0.69	19.27	-66.15	79.28	-1.54	21.34	-66.15	79.28
ConsumerGr	-4.77	32.08	-100.34	140.54	-4.22	31.41	-100.34	140.54	-5.91	33.41	-100.34	140.54

Note: The table displays summary statistics for the variables used in this study. It shows three panels: All Banks, Securitisation Active Banks, and Non-Securitising Banks. The variables winsorised are *CGrowth*, *CCGrowth*, *LIQASGR*, *LIQGR*, *EAGrowth*, *SHETAGr*, *NII*, *CostIncome*, *CIGrowth*, and *ConsumerGr*. See Table 4.1 for variable definitions.

Figure 4.1 *Evolution of lending, liquidity, and equity capital*



Note: The graph presents the trends of the three dependent variables over the period 2007-2018. The solid line shows the banksôcredit growth, the dashed line shows the growth ratio of banksôliquidity holdings, and the dashed-dotted line shows the growth ratio of banksôequity capital. See Table 4.1 for variable definitions.

4.5 Methodology

To determine how internal capital adjustment influences banksô asset management and equity issuance via securitisation, this study estimates the model below. We first investigate the response of loan growth to capital adjustment and securitisation. Credit growth is used as the dependent variable in this analysis. Then, we investigate the role of liquid asset holdings and equity capital. In this case, we use growth ratio of liquid assets and the growth ratio of equity capital as successive dependent variables. This can be written as follows:

$$Y_{i,t} = [a_1 + \beta_1(SecActivity_{i,t})] * Surplus_{i,t-1} + [a'_1 + \beta'_1(SecActivity_{i,t})] * Shortage_{i,t-1} + \delta Y_{i,t-1} + \theta Z_{i,t-1} + \varphi V_{t-1} + a_0 + \xi Crisis_t + \tau Year_t + \varepsilon_{i,t} \quad (4.5)$$

where Y is the dependent variable that accounts either for credit growth (annual change in net loans), liquid assets growth (annual change in liquid assets excluding trading securities), or total equity growth (annual change in total equity), all scaled by total assets. $Surplus$ and $Shortage$ are, respectively, the ratio of capital surplus or capital shortage as computed in Section 3. $SecActivity$ is a set of two dummy variables that we use, one at a time. The first dummy is $Active$, which takes the value of one if the bank is active in securitisation, and zero otherwise. The second dummy is $High$, which takes the value of one if the bankôs securitisation level is above the median value of all banks active in securitisation (excluding non-active banks). The base category (removed dummy) includes not only banks below the median but also non-active banks. Using such dummies helps us to draw a comprehensive picture of different levels of securitisation and to understand its link with capital adjustment. Z is a vector of bank-specific variables that includes, in addition to $SecActivity$, the ratio of customer deposits to assets (*CDEPAS*) as a proxy for funding structure, non-interest income ratio (*NII*) as a proxy for income diversification, cost to income ratio (*CostIncome*) as a proxy for performance and efficiency, a dummy variable for public listed banks (PLC) that takes the value of one if the bank is listed on stock exchange, and a dummy variable for too-big-to-fail banks (*TBTF*), which takes the value one if the bank total assets exceeds USD 50 billion (and zero otherwise); V is a vector of macroeconomic variables that includes the growth rate of real GDP (*GDPGrowth*) and the three-month interbank rate (*IBRate*). Note that all time-varying explanatory variables are lagged by one period to prevent potential endogeneity problems that might arise from simultaneity. Finally, we include a $Crisis$ dummy, which takes the value one for the observations in 2007-2009, to capture the global financial crisis; $Year$ dummies are time fixed effects.[55]

In the analyses, the study employs the Blundell and Bond (1998) two-step system GMM estimator to estimate the coefficients of the dynamic panel model in Equation (4.5). This is because the inclusion of the LDV among the regressors makes OLS and other panel data estimators, such as fixed and random effects, biased and inconsistent. GMM corrects for potential endogeneity, autocorrelation, and heteroscedasticity, which in turn makes it a superior estimator compared to the conventional estimators. It uses as instruments the lagged values of the dependent variable and the exogenous variables, which in turn eliminates the need for external instruments. More specifically, it uses lagged first differences as instruments for the level equation, whereas in the differenced equation it uses lagged levels as instruments. The option ǿcollapseô is used to limit an instrument proliferation problem (Roodman, 2009). In order to check the validity of the GMM instruments, the Hansen test and the Arellano and Bond test for the second order autocorrelation are used, which, respectively, test for the exogeneity of all the instruments as a group and the absence of second order residual autocorrelation.

4.6 Results and Discussion

This section first examines how banksô asset management (loans and liquid assets) and equity capital change in response to the link between securitisation and internal capital

[55] Note that the year fixed effects are included for the years 2011-2018 as the earlier period is captured through the crisis dummy for the period 2007-2009. It is also worth mentioning that our results remain the same if our year dummies cover the entire period, *i.e.* excluding the crisis dummy.

adjustments. Then it investigates how capitalisation and the financial crisis influence such a relation.

4.6.1 Impact of securitisation and adjustment toward target capital ratio

Table 4.3 shows the estimation results of Equation 4.5. In both panels, Panel A and B, Column 1 reports the results when our dependent variable is the ratio of loan growth, Column 2 reports the results for the growth ratio of liquid assets, and Column 3 reports the results of the growth ratio of total equity, all scaled by total assets. Panel A presents the results when the dummy $Active$ is used, whereas in Panel B it is replaced by the dummy $High$.

We first discuss the results for non-securitising and less-securitising banks and then high-securitising banks. We find that non-securitising banks and banks that are less active in securitisation generally expand their credit supply, but not their liquidity holdings, in response to an internal capital surplus. At the same time, they are also reluctant to increase their equity capital whether through internal retained earnings or external equity issue. This is intuitive since non-active banks may be controlled by family and other sort of shareholders that fear ownership dilution. Quantitatively, when the capital ratio surplus increases by one percentage point, credit growth increases, on average, by 1.79p.p (Column 1 Panel A) and the equity ratio decreases by around 0.82p.p, ceteris paribus (Column 3 Panel A), without affecting liquidity holdings. The corresponding figures in Panel B, when low-securitising banks are included in the base category (removed dummy), are a 1.15p.p increase in credit growth (Column 1) and a 0.73p.p decrease in equity ratio (Column 3). Note that the economic significance is lost in credit growth regression in Panel B, suggesting that the existence of low-securitising banks weakens the impact of internal capital surplus on lending growth.

When these banks encounter an adverse capital shortage, however, they both continue their loans supply and, at the same time, raise their equity capital. Specifically, a one percentage point increase in capital shortage ratio leads to a 2.19p.p increase in credit growth and a 2.92p.p increase in equity growth for non-securitising banks. The corresponding figures for Panel B are 2.20p.p and 2.55p.p, respectively. The impact for lending growth, however, appears statistically significant in Panel B when low-securitising banks are included in the comparison between coefficients (removed dummy). This means that banks that engage in securitisation markets at low levels are more likely to continue their lending when they face a shortage in their internal target capital. In addition, the fact that capital is more pivotal for non-securitising banks (and less active banks), it is intuitive that these banks react to capital shortage by growing their equity capital since it is as important as other sources of funds for them.

Regarding high-securitising banks, they respond to capital surplus by cutting lending significantly and choose to build up their liquid assets holdings with no impact on their equity capital. This means that such banks prefer to build their liquidity buffer at the expense of cutting lending and without issuing equity capital. Quantitatively, Panel B shows that a one percentage point increase in capital surplus ratio leads to a 0.07p.p decrease in credit growth and, importantly, a 1.10p.p increase in liquid assets, but does not affect equity capital. However, when these banks are having shortages in their target capital, unlike non-securitising and low-securitising banks, they contract their credit supply significantly without necessarily adjusting their liquid assets or equity capital. That is, a one percentage point increase in capital ratio shortage leads to a 0.99p.p decrease in credit growth without any significant impact on liquid assets and equity capital. The fact that these banks do not raise their equity capital appears intuitive since capital in general is less pivotal for banks largely engaging in securitisation, which indicates that these banks allocate most of their securitisation activity outcomes toward their asset management and not equity capital. This finding, however, may be subject to the bankôs current level of capital which is investigated in the next subsection.

With regards to the control variables, both securitisation dummies, *i.e. SecActive* and *High*, are associated with higher equity growth, suggesting that securitisation allows banks to increase their equity capital. *NII* exerts a negative impact on both liquidity growth and equity growth, suggesting that banks with lower income diversification increase their liquidity and equity capital ratios, or vice versa. *CostIncome* is positively associated with the growth ratio of equity capital, suggesting that banks with lower efficiency tend to increase their equity capital; alternatively, banks with higher efficiency are less likely to do so. Consistent with expectations, *TBTF* is negatively associated with the ratio of equity capital, suggesting that systemic banks are reluctant to raise their equity issue. *GDPGrowth* is negatively associated with liquidity holdings, suggesting that banks during economic growth reduce their liquid assets and vice versa. *Crisis* dummy confirms this finding as banks during the crisis are observed to increase their liquidity holdings and reduce their lending. *IBRate* is positively associated with lending and negatively with equity capital ratios. This is consistent with arguments predicting that a low monetary policy rate induces banks to increase their credit supply and boosts the values of a bankös assets, which in turn reduces the bankös equity capital ratio. Finally, it is interesting to see that the lagged dependent variable is significantly positive only for the credit growth regression with a relatively low coefficient (approximately 0.08). This implies a persistence of lending and demonstrates a high speed of adjustment in bank lending.[56] This, however, does not hold for liquid assets and equity growth, suggesting that there is no persistence in these ratios.

[56] Broadly speaking, a coefficient between zero and one indicates persistence in the respective variable, but it will eventually return to its normal level. A value close to zero implies a high speed of adjustment, whereas a value approaches unity means low speed of adjustment (it takes a longer time to converge towards the equilibrium).

Table 4.3 *Securitisation and equity capital adjustment*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CGrowth	*LIQASGR*	*EAGrowth*	*CGrowth*	*LIQASGR*	*EAGrowth*
Surplus $_{t-1}$	1.794***	-0.580	-0.820***	1.146	-0.396	-0.730***
	(0.621)	(0.663)	(0.279)	(0.720)	(0.348)	(0.232)
Shortage $_{t-1}$	2.186	-1.143	2.920***	2.196**	-0.533	2.548***
	(1.531)	(1.287)	(0.468)	(1.033)	(0.817)	(0.488)
SecActive$_t$XSurplus $_{t-1}$	-1.878***	1.134	-0.0253			
	(0.482)	(0.971)	(0.237)			
SecActive$_t$XShortage $_{t-1}$	-1.387	1.430	-0.398			
	(2.453)	(1.886)	(0.696)			
High$_t$XSurplus $_{t-1}$				-1.217**	1.499***	-0.370
				(0.484)	(0.376)	(0.226)
High$_t$XShortage $_{t-1}$				-3.185**	0.525	0.641
				(1.414)	(1.194)	(0.592)
CGrowth $_{t-1}$	0.0786***			0.0799***		
	(0.0257)			(0.0260)		
LIQASGR $_{t-1}$		-0.0256			-0.0243	
		(0.0239)			(0.0239)	
EAGrowth $_{t-1}$			-0.221***			-0.223***
			(0.0312)			(0.0290)
SecActive $_{t-1}$	-0.117	-1.578	1.420**			
	(1.856)	(1.924)	(0.597)			
High $_t$				-1.060	-1.115	1.194**
				(1.386)	(1.280)	(0.565)
NII $_{t-1}$	0.00995	-0.0679*	-0.0283*	0.0278	-0.0726*	-0.0321*
	(0.0505)	(0.0391)	(0.0170)	(0.0537)	(0.0402)	(0.0171)
CDEPAS $_{t-1}$	-0.0401	-0.0636	0.0356	-0.0342	-0.0558	0.0310
	(0.0998)	(0.0803)	(0.0428)	(0.106)	(0.0792)	(0.0402)
CostIncome $_{t-1}$	0.0300	-0.0460	0.0381**	0.0326	-0.0411	0.0349*
	(0.0470)	(0.0430)	(0.0190)	(0.0497)	(0.0420)	(0.0186)
PLC$_t$	-1.140	-2.166	-1.505	-1.686	-2.080	-1.361
	(1.927)	(1.856)	(0.991)	(1.787)	(1.919)	(0.943)
TBTF$_t$	-0.977	1.015	-2.291**	-0.544	1.423	-2.539***
	(2.314)	(1.534)	(0.933)	(2.178)	(1.576)	(0.904)
GDPGrowth $_{t-1}$	-1.047	-6.785***	0.667	-0.821	-6.346***	0.327
	(2.610)	(2.026)	(1.103)	(2.552)	(1.936)	(0.976)
IBRate $_{t-1}$	4.199*	-0.462	-2.273**	4.020*	-0.817	-1.991**
	(2.337)	(1.943)	(0.999)	(2.310)	(1.870)	(0.891)
Crisis$_t$	-7.622**	26.26***	1.739	-7.771**	25.84***	2.045
	(3.177)	(4.200)	(1.854)	(3.076)	(4.175)	(1.826)
Observations	3,955	3,955	3,955	3,955	3,955	3,955
No. of Banks	375	375	375	375	375	375
Instruments	27	25	29	27	25	29
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00

Table 4.3 *Securitisation and equity capital adjustment (cont.)*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CGrowth	*LIQASGR*	*EAGrowth*	*CGrowth*	*LIQASGR*	*EAGrowth*
AR(2)	0.18	0.87	0.98	0.13	.85	0.97
Hansen	0.36	0.18	0.24	0.23	0.17	0.24

Note: The table reports the estimation results for Equation 4.5. Column 1 displays the estimation results when the dependent variable is loan growth ratio (*CGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets (*LIQASGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of total equity to total assets (*EAGrowth*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.6.2 Securitisation and adjustment toward target capital ratio: capitalisation and crisis

Having established the role that securitisation and target capital adjustment have on banksô asset management, we turn our attention to analysing how a bankôs level of capital (low-capitalised) and the 2007-09 global financial crisis impact the results. Table 4.4 reports the results when the dummy variable *LowCap* is introduced to Equation 4.5. This dummy takes the value one if the bankôs capital (equity-to-asset ratio) is below the median value, and zero otherwise. It is then substituted by the *Crisis* dummy, which takes the value one for the period 2007-2009. The respective results are reported in Table 4.5.[57] As before, Panel A displays the results when *SecActive* dummy is used, whereas Panel B displays the results when *High* dummy is used. For brevity, the results in both tables show the key variables of interest.[58]

The results in Table 4.4 provide an informative extension to the earlier findings. As can be seen, and consistent with the previous findings in Table 4.3, while banks engaging in securitisation prefer to increase their liquidity buffer at the expense of reducing lending in response to a capital surplus, this behaviour is more evident for undercapitalised banks. In fact,

[57] Note that the *Crisis* dummy is already included in all of the earlier regressions as a time fixed effect for the period 2007-2009 to capture the crisis period. Hence, in this section it is interacted with the variables of interest.

[58] See Appendix E, Table E1 and E2, for the full results of both tables.

these banks are observed to be reluctant to increase their equity capital and, instead, tend to increase their liquid assets without any impact on lending. This means that these banks tend to allocate their internal capital growth for liquidity build-ups rather than increasing their equity or reduce lending even if they are low capitalised. This may be interesting since it reinforces theories that emphasise the importance of capital and liquidity management to mitigate the impacts of external economic shocks on banksô activities. In addition, Di Tommaso (2020) show that banks after the crisis use securitisation to reconstitute their liquidity or reduce leverage and not for credit supply. Thus, it is not surprising that banks making use of securitisation choose to boost their liquidity holdings and not increase their credit supply in response to capital surplus for both low capitalised and well capitalised.

For capital shortage, while banks engaging in securitisation (especially high-securitising banks) respond to such negative shocks by contracting their lending, this holds only for low capitalised banks. Interestingly, these banks do not increase their liquid assets or equity capital, suggesting that they are more reluctant to issue equity, perhaps, to avoid ownership dilution for shareholders, but at the expense of reducing credit supply. In the absence of securitisation, however, these low capitalised banks behave differently. While capital shortage forces them to increase their equity capital without the need to reduce credit supply, they choose to shrink their liquid assets holdings when they hold low capital. In fact, these banks are not only reluctant to contract lending, but they also refrain from raising additional equity whether internally (retained earnings retention) or externally (equity issuance); however, they do this at the expense of depleting their liquidity buffer. By contrast, when these banks face a capital surplus, they choose to build up their liquidity buffer without necessarily affecting lending or equity capital.

Moreover, the results in Table 4.5 for the crisis interactions demonstrates that securitising banks facing capital surplus did not increase (or decrease) their credit supply during the global financial crisis ï as they would do during normal times. Rather, they increased their liquidity buffer and at the same time reduced their equity capital, likely because they were forced to provide loans to meet the credit demand during the crisis. By contrast, (highly) securitising banks facing capital shortages were forced to increase their equity capital with no impact on credit supply or liquid assets. They chose to increase their equity capital rather than reduce lending or deplete their liquidity buffer, likely because they were not able to cut down lending as much during the financial crisis and due to a high demand of loans. Regarding non-securitising banks, while facing internal capital shortage forces them to raise their equity and to continue lending during normal times, the financial crisis led them to significantly increase their liquidity buffer at the expense of reducing lending, perhaps, as a safety net for them since such banks have fewer funding options. Contrarily, when these banks had internal capital surplus during the financial crisis, they did not deplete their liquidity buffer to avoid raising equity and continue lending as they tend to do during normal times.

Table 4.4 *Securitisation and equity capital adjustment for low capitalised banks*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CGrowth	*LIQASGR*	*EAGrowth*	*CGrowth*	*LIQASGR*	*EAGrowth*
Surplus $_{t-1}$	1.951**	-1.202*	-1.121***	1.026	-0.687**	-1.034***
	(0.781)	(0.697)	(0.319)	(0.805)	(0.340)	(0.308)
Shortage $_{t-1}$	1.796	0.638	4.770***	3.527**	0.367	3.780***
	(1.868)	(1.967)	(0.929)	(1.698)	(1.294)	(0.715)
$LowCap_tXSurplus_{t-1}$	-0.881	2.606*	-0.789			
	(1.134)	(1.544)	(0.963)			
$SecActiveXSurplus_{t-1}$	-2.025***	1.601*	0.0220			
	(0.599)	(0.954)	(0.248)			
$SecActive_tXLowCap_tXSurplus_{t-1}$	-0.417	3.853***	-2.187***			
	(2.094)	(1.069)	(0.583)			
$LowCap_tXShortage_{t-1}$	0.364	-3.458*	-1.503			
	(1.754)	(1.985)	(1.127)			
$SecActive_tXShortage_{t-1}$	2.335	-1.416	-1.247			
	(3.480)	(2.774)	(1.407)			
$SecActive_tXLowCap_tXShortage_{t-1}$	-3.252	0.318	-1.042			
	(2.058)	(2.324)	(1.109)			
$LowCap_tXSurplus_{t-1}$				0.110	2.247*	-0.960
				(1.104)	(1.287)	(0.881)
$High_tXSurplus_{t-1}$				-1.183**	1.654***	-0.298
				(0.525)	(0.366)	(0.239)
$High_tXUnderCap_tXSurplus_{t-1}$				0.557	3.546***	-2.728***
				(2.669)	(0.877)	(0.679)
$LowCap_tXShortage_{t-1}$				-2.615	-1.762	-0.328
				(1.777)	(1.472)	(0.626)
$High_tXShortage_{t-1}$				-2.063	-2.648	1.120
				(2.364)	(1.735)	(0.910)
$High_tXLowCap_tXShortage_{t-1}$				-5.986***	0.780	0.435
				(2.115)	(1.971)	(0.752)
Observations	3,955	3,955	3,955	3,955	3,955	3,955
No. of Banks	375	375	375	375	375	375
Instruments	32	30	34	32	30	34
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.11	0.77	0.55	0.10	0.79	0.43
Hansen	0.26	0.18	0.11	0.28	0.17	0.10

Note: The table reports the estimation results for Equation 4.5 after introducing low capitalisation dummy. Column 1 displays the estimation results when the dependent variable is loan growth ratio (*CGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets (*LIQASGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of total equity to total assets (*EAGrowth*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaces by the dummy *High*. The dummy *LowCap* takes the value one if a bankȏs equity capital ratio (equity to asset) is below the median, and zero otherwise. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.5 *Securitisation and equity capital adjustment during the 2007-2009 financial crisis*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CGrowth	*LIQASGR*	*EAGrowth*	*CGrowth*	*LIQASGR*	*EAGrowth*
$Surplus_{t-1}$	0.665	-0.178	-0.793**	0.254	-0.336	-0.604***
	(0.715)	(0.609)	(0.350)	(0.614)	(0.413)	(0.227)
$Shortage_{t-1}$	2.023	-1.700	2.836***	2.040*	-1.270	2.387***
	(1.544)	(1.520)	(0.525)	(1.152)	(0.879)	(0.441)
$Crisis_tXSurplus_{t-1}$	1.899*	-0.261	-0.0795			
	(1.031)	(1.415)	(0.369)			
$SecActive_tXSurplus_{t-1}$	-0.969	-0.0289	0.332			
	(0.730)	(0.886)	(0.356)			
$SecActive_tXCrisis_tXSurplus_{t-1}$	-0.569	1.392*	-0.305			
	(0.811)	(0.799)	(0.390)			
$Crisis_tXShortage_{t-1}$	-0.751	4.762	0.355			
	(2.622)	(3.252)	(1.852)			
$SecActive_tXShortage_{t-1}$	-1.021	1.204	-0.535			
	(2.517)	(2.136)	(0.832)			
$SecActive_tXCrisis_tXShortage_{t-1}$	-2.922	4.854	1.731			
	(2.446)	(2.965)	(1.216)			
$Crisis_tXSurplus_{t-1}$				2.204**	0.0166	-0.283
				(0.877)	(1.420)	(0.291)
$High_tXSurplus_{t-1}$				-1.328	0.996	0.0364
				(1.398)	(1.098)	(0.437)
$High_tXCrisis_tXSurplus_{t-1}$				-0.0947	1.598**	-0.520*
				(0.609)	(0.716)	(0.306)
$Crisis_tXShortage_{t-1}$				-0.459	5.063**	0.826
				(2.230)	(2.422)	(1.113)
$High_tXShortage_{t-1}$				-3.014*	1.075	0.389
				(1.559)	(1.233)	(0.588)
$High_tXCrisis_tXShortage_{t-1}$				-5.532**	1.552	4.313***
				(2.628)	(2.814)	(1.169)
Observations	3,955	3,955	3,955	3,955	3,955	3,955
No. of Banks	375	375	375	375	375	375
Instruments	31	29	33	31	29	33
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.17	0.84	0.82	0.12	0.78	0.80
Hansen	0.20	0.16	0.24	0.13	0.18	0.27

Note: The table reports the estimation results for Equation 4.5 after introducing the crisis interactions. Column 1 displays the estimation results when the dependent variable is loan growth ratio (*CGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets (*LIQASGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of total equity to total assets (*EAGrowth*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaces by the dummy *High*. The dummy *Crisis* is interacted with the key variables of interest. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.7 Robustness Checks

This section carries out a battery of robustness checks to verify the results obtained. First, we replace the dependent variable credit growth in Equation (4.5) by the ratio of loan growth including off-balance sheet credit commitments (*CCGrowth*). Second, we re-estimate the same equation, substituting our dependent variable by the growth ratio of liquid assets including trading securities (*LIQGR*). Third, we re-run total equity growth regressions, substituting the dependent variable by equity growth excluding retained earnings (*SHETAGr*).[59] The results for the above tests are reported in Table 4.6 ï 4.8. For brevity, the results in these tables show the key variables of interest.[60]

The results before introducing capitalisation or the crisis interactions are reported in Table 4.6. We find similar results and also an extension to the main findings. This can be observed by the difference in some coefficients as follows. First, capital shortage for non-securitising banks becomes significant at 10% significance level and, at the same time, the significance for capital surplus is lost for these banks in the *CCGrowth* regression (Column 1). This suggests that these banks undertake their lending through on-balance sheet loans in the case of capital surplus, whereas when facing capital shortage, they shift their lending to off-balance sheet credit commitments. Implying that while these banks issue new equity shares in response to capital shortage, they continue lending only through the avenue of off-balance sheet. Second, the significance of capital surplus for banks active in securitisation is completely lost in the *CCGrowth* regression (Column 1), which also suggests that banks active in securitisation are less likely to cut down their credit supply through credit commitment. In addition, the impact

[59] Note that when using *SHETAGr* as dependent variable, this study loses some of the observations due to missing values, therefore the target capital ratios are re-estimated using Equation 4.1 to have consistent results that match the corresponding sample.

[60] See Appendix E, Table E3 - E5, for the full results.

of capital surplus ratio on liquidity holdings for banks highly engaged in securitisation is observed to be less pronounced when trading securities are included (Column 2 Panel B). This is in line with studies predicting that securitisation may reduce banksô liquid securities and increase their lending ability, which is off-balance sheet lending in our case (*e.g.*, Altunbas *et al*., 2009; Loutskina, 2011).[61]

In Table 4.7, when introducing *LowCap* dummy, it is found that the coefficient on shortage for highly-securitising banks with low capital in *CCGrowth* regression not only loses its significance, but also its magnitude is diminished (Column 1 Panel B). This indicates that highly securitising banks that are low capitalised do not cut their off-balance sheet lending but, instead, contract their on-balance sheet lending. Finally, the estimated results for the crisis interactions in Table 4.8 show that the significance on capital shortage for high-securitising banks is lost in *CCGrowth* regression (Column 1 Panel B). This indicates that while such banks cut down lending during the crisis, they maintained it through credit commitments, consistent with studies documenting that banks increased their off-balance sheet during the crisis. Overall, the results correspond to the findings provided by Berger and Bouwman (2009) who show that that capital is associated with higher liquidity creation when off-balance sheet items are included and that banks undertake roughly half of their lending off-balance sheet. Therefore, it is not surprising that throughout the capital adjustment process bank executives tend to shift to off-balance sheet credit commitments in an attempt to remain proactive in seizing new opportunities and reducing credit risk.

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[61] It is also worth mentioning that the bankǿs willingness to hold marketable securities might be influenced by loan demand. That is, a weak demand for loans in the market would induce banks to hold more securities, whereas a high demand leads banks to reduce their liquid securities. Therefore, it could be that our sample period represents a high demand for loans relatively, leading banks to hold liquid securities moderately and care more about other their liquid cash holdings.

Table 4.6 *Robustness check: Securitisation and equity capital adjustment*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
Surplus $_{t-1}$	0.198	-0.157	-1.122***	0.141	-0.347	-1.002***
	(0.192)	(0.493)	(0.257)	(0.116)	(0.328)	(0.284)
Shortage $_{t-1}$	0.641*	-1.083	2.506***	0.494**	-0.812	2.299***
	(0.385)	(1.153)	(0.482)	(0.223)	(0.701)	(0.514)
SecActive$_t$*XSurplus* $_{t-1}$	-0.255	0.140	-0.0127			
	(0.233)	(0.591)	(0.208)			
SecActive$_t$*XShortage* $_{t-1}$	-0.604	0.886	0.181			
	(0.614)	(1.658)	(0.731)			
High$_t$*XSurplus* $_{t-1}$				-0.283**	0.779*	-0.215
				(0.136)	(0.469)	(0.220)
High$_t$*XShortage* $_{t-1}$				-0.687*	0.649	1.018
				(0.370)	(1.015)	(0.657)
Observations	3,955	3,955	3,621	3,955	3,955	3,621
No. of Banks	375	375	340	375	375	340
Instruments	27	25	50	27	25	50
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.12	.69	.87	0.38	0.63	0.79
Hansen	.47	0.37	0.54	0.47	0.33	.59

Note: The table reports the estimation results of the robustness check for Equation 4.5. Column 1 displays the estimation results when the dependent variable is loan growth ratio including credit commitments (*CCGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets including trading assets (*LIQGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of equity to total assets excluding retained earnings (*SHETAGr*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaces by the dummy *High*. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.7 *Robustness check: Securitisation and equity capital adjustment for low capitalised banks*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
Surplus $_{t-1}$	0.293	-0.691	-1.089***	0.191*	-0.679**	-1.051***
	(0.183)	(0.519)	(0.241)	(0.115)	(0.307)	(0.246)
Shortage $_{t-1}$	0.143	0.666	4.617***	0.279	0.114	3.864***
	(0.547)	(1.825)	(0.859)	(0.272)	(1.162)	(0.820)
LowCap$_t$XSurplus $_{t-1}$	-0.311	2.037	-2.879***			
	(0.534)	(1.392)	(0.338)			
SecActive$_t$XSurplus $_{t-1}$	-0.329	0.476	-0.0720			
	(0.223)	(0.599)	(0.175)			
SecActive$_t$XLowCap$_t$XSurplus $_{t-1}$	-0.667	3.245***	-2.900***			
	(0.413)	(0.877)	(0.578)			
LowCap$_t$XShortage $_{t-1}$	0.957**	-3.374*	-1.431			
	(0.482)	(1.799)	(1.069)			
SecActive$_t$XShortage $_{t-1}$	0.252	-1.800	-0.441			
	(0.899)	(2.512)	(1.813)			
SecActive$_t$XLowCap$_t$XShortage $_{t-1}$	-0.363	-0.0763	-1.210			
	(0.696)	(2.134)	(1.006)			
LowCap$_t$XSurplus $_{t-1}$				-0.314	2.235*	-3.138***
				(0.489)	(1.228)	(0.346)
High$_t$XSurplus $_{t-1}$				-0.334***	0.925**	-0.215
				(0.114)	(0.453)	(0.172)
High$_t$XLowCap$_t$XSurplus $_{t-1}$				-0.375	3.126***	-2.608***
				(0.579)	(0.757)	(0.475)
LowCap$_t$XShortage $_{t-1}$				0.420	-1.691	-0.859
				(0.398)	(1.322)	(0.786)
High$_t$XShortage $_{t-1}$				0.167	-2.234	2.433**
				(0.485)	(1.577)	(0.993)
High$_t$XUnderCap$_t$XShortage $_{t-1}$				-0.810	0.873	0.349
				(0.505)	(1.725)	(0.916)
Observations	3,955	3,955	3,621	3,955	3,955	3,621
No. of Banks	375	375	340	375	375	340
Instruments	32	30	55	32	30	55
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.42	0.85	0.45	0.39	0.54	0.30
Hansen	0.48	0.35	0.19	0.49	.37	0.21

Note: The table reports the estimation results of the robustness check for Equation 4.5 after introducing low capitalisation dummy. Column 1 displays the estimation results when the dependent variable is loan growth ratio including credit commitments (*CCGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets including trading assets (*LIQGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of equity to total assets excluding retained earnings (*SHETAGr*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The dummy *LowCap* takes the value one if a bankǿs equity capital ratio (equity to asset) is below the median, and zero otherwise. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.8 *Robustness check: Securitisation and equity capital adjustment during the 2007-2009 financial crisis*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
$Surplus_{t-1}$	0.174	-0.274	-1.133***	0.161	-0.570*	-0.776**
	(0.217)	(0.599)	(0.410)	(0.110)	(0.321)	(0.307)
$Shortage_{t-1}$	0.679	-1.648	2.229***	0.680***	-1.502*	1.893***
	(0.424)	(1.364)	(0.587)	(0.227)	(0.768)	(0.463)
$Crisis_t XSurplus_{t-1}$	-0.0180	0.558	-0.0208			
	(0.404)	(1.148)	(0.413)			
$SecActive_t XSurplus_{t-1}$	-0.0980	-0.277	0.604			
	(0.232)	(0.722)	(0.398)			
$SecActive_t XCrisis_t XSurplus_{t-1}$	-0.355	0.840	-0.0543			
	(0.230)	(0.878)	(0.435)			
$Crisis_t XShortage_{t-1}$	-0.363	3.870	1.502			
	(0.660)	(2.941)	(2.022)			
$SecActive_t XShortage_{t-1}$	-0.483	0.963	-0.198			
	(0.649)	(1.889)	(0.868)			
$SecActive_t XCrisis_t XShortage_{t-1}$	-1.245	3.096	3.051**			
	(0.765)	(2.579)	(1.332)			
$Crisis_t XSurplus_{t-1}$				-0.0921	0.839	-0.351
				(0.377)	(0.962)	(0.324)
$High_t XSurplus_{t-1}$				-0.308	0.994	0.412
				(0.305)	(1.092)	(0.464)
$High_t XCrisis_t XSurplus_{t-1}$				-0.323**	1.154*	-0.404
				(0.125)	(0.680)	(0.314)
$Crisis_t XShortage_{t-1}$				-1.119**	4.396**	1.563
				(0.560)	(2.071)	(1.286)
$High_t XShortage_{t-1}$				-0.973***	1.576	0.676
				(0.351)	(1.058)	(0.672)
$High_t XCrisis_t XShortage_{t-1}$				-0.180	-0.251	6.313***
				(0.831)	(2.551)	(1.348)
Observations	3,955	3,955	3,621	3,955	3,955	3,621
No. of Banks	375	375	340	375	375	340
Instruments	31	29	54	31	29	54
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.37	0.52	0.70	0.33	0.47	0.60
Hansen	0.48	0.36	0.33	0.43	0.40	0.31

Note: The table reports the estimation results of our robustness check for Equation 4.5 after introducing the crisis interactions. Column 1 displays the estimation results when the dependent variable is loan growth ratio including credit commitments (*CCGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets including trading assets (*LIQGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of equity to total assets excluding retained earnings (*SHETAGr*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaces by the dummy *High*. The dummy *Crisis* is interacted with our key variables of interest. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.7.1 Extra analysis: the effects on consumer and C&I loans

It is acknowledged that the engagement in securitisation markets provides banks good opportunities in one specific line of business ï mortgages ï that, in turn, allows them to reallocate their resources away from other lines of business. For this reason, the study provides an extra analysis through which it investigates the growth ratio of C&I loans on the one hand, and the growth ratio of consumer loans, on the other hand. The benefits of testing such types of loans are not only meaningful but also important to ensure robust results. First, C&I loans may better reflect banksô lending capacity since these loans are, relatively, harder to securitise and they are last to be sold by banks when facing funding constraints (Loutskina, 2011). Second, C&I loans are known to have higher risk-weight and risk of default rate as well as larger amount in nature; contrary to consumer loans that are considered safer and have lower amounts. Accordingly, this examination better reflects the actual bank lending capacity and, at the same time, allows testing whether banks reshuffle their loan portfolios in response to the relationship between capital adjustment and securitisation.[62]

Table 4.9 reports the results for C&I loans and consumer loans before introducing the level of capital or the crisis interactions, whereas Table 4.10 and 4.11 report the results when these factors are accounted for, respectively. As before, Panel A shows the results when *SecActive* dummy is used and Panel B shows the results when it is replaced by the dummy *High*. To preserve space, the results in these tables show the key variables of interest.[63]

Three key results deserve to be highlighted. First, in the absence of securitisation, banks respond to both capital adjustment ratios by reducing their C&I loans with no significant impact

[62] Note that the target capital ratios for both loan ratios are re-estimated since some of the banks are dropped from the sample due to missing values.

[63] See Appendix E, Table E6 - E8, for the full results.

on consumer loans. In contrast, banks engaging in securitisation markets increase their C&I loans and also decrease their consumer loans to some extent. Second, when these banks are low capitalised, they respond to internal capital surplus by increasing both their consumer loans and C&I loans. In the case of internal capital shortage, however, they choose to continue increasing their C&I loans without the need to reduce or increase their consumer loans. These results are in line with studies predicting that securitisation, as part of off-balance sheet activities, helps mitigating the underinvestment problem of banks previously engaged in risky debts (James, 1988) even for low capitalised banks. Third, during the global financial crisis, securitising banks facing capital shortage did not reduce their C&I lending, but they did reduce their consumer loans; contrary to non-securitising banks that reduced their C&I loans and increased their consumer loans. These results provide further evidence in favour of the notion that securitisation plays a critical role on the ability of banks to continue engaging in risky debts that offer higher returns.

Table 4.9 *Extra analysis: Securitisation and equity capital adjustment impact on C&I loans and consumer loans*

	Panel A		Panel B	
	(1)	(2)	(1)	(2)
	CIGrowth	*ConsumerGr*	*CIGrowth*	*ConsumerGr*
Surplus $_{t-1}$	-1.481**	1.547	-0.720	-0.481
	(0.647)	(1.505)	(0.765)	(0.830)
Shortage $_{t-1}$	-1.109	1.889	0.490	0.0844
	(1.670)	(1.707)	(0.849)	(1.074)
SecActive$_t$*XSurplus* $_{t-1}$	1.221*	-2.561*		
	(0.645)	(1.534)		
SecActive$_t$*XShortage* $_{t-1}$	2.843	-2.115		
	(2.066)	(2.105)		
High$_t$*XSurplus* $_{t-1}$			0.391	0.349
			(0.698)	(1.557)
High$_t$*XShortage* $_{t-1}$			1.034	1.537
			(1.204)	(1.997)
Observations	3,217	3,232	3,217	3,232
No. of Banks	334	335	334	335
Instruments	25	26	25	26
AR(1)	0.00	0.00	0.00	0.00
AR(2)	0.56	0.32	0.57	0.34
Hansen	0.50	0.23	0.55	0.22

Note: The table reports the estimation results of the extra analysis for the impact on C&I loans and consumer loans. Column 1 displays the estimation results when the dependent variable is the growth ratio of C&I loans, and Column 2 displays the estimation results when the dependent variable is the growth ratio of consumer loans. For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2012-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.10 *Extra analysis: Securitisation and equity capital adjustment impact on C&I loans and consumer loans for low capitalised banks*

	Panel A		Panel B	
	(1)	(2)	(1)	(2)
	CIGrowth	*ConsumerGr*	*CIGrowth*	*ConsumerGr*
Surplus $_{t-1}$	-1.557**	0.792	-0.809	-0.909
	(0.652)	(1.639)	(0.821)	(0.713)
Shortage $_{t-1}$	-4.420**	0.237	-0.320	-0.224
	(1.973)	(2.813)	(1.208)	(1.963)
UnderCap$_t$XSurplus $_{t-1}$	0.0441	3.739		
	(1.625)	(3.068)		
SecActive$_t$XSurplus $_{t-1}$	1.135*	-2.042		
	(0.679)	(1.646)		
SecActive$_t$XUnderCap$_t$XSurplus $_{t-1}$	5.417**	3.461		
	(2.516)	(3.932)		
UnderCap$_t$XShortage $_{t-1}$	5.208***	3.232		
	(1.861)	(2.787)		
SecActive$_t$XShortage $_{t-1}$	6.819***	1.137		
	(2.507)	(2.861)		
SecActive$_t$XUnderCap$_t$XShortage $_{t-1}$	6.243***	-0.875		
	(2.264)	(3.311)		
UnderCap$_t$XSurplus $_{t-1}$			0.200	5.134**
			(1.705)	(2.480)
High$_t$XSurplus $_{t-1}$			0.298	0.135
			(0.649)	(1.282)
High$_t$XUnderCap$_t$XSurplus $_{t-1}$			6.224*	7.103*
			(3.272)	(4.258)
UnderCap$_t$XShortage $_{t-1}$			1.346	1.325
			(1.469)	(2.217)
High$_t$XShortage $_{t-1}$			2.255	3.983
			(1.747)	(3.562)
High$_t$XUnderCap$_t$XShortage $_{t-1}$			2.340	1.403
			(1.763)	(3.149)
Observations	3,217	3,232	3,217	3,232
No. of Banks	334	335	334	335
Instruments	30	31	30	31
AR(1)	0.00	0.00	0.00	0.00
AR(2)	0.75	0.30	0.69	0.30
Hansen	0.45	0.23	0.49	0.23

Note: The table reports the estimation results of the extra analysis for the impact on C&I loans and consumer loans for low capitalised banks. Column 1 displays the estimation results when the dependent variable is the growth ratio of C&I loans, and Column 2 displays the estimation results when the dependent variable is the growth ratio of consumer loans. For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The dummy *LowCap* takes the value one if a bankꞌs equity capital ratio (equity to asset) is below the median, and zero otherwise. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2012-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.11 *Extra analysis: Securitisation and equity capital adjustment impact on C&I loans and consumer loans during the 2007-2009 financial crisis*

	Panel A		Panel B	
	(1)	(1)	(2)	(2)
	CIGrowth	*ConsumerGr*	*CIGrowth*	*ConsumerGr*
Surplus $_{t-1}$	-0.745	-0.324	-0.468	-0.954*
	(0.843)	(1.539)	(0.891)	(0.573)
Shortage $_{t-1}$	-0.941	1.228	0.825	0.146
	(1.706)	(1.805)	(0.875)	(1.152)
Crisis$_t$XSurplus $_{t-1}$	-2.018	5.449**		
	(1.530)	(2.386)		
SecActive$_t$XSurplus $_{t-1}$	0.606	-0.595		
	(1.081)	(1.577)		
SecActive$_t$XCrisis$_t$XSurplus $_{t-1}$	0.299	-1.531		
	(0.759)	(1.980)		
Crisis$_t$XShortage $_{t-1}$	0.500	3.798		
	(4.306)	(2.871)		
SecActive$_t$XShortage $_{t-1}$	2.965	-1.170		
	(2.009)	(2.170)		
SecActive$_t$XCrisis$_t$XShortage $_{t-1}$	0.156	-5.681*		
	(2.248)	(3.276)		
Crisis$_t$XSurplus $_{t-1}$			-2.233*	4.363*
			(1.339)	(2.489)
High$_t$XSurplus $_{t-1}$			0.793	1.735
			(1.229)	(1.403)
High$_t$XCrisis$_t$XSurplus $_{t-1}$			0.0253	0.00551
			(0.749)	(1.957)
Crisis$_t$XShortage $_{t-1}$			-3.151	-1.713
			(2.642)	(3.183)
High$_t$XShortage $_{t-1}$			0.883	1.634
			(1.250)	(2.046)
High$_t$XCrisis$_t$XShortage $_{t-1}$			1.284	2.863
			(1.950)	(3.637)
Observations	3,217	3,232	3,217	3,232
No. of Banks	334	335	334	335
Instruments	29	30	29	30
AR(1)	0.00	0.00	0.00	0.00
AR(2)	0.49	0.30	0.47	0.29
Hansen	0.44	0.23	0.46	0.22

Note: The table reports the estimation results of the extra analysis for the impact on C&I loans and consumer loans during the 2007-2009 financial crisis. Column 1 displays the estimation results when the dependent variable is the growth ratio of C&I loans, and Column 2 displays the estimation results when the dependent variable is the growth ratio of consumer loans. For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The dummy *Crisis* is interacted with our key variables of interest. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2012-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.8 Conclusion

Constructing a sample of 375 U.S. commercial banks over the period 2007-2018, this study examines how banksô assets and equity capital are influenced in response to the link between securitisation and banksô target capital adjustment. We find that low capitalised banks that make use of securitisation respond to capital shortage shocks by reducing their (on-balance sheet) lending without increasing or decreasing their liquid assets or equity capital. We also show that when these banks face capital surplus they become reluctant to increase their equity capital and, instead, they tend to increase their liquid assets without any impact on lending. In addition, we find that during the global financial crisis securitising banks facing capital surplus did not increase (or decrease) their credit supply. Rather, they increased their liquidity buffer and at the same time reduced their equity capital (i.e. increase leverage). By contrast, securitising banks facing capital shortages were forced to increase their equity capital with no impact on credit supply or liquid assets, and it is only during the crisis banks that make use of securitisation issued equity. This is intuitive since banks would in general rather raise finance through debt since the cost of equity is normally perceived by banks to be higher than the cost of debt ï as it is often too costly to raise new shares. By extension, we provide evidence to suggest that securitisation helps banks to improve their commercial lending irrespective to their target capital, whereas for consumer lending banks may increase these loans only in response to capital surplus.

Our findings provide important policy implications for the changing role of banks from the originate-to-hold model to the originate-to-distribute model and shed light on the implications of the post-crisis changes in regulations, supervisions, and bank liquidity management. The fact that banks facing capital surplus shocks always tend to allocate their internal capital growth for liquidity hoarding rather than increasing lending emphasise the important role of liquidity management, which banks use to mitigate the impacts of external economic shocks on their activities. This is also in line with theories predicting that securitisation is mainly driven by liquidity needs and as a means of alternative funding source. Accordingly, regulators should be aware of the fact that banks after the crisis make use of securitisation to reconstitute their liquidity or reduce their leverage rather than increase lending.

Our findings also contribute to the debate on whether adjusting bank capital would contract their lending capacity. This is because low capitalised banks appear to favour cutting lending rather than issuing equity under negative capital shocks. It is only the crisis period that forced them to issue equity alongside to cutting lending. An interesting evidence for regulators which demonstrates that banks are very reluctant to issue equity to adjust their capital requirements and prefer to cut credit supply instead, which would have important implications on economic growth. One important implication is the fact that banks are less likely to reduce their off-balance sheet lending under both negative and positive capital shocks. This is consistent with theories suggesting that banks undertake most of their lending off-balance sheet through credit commitments, which underlines the fact for regulators that banks consider off-balance sheet lending a safer avenue for them to continue their credit supply.

Another important implication is that securitisation helps banks to keep lending C&I loans for all banks even for low capitalised banks that are facing negative capital shocks. This is an important finding for regulators since it shows that banks making use of securitisation mainly focus on providing riskier loans that offer higher return. And in the case of low capitalisation, banks appear to shift their focus to C&I loan but without necessarily reducing their consumer loans growth; contrary to low capitalised banks that are effectively boosting their capital, which are observed to continue providing both loans. Overall, the findings can be used by regulators and central banks to answer many questions related to the implementations of Basel III and the debate ensued on capital requirements and bank lending.

Chapter 5
Conclusion

This thesis presents three empirical chapters that examine the impact of the 2007-2009 financial crisis on the banking industry. It aims at examining whether banks have participated in transformative behaviour due to the 2007-09 global financial crisis in terms of three inter-related topics: bank lending, dividend payout policy, and capital structure adjustment. A summary of the findings in each chapter is discussed in this section alongside with the limitations and suggestions for future research.

First, Chapter 2 suggests that the implications of excessive lending can be explained by modern financial theories of risk management and moral hazard incentives. Employing a two-step system GMM estimator, the results show that the variability of credit supply strategy across banks can depend on the period and bank size. That is, there is strong evidence in favour of the *risk-management hypothesis* for large banks and the period after the 2008 financial crisis, under which banks exercising excessive lending with low risky borrowers generate adequate premium from both high and low risk borrowers. Contrarily, the *moral hazard hypothesis*, under which banks practise excessive lending to relatively risky borrowers that pay higher premium and thereby increase their credit risk, is supported in the pre-crisis period and for small banks. Importantly, we find that bank performance is a key driver to engage in higher risk when practising excessive lending. That is, while banks with good performance undertake a ósearch for yieldô behaviour to maintain their good performance, banks with poor performance are observed to ógamble to surviveó by taking higher risk in the form of lending to riskier borrowers to generate higher return. After the financial crisis, however, such behaviours are observed to diminish.

Overall, the findings of this first chapter are remarkable and can be viewed as part of a larger picture. They shed light on the effectiveness of the post-crisis changes in regulations, supervisions, and bank risk management, which all emphasise the importance of bank risk and lending practices. From a policy perspective, the post-crisis period implications show that banks have become more dependent on the conditions of bond and money markets and generate adequate risk premium when expanding credit supply. In addition, the intensive ósearch for yieldô and ógamble to surviveô behaviour appear to be necessarily dependent on performance when exercising aggressive lending, but the financial crisis has shown to eliminate risky behaviours that affect the financial stability of the banking system as a whole. Therefore, regulators and central banks that are deeply concerned about the notion that banks may increase their risk-taking to adapt the new requirements can consider our findings for conducting risk assessment and comparisons.

On the other hand, Chapter 3 shows the implications of imposing subordinated debt as a beneficial tool to discipline banks from wealth expropriation activities. An IV-Tobit model is employed over a dataset of 684 U.S. banks during and after the 2007-09 financial crisis. The results show that a higher share of subordinated debt is associated with a strong monitoring impact that prohibits unlisted weak banks from distributing dividends during the crisis period. This result is in line with the *monitoring hypothesis*. For listed weak banks, on the other hand, evidence points out that a higher share of subordinated debt leads them to pay larger dividends as a mean of wealth expropriation, in line with the *risk-shifting hypothesis*. During normal times, in contrast, both listed and unlisted weak banks with higher share of subordinated debt pay larger dividends as a mean of wealth expropriation. Alternatively stated, the results suggest that subordinated debtholders relax their screening and have less incentive to monitor unlisted risky banksô managers during normal times. At the same time, banks with higher growth opportunities always increase their dividend payouts to signal their financial strength and subordinated debt plays a significant role in the signalling motive after the crisis. From a policy perspective, while the findings favour the imposition of subordinated debt as a monitoring tool to curb moral hazard behaviour during times of stress, they advise against a one-size-fits-all approach. This is because listed banks that are near insolvency choose to distribute larger dividends, suggesting that subordinated debtholder investors do not have the same relative strength over these listed banks. More importantly, during normal times screening is observed to be relaxed by debtholders over both listed and unlisted banks. Implying that policy choices differ across bank type and time periods because its effectiveness is highly dependent on the macroeconomic conditions. Overall, regulators and scholars examining the economic role of dividend policy ought to account for the debt component, particularly uninsured debtholders, since the strength of debtholders to affect dividend policy and strengthen market discipline may be greater than that for shareholders.

Finally, Chapter 4 explores the role of securitisation in mitigating the negative side effects of banks capital adjustment process and the implications of such relation on the size of their operations. The empirical analysis in this chapter starts by employing a partial adjustment framework to estimate a bank-specific and time-varying target equity capital ratio. Then, using the estimated ratios, a two-step system GMM estimator is run over a sample of 375 U.S. commercial banks during 2007-2018. The results show that non-securitising banks issue equity without cutting lending when there is an internal shortage of capital. Whereas banks that rely highly on securitisation choose to cut their on-balance sheet lending rather than issuing equity. This becomes more evident in the case of low capitalised banks. During the financial crisis, on the other hand, banks that highly engaged in securitisation raised their equity and reduced their on-balance sheet lending against capital shortages. In the case of capital surplus, however, these securitising banks prefer to increase their liquidity holdings and, in some cases, may reduce their on-balance sheet lending. Additionally, evidence points out that securitisation helps banks to increase their risky loans that offer higher returns.

The implications of these findings reflect two important dimensions, First, they reflect how securitisation influences banksô liquidity position and lending capacity under different capital shocks. Second, they demonstrate how banks have responded to the new micro-prudential and macro-prudential regulations that aim at strengthening the resilience of the banking system. Regulators expressed deep concerns that new regulations ï Basel III ï and changes in securitisation activities that aim at maintaining financial stability may compromise bank credit supply and thereby economic growth. We show that while banks may contract their lending to adjust their capital, they make use of securitisation to continue their off-balance sheet lending or at least commercial loans, which generate higher returns for banks. One implication is that banks use securitisation activities to reconstitute their liquidity or reduce leverage rather than to increase credit supply. Therefore, such findings can be used by regulators and central banks to answer many questions regarding the implementations of Basel III and the debate ensued on capital requirements and bank lending.

While this thesis provides robust evidence on the extent of the impact of financial crisis on the banking sector, it does have some limitations that were difficult to address. In Chapter 2, for example, the restrictions of data availability have prevented some important extensions, such as accounting for off-balance sheet items. This would play an important role on the way banks that exercise excessive lending undertake their loan pricing. It is likely that banks may price their credit risk differently for off-balance sheet loans. Importantly, the pricing of loans may vary across the different type of loans (*i.e.* housing loans, commercial loans, and others) and the present study could not account for such variations due to data availability. In Chapter 3, the analysis of the economic role of subordinated debt on dividend payouts is sensitive to the regulatory capital ratios (*i.e.* Tier 1 ratio) and the portfolio risk ratio (risk-weighted assets ratio), which were not accounted for. Similarly, the study in Chapter 4 could not account for regulatory capital ratios, such as Tier 1 and total regulatory capital ratios. Such ratios would reflect a better picture for the optimal targeted capital structure. The reason for the above limitations is mainly due to data availability for the database used at the time of conducting the relevant study.

Future studies may build on the present thesis by taking into account the aforementioned limitations with some additions. For example, Chapter 2 can be extended with the inclusion of off-balance sheet components to assess their impact on loan pricing, excessive credit growth and bank risk. This is because off-balance sheet activities allow banks to originate loans with the intent to sell them (securitisation), which would clearly have important implications on loan pricing and risk-taking. Also, it would be crucial to include disaggregated data of bank loans such as housing loans, commercial loans, and others to examine loan pricing and credit risk for the different type of loans. The income generated through excessive lending can be further linked to the market and checked whether it adequately compensates the additional lending through different premium measures. Distinguishing between low- and high-income countries may also provide a better insight of banksô strategies. In this case, it may be more useful to consider the dividend payout policy alongside to credit transfer activities and other derivatives.

For Chapter 3, as discussed earlier, it is worthwhile to test the economic role of subordinated debt with the inclusion of capital adequacy requirements (*i.e*. Tier 1) alongside with the ratio of risk-weighted assets. This may provide more accurate results as it accounts for the sensitivity of the linkage between subordinated debt and Tier 1 ratio. This seems to be the case since banks normally favour increasing their regulatory capital through subordinated debt that is considered cheaper than issuing equity. Further studies may also consider merger and acquisition (M&A) activities and test the impact before and after the M&A takes place. It would also be very beneficial if European banks are included in a comparative analysis between U.S.

and European realities. This might provide evidence on whether subordinated debtholders have different incentives to discipline risky banks in different contexts. Moreover, it would be crucially important if executive incentives, such as inside debt and other incentives, are accounted for to test the *risk-shifting hypothesis* and examine the role they play on the relation between subordinated debt and dividend policy.

Finally, for Chapter 4, future studies may, in addition to include Tier 1 ratio and regulatory capital ratios, utilise a richer database that have more details about securitisation activities and allow to differentiate between ABS segments such as MBS and CDOs. In fact, some segments may be easier for banks to securitise relative to others depending on the type of loans securitised. It would also be worth doing to include all types of bank loans with different risk categories in order to test whether banks reshuffle their loan portfolios and increase the riskiness of their portfolios when adjusting their capital.

From a holistic approach, this thesis reflects on how the introduction of new regulations at both the micro- and macro-prudential levels impacted individual banks and the aggregate banking system. More specifically, it addresses whether there has been a potential conflict between micro-prudential policy, which addresses the health of financial institutions, and macro-prudential policy, which highlights risks to the financial system as a whole. Therefore, a reflection on whether there are any negative consequences of policy interaction and whether a potential for tensions between the two policies is reduced efficiently. It demonstrates how the post-crisis regulations could limit the financial stability risks from relaxing lending standards which fuels credit booms and creates asset price bubbles and thereby sowing the seeds of the next crisis. It also addresses policy-makersô concerns in what regards to the trade-off between financial efficiency and financial stability in the banking system. This is because central banks and regulators typically aim to establish precise measures that maximise efficiency to achieve a preferred level of stability whilst attempting to limit the potential inefficiency costs associated with such new measures, *i.e*. the welfare implications of such new policies. Finally, it also reflects on how market investors can play a critical role during times of stress in curbing moral hazard behaviour.

Overall, regulators and central banks, particularly those examining bank policy at the micro-prudential, can benefit from this thesis since it examines bank behaviour and the stability of the individual financial institutions. For example, the congestion of credit supply created by zombie banks prior to the financial crisis reduced the profit for healthy banks and generated counterparty fears, which in turn discouraged credit supply. This is particularly of paramount importance since regulators argue that financial institutions were not following micro-prudential rules strongly enough and that such rules must be deepened and made more comprehensive. With that in mind, our findings reflect whether the new measures and regulations effectively safeguard individual banks from idiosyncratic risks and refrain them from practising excessive risk-taking and moral hazard behaviour. In addition, regulators examining bank policy at the macro-prudential level can also infer whether a tension is more likely to take place at different stages of the credit cycle. This is important not only to minimise tensions between authorities, but also to bolster investorsô confidence during turbulent periods since it can be inferred that such macro-prudential policies may have been successful in calming booms and softening busts while attempting to address negative externalities and mitigate systemic risk resulting from interconnectedness in the financial system. Overall, this thesis concludes that regulators and policy-makers must be careful about the application of micro-prudential rules as our findings advise against a one-size-fits-all approach to regulate banks.

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Appendix A. Additional Tables for Chapter 2

Table A1 *Regression results for premium ï Core European countries*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	Premium	*Premium*	*Premium*	*Premium*	*Premium*
$Premium_{t-1}$	0.545**	0.482**	0.871***	0.697***	0.439*
	(0.264)	(0.221)	(0.264)	(0.0973)	(0.222)
ECG_{t-1}	-0.0646**	-0.00931	0.0679**	0.0283*	-0.0370**
	(0.0276)	(0.00915)	(0.0334)	(0.0151)	(0.0162)
$RWATA_{t-1}$	0.00808	0.00457	-0.00159	-0.00297	0.00789*
	(0.00561)	(0.00392)	(0.00387)	(0.00251)	(0.00423)
ROA_{t-1}	-0.00215	0.0780	0.0794	0.0474	0.107
	(0.0932)	(0.0565)	(0.154)	(0.0672)	(0.104)
$CapBuff_{t-1}$	0.0256	0.00703	0.0166	0.00873	0.0602**
	(0.0203)	(0.00997)	(0.0117)	(0.00883)	(0.0233)
$Size_{t-1}$	-0.110	-0.101**	-0.00638		
	(0.0663)	(0.0494)	(0.0679)		
$DEPAS_{t-1}$	-2.84e-07	0.0117*	0.00892**	0.0106*	0.00554
	(0.00641)	(0.00625)	(0.00359)	(0.00532)	(0.00614)
LIQ_{t-1}	-0.00182	0.000104	0.000153	0.000503	-0.00186
	(0.00138)	(0.000977)	(0.000656)	(0.000652)	(0.00131)
$LLPLN_{t-1}$	0.0472	0.0279	0.0333	0.00888	0.0875
	(0.0528)	(0.0322)	(0.0622)	(0.0721)	(0.0886)
NII_{t-1}	0.00272	-0.00349	-0.00544**	-0.00433	-0.00523
	(0.00489)	(0.00274)	(0.00266)	(0.00281)	(0.00530)
GDPGrowth	-0.0138	0.0245	-0.153***	-0.0303	-0.0195
	(0.0406)	(0.0204)	(0.0481)	(0.0291)	(0.0649)
HHI	-0.0155	0.00232	0.00492	-0.0127	0.0204
	(0.0161)	(0.00909)	(0.0150)	(0.0109)	(0.0408)
InterestRate	-0.0866	-0.150*	0.0583	-0.157**	0.0822
	(0.0825)	(0.0858)	(0.0725)	(0.0664)	(0.158)
Observations	816	259	551	398	418
No of Banks	76	51	76	32	44
AR(1)	0.01	0.00	0.04	0.01	0.01
AR(2)	0.11	0.10	0.07	0.13	0.42
Instruments	31	28	28	31	35
Hansen	0.64	0.56	0.74	0.38	0.13

Note: The table presents the full estimation results for premium regressions for core countries. It corresponds to Table 2.9 Panel A. It shows the estimations results for the full period, sub-periods subsamples, and size subsamples. The full sample period is (2001-2016), pre-crisis period (2001-2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table A2 *Regression results for premium ï Periphery European countries*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	Premium	*Premium*	*Premium*	*Premium*	*Premium*
$Premium_{t-1}$	0.422***	0.517**	0.465***	0.531***	0.284**
	(0.0479)	(0.211)	(0.0853)	(0.103)	(0.109)
ECG_{t-1}	0.191***	-0.0199	0.270**	0.174*	-0.175**
	(0.0651)	(0.0169)	(0.115)	(0.0949)	(0.0852)
$RWATA_{t-1}$	0.000765	-0.00126	-0.0104	-0.0145	-0.0127
	(0.00586)	(0.00496)	(0.0106)	(0.0100)	(0.0237)
ROA_{t-1}	0.522**	0.112	0.566*	0.594*	0.302
	(0.219)	(0.205)	(0.317)	(0.303)	(0.212)
$CapBuff_{t-1}$	0.0142	0.00949	0.00668	0.0503	-0.0161
	(0.0336)	(0.0199)	(0.0787)	(0.0960)	(0.0583)
$Size_{t-1}$	-0.0858***	-0.0828***	-0.0827		
	(0.0297)	(0.0268)	(0.0502)		
$DEPAS_{t-1}$	-0.0161**	0.0105**	-0.0251*	-0.00675	-0.00302
	(0.00733)	(0.00440)	(0.0151)	(0.00881)	(0.0224)
LIQ_{t-1}	0.00136	0.000574	0.000428	0.00321	-0.00575
	(0.00102)	(0.000657)	(0.00358)	(0.00381)	(0.00626)
$LLPLN_{t-1}$	-0.468**	0.371	-0.619*	-0.0750	0.201
	(0.194)	(0.236)	(0.369)	(0.260)	(0.263)
NII_{t-1}	0.0122**	0.00957**	0.0205	0.0228**	-0.0150**
	(0.00579)	(0.00427)	(0.0149)	(0.00897)	(0.00657)
GDPGrowth	0.174**	-0.0127	0.0790	-0.0389	-0.142
	(0.0774)	(0.0378)	(0.0900)	(0.0329)	(0.189)
HHI	0.0383***	-0.0144	0.0761**	0.00784	-0.0374
	(0.0136)	(0.00977)	(0.0324)	(0.0194)	(0.0338)
InterestRate	0.311	-0.146**	0.832*	0.296	-0.572*
	(0.232)	(0.0667)	(0.443)	(0.348)	(0.287)
Observations	787	235	547	425	362
No of Banks	73	49	72	37	36
AR(1)	0.00	0.01	0.01	0.02	0.04
AR(2)	0.12	0.37	0.11	0.32	0.14
Instruments	30	25	25	30	37
Hansen	0.30	0.22	0.76	0.21	0.50

Note: The table presents the full estimation results for premium regressions for periphery countries. It corresponds to Table 2.9 Panel B. It shows the estimations results for the full period, sub-periods subsamples, and size subsamples. The full sample period is (2001-2016), pre-crisis period (2001-2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table A3 *Regression results for RWATA ï Core European countries*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.607***	0.457**	0.818***	0.798***	0.382
	(0.200)	(0.172)	(0.124)	(0.126)	(0.268)
ECG_{t-1}	-0.209	0.349	-0.501*	-0.00870	0.146
	(0.239)	(0.235)	(0.256)	(0.0885)	(0.356)
ROA_{t-1}	2.234*	7.024**	2.105	0.766	2.537
	(1.331)	(3.437)	(1.283)	(0.772)	(1.849)
$CapBuff_{t-1}$	0.154	-0.0364	0.299*	0.236	0.122
	(0.117)	(0.458)	(0.159)	(0.152)	(0.217)
$Size_{t-1}$	-0.514	-0.377	0.00333		
	(0.354)	(0.446)	(0.239)		
$DEPAS_{t-1}$	0.172	0.316**	0.0133	0.120	0.0696
	(0.123)	(0.136)	(0.0910)	(0.0781)	(0.0921)
LIQ_{t-1}	0.000266	0.0276	-0.00593	0.0106**	0.0151
	(0.0130)	(0.0298)	(0.0155)	(0.00444)	(0.0170)
$LLPLN_{t-1}$	1.220***	1.337	1.162**	1.457*	1.466
	(0.454)	(1.246)	(0.581)	(0.724)	(0.875)
NII_{t-1}	-0.126*	-0.188**	-0.0333	-0.0359	-0.264**
	(0.0678)	(0.0874)	(0.0502)	(0.0332)	(0.103)
GDPGrowth	-0.278	-1.473*	0.343	0.113	-0.628
	(0.481)	(0.789)	(0.440)	(0.259)	(1.013)
HHI	0.0411	0.598	-0.123	0.00712	0.724
	(0.151)	(0.741)	(0.169)	(0.0398)	(0.476)
InterestRate	2.518	3.476*	-0.491	0.176	6.641**
	(1.898)	(1.947)	(1.319)	(0.528)	(3.213)
Observations	815	257	552	399	416
No of Banks	76	51	76	32	44
AR(1)	0.00	0.01	0.00	0.00	0.04
AR(2)	0.89	0.50	0.45	0.36	0.24
Instruments	30	28	25	33	32
Hansen	0.70	0.24	0.74	0.72	0.41

Note: The table presents the full estimation results for risk regressions for core countries. It corresponds to Table 2.10 Panel A. It shows the estimations results for the full period, sub-periods samples, and size samples. The full sample period is (2001-2016), pre-crisis period (2001-2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table A4 *Regression results for RWATA ï Periphery European countries*

	Full Period	Pre-Crisis	Post-Crisis	Large Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.601***	0.606***	0.819***	0.674***	0.737***
	(0.142)	(0.204)	(0.0882)	(0.0990)	(0.238)
ECG_{t-1}	0.265*	-0.189	-0.0814	0.113	0.114
	(0.136)	(0.276)	(0.105)	(0.180)	(0.203)
ROA_{t-1}	0.524	-1.399	-0.257	0.654	-0.286
	(0.576)	(1.830)	(0.629)	(0.723)	(1.131)
$CapBuff_{t-1}$	-0.143	0.634	0.218	-0.111	-0.0157
	(0.150)	(0.431)	(0.197)	(0.312)	(0.191)
$Size_{t-1}$	0.492*	1.004	0.176		
	(0.275)	(0.748)	(0.239)		
$DEPAS_{t-1}$	0.129***	0.179*	0.119***	0.184***	0.0947**
	(0.0479)	(0.0896)	(0.0428)	(0.0655)	(0.0433)
LIQ_{t-1}	0.00686	-0.00472	0.00988*	0.0348**	-0.000829
	(0.00778)	(0.0136)	(0.00496)	(0.0138)	(0.0142)
$LLPLN_{t-1}$	-0.104	-2.469	0.170	0.285	-0.0517
	(0.379)	(3.499)	(0.291)	(0.459)	(0.829)
NII_{t-1}	-0.0109	0.0486	-0.0110	-0.0114	0.0690**
	(0.0425)	(0.0756)	(0.0419)	(0.0355)	(0.0302)
GDPGrowth	-0.0165	-0.560	0.233	-0.110	0.0264
	(0.147)	(0.764)	(0.141)	(0.129)	(0.391)
HHI	-0.170*	-0.340**	-0.138**	-0.173*	-0.178
	(0.0923)	(0.169)	(0.0653)	(0.0971)	(0.130)
InterestRate	1.539	-1.127	-0.174	0.353	0.966
	(0.974)	(1.108)	(0.536)	(0.919)	(1.807)
Observations	788	235	548	425	363
No of Banks	73	49	72	37	36
AR(1)	0.00	0.02	0.00	0.00	0.00
AR(2)	0.28	0.43	0.48	0.14	0.74
Instruments	31	20	27	31	28
Hansen	0.72	0.41	0.39	0.75	0.86

Note: The table presents the full estimation results for risk regressions for core countries. It corresponds to Table 2.10 Panel B. It shows the estimations results for the full period, sub-periods samples, and size samples. The full sample period is (2001-2016), pre-crisis period (2001-2007), post-crisis period (2008-2016), large banks (2001-2016) and small banks (2001-2016). The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table A5 *Regression results for RWATA with interactions ï Core European countries*

	Full Period (1) *RWATA*	Full Period (2) *RWATA*	Large Banks (3) *RWATA*	Large Banks (4) *RWATA*	Small Banks (5) *RWATA*	Small Banks (6) *RWATA*
$RWATA_{t-1}$	0.730***	0.733***	0.738***	0.779***	0.358*	0.391**
	(0.133)	(0.158)	(0.0959)	(0.156)	(0.190)	(0.185)
ECG_{t-1}	-0.366**	0.0763	0.0474	0.178	0.527*	0.330*
	(0.144)	(0.246)	(0.120)	(0.174)	(0.292)	(0.178)
ROA_{t-1}	1.101	-1.433	3.995**	0.495	4.804**	3.914**
	(1.436)	(2.395)	(1.675)	(1.966)	(2.203)	(1.833)
$ECGxROA_{t-1}$	-0.0735	-1.516*	0.586**	-0.599	0.348	0.220
	(0.342)	(0.874)	(0.272)	(0.573)	(0.331)	(0.459)
$ECGxROAxC_{t-1}$		2.019		1.460*		-0.248
		(1.550)		(0.741)		(0.646)
$CapBuff_{t-1}$	0.209**	0.146	0.245	0.0398	0.253	0.212
	(0.0915)	(0.139)	(0.212)	(0.139)	(0.429)	(0.232)
$Size_{t-1}$	-0.344	-0.0310				
	(0.227)	(0.350)				
$DEPAS_{t-1}$	0.0972	0.109	0.143**	0.137	0.0698	0.157
	(0.0785)	(0.0912)	(0.0553)	(0.113)	(0.167)	(0.116)
LIQ_{t-1}	-0.00810	-0.00493	0.00652	0.00819	0.0301	0.0300
	(0.0107)	(0.0125)	(0.00487)	(0.0113)	(0.0341)	(0.0271)
$LLPLN_{t-1}$	1.110***	0.560	3.487**	1.117*	1.203	1.302*
	(0.388)	(0.490)	(1.611)	(0.575)	(0.965)	(0.772)
NII_{t-1}	-0.0733	-0.104*	-0.0191	-0.0307	-0.285**	-0.250***
	(0.0529)	(0.0603)	(0.0211)	(0.0418)	(0.114)	(0.0886)
GDPGrowth	-0.0562	0.355	0.310	0.00318	-2.108*	-1.465
	(0.417)	(0.392)	(0.628)	(0.819)	(1.120)	(1.079)
HHI	0.00873	-0.0628	0.0979	0.0398	0.744*	0.769
	(0.158)	(0.200)	(0.144)	(0.223)	(0.440)	(0.508)
InterestRate	1.342	1.212	0.494	0.488	7.532**	7.737**
	(1.135)	(1.523)	(0.449)	(1.164)	(3.090)	(2.988)
Observations	815	815	399	399	416	416
No of Banks	76	76	32	32	44	44
AR(1)	0.00	0.00	0.00	0.00	0.01	0.02
AR(2)	0.97	0.28	0.51	0.62	0.36	0.27
Instruments	36	39	33	34	37	39
Hansen	0.72	0.76	0.78	0.70	0.26	0.76

Note: The table presents the full estimation results for the interaction effect between excessive credit growth and performance on bank risk for core countries. It corresponds to Table 2.11 Panel A. It shows the estimations results for the full sample, large banks, and small banks. Size is excluded in size specifications. The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Table A6 *Regression results for RWATA with interactions ï Periphery European countries*

	Full Period	Full Period	Large Banks	Large Banks	Small Banks	Small Banks
	(1)	(2)	(3)	(4)	(5)	(6)
	RWATA	*RWATA*	*RWATA*	*RWATA*	*RWATA*	*RWATA*
$RWATA_{t-1}$	0.737***	0.776***	0.695***	0.709***	0.605***	0.634***
	(0.0847)	(0.0974)	(0.127)	(0.105)	(0.162)	(0.134)
ECG_{t-1}	0.100	0.0543	0.0939	0.0312	0.181*	-0.171
	(0.0814)	(0.145)	(0.275)	(0.201)	(0.104)	(0.179)
ROA_{t-1}	0.492	0.0903	1.001	1.515	0.127	1.596
	(0.859)	(1.539)	(0.694)	(2.106)	(0.953)	(2.041)
$ECGxROA_{t-1}$	-0.0407	-0.178	-0.0675	0.253	0.256*	0.382
	(0.262)	(0.317)	(0.250)	(0.915)	(0.149)	(0.303)
$ECGxROAxC_{t-1}$		0.243		-0.320		-0.342
		(0.612)		(1.053)		(0.359)
$CapBuff_{t-1}$	0.0276	0.150	-0.126	-0.180	-0.290*	-0.421*
	(0.160)	(0.158)	(0.262)	(0.326)	(0.160)	(0.243)
$Size_{t-1}$	0.245	0.167				
	(0.219)	(0.226)				
$DEPAS_{t-1}$	0.103**	0.104***	0.170**	0.146**	0.302**	0.261**
	(0.0408)	(0.0390)	(0.0659)	(0.0673)	(0.128)	(0.114)
LIQ_{t-1}	0.00271	0.00557	0.0339**	0.0265	0.0264	0.0205
	(0.0114)	(0.0112)	(0.0155)	(0.0158)	(0.0158)	(0.0146)
$LLPLN_{t-1}$	0.224	0.304	0.303	0.597	-0.562	-0.402
	(0.598)	(0.399)	(0.471)	(0.431)	(1.149)	(1.633)
NII_{t-1}	0.0164	0.0239	-0.0167	-0.0103	0.0214	0.0123
	(0.0307)	(0.0305)	(0.0410)	(0.0393)	(0.0224)	(0.0373)
GDPGrowth	0.127	0.121	-0.0875	-0.0288	-0.00507	-1.139
	(0.137)	(0.133)	(0.139)	(0.106)	(0.564)	(1.411)
HHI	-0.156**	-0.145*	-0.175*	-0.165*	-0.121*	-0.157*
	(0.0758)	(0.0736)	(0.0989)	(0.0884)	(0.0696)	(0.0822)
InterestRate	0.592	0.311	0.378	0.309	1.398	1.652
	(0.645)	(0.843)	(1.223)	(1.041)	(1.069)	(1.723)
Observations	788	788	425	425	363	363
No of Banks	73	73	37	37	36	36
AR(1)	0.00	0.00	0.00	0.00	0.01	0.01
AR(2)	0.32	0.37	0.15	0.24	0.41	0.79
Instruments	36	37	32	34	37	38
Hansen	0.65	0.40	0.58	0.58	0.83	0.77

Note: The table presents the full estimation results for the interaction effect between excessive credit growth and performance on bank risk for core countries. It corresponds to Table 2.11 Panel B. It shows the estimations results for the full sample, large banks, and small banks. Size is excluded in size specifications. The GMM estimations is used in all regressions and performed using two-step system GMM with Windmeijer (2005) corrected standard errors. *ECG* is treated as an endogenous variable. Standard errors in parentheses. *** p<0.1, ** p<0.05, * p<0.1.

Appendix B. Additional Tables for Chapter 3

Table B1 *Regression results for unlisted and listed banks*

	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)	(5)	(6)
	DivEq	*DivEq*	*DivEq*	*DivEq*	*DivEq*	*DivEq*
SNDXRiskH	10.70***	-4.104**	2.553***	0.876**	1.317***	1.138***
	(3.522)	(2.020)	(0.886)	(0.371)	(0.427)	(0.427)
	[-0.218]	[0.431]	[0.244]	[0.528]	[0.224]	[0.988]
SNDXRiskL	7.618***	-0.875	0.633*	1.209***	0.276	1.721***
	(1.881)	(1.892)	(0.336)	(0.300)	(0.332)	(0.322)
	[0.247]	[0.114]	[-0.059]	[0.113]	[-0.014]	[0.037]
MBV					16.00***	19.16***
					(2.905)	(3.593)
					[12.727]	[11.647]
OWNSHIP	3.691**	2.222**	-0.152	-0.678	-0.183	-0.195
	(1.457)	(0.910)	(0.625)	(0.549)	(0.749)	(0.615)
	[0.823]	[1.108]	[-0.500]	[-0.486]	[-0.393]	[-0.103]
AGrowth	-0.0385***	-0.0187*	-0.0305**	-0.0153**	-0.0318**	-0.0220**
	(0.0145)	(0.0104)	(0.0148)	(0.00742)	(0.0123)	(0.00940)
	[-0.021]	[-0.008]	[-0.029]	[-0.009]	[-0.034]	[-0.015]
Size	-0.358	1.044***	0.470**	0.0402	0.363*	-0.161
	(0.392)	(0.271)	(0.201)	(0.149)	(0.196)	(0.153)
	[0.292]	[0.415]	[0.379]	[0.094]	[0.335]	[-0.018]
ROA	2.500***	0.522**	0.817**	0.903***	0.396**	0.492**
	(0.373)	(0.210)	(0.373)	(0.188)	(0.178)	(0.211)
	[1.289]	[0.224]	[0.241]	[0.555]	[0.261]	[.346]
DDEPAS	0.0813	-0.0591***	0.0665***	0.00338	0.0526**	-0.00128
	(0.0659)	(0.0228)	(0.0231)	(0.0116)	(0.0217)	(0.0133)
	[0.057]	[-0.026]	[0.044]	[0.008]	[0.047]	[0.007]
RETE	0.0479***	0.0385***	0.0100	0.00714	0.00999*	0.0103
	(0.0131)	(0.0103)	(0.00735)	(0.00757)	(0.00600)	(0.00733)
	[0.014]	[0.017]	[0.004]	[0.004]	[0.006]	[0.007]
CAP	-0.115	-0.431***	-0.163**	-0.118*	-0.0606	0.0677
	(0.135)	(0.123)	(0.0793)	(0.0691)	(0.0659)	(0.0698)
	[-0.213]	[-0.161]	[-0.124]	[-0.095]	[-0.070]	[0.004]
Pressure	-4.009*	0.173	-1.817	-0.480	-0.528	0.906
	(2.242)	(1.363)	(1.216)	(0.974)	(0.780)	(1.112)
	[0.384]	[-0.077]	[-0.858]	[-0.343]	[-0.447]	[0.335]
Z-Score	-0.0633	0.306	0.0708	0.207*	-0.00931	0.0563
	(0.227)	(0.211)	(0.166)	(0.106)	(0.143)	(0.121)
	[-0.109]	[0.158]	[0.004]	[0.170]	[-0.027]	[0.126]
TBTF	-6.591***	-2.778	-1.470	-1.379*	0.322	-1.330
	(2.453)	(1.924)	(1.101)	(0.838)	(0.996)	(0.878)
	[-1.233]	[-1.840]	[-0.341]	[-0.656]	[0.683]	[-0.164]
Loss	1.215	-4.719***	-0.608	1.130	-0.360	1.036
	(1.369)	(1.171)	(0.725)	(0.913)	(0.640)	(1.195)
	[0.676]	[-1.196]	[-0.636]	[0.753]	[0.512]	[0.842]
BHC	-6.607***	-0.0554	-0.868	-0.00802	0.146	-0.679
	(1.863)	(1.316)	(0.895)	(0.702)	(0.885)	(0.816)
	[-1.067]	[-0.566]	[0.200]	[0.381]	[0.417]	[0.368]
Observations	1,237	2,632	533	1,294	427	1,023
No of Banks	422	451	188	233	149	189
Exogeneity test (Prob>chi2)	0.000	0.044	0.005	0.004	0.089	0.000

Table B1 *Regression results for unlisted and listed banks (cont.)*

	2007-2009 (1) *DivEq*	2010-2015 (2) *DivEq*	2007-2009 (3) *DivEq*	2010-2015 (4) *DivEq*	2007-2009 (5) *DivEq*	2010-2015 (6) *DivEq*
p value: Effect of SND for RiskH = effect of SND for RiskL (Wald test)	0.385	0.169	0.031**	0.390	0.049**	0.184

Note: The table displays the full results of Table 3.4 that reports the impact of subordinated debt on dividend payouts during the crisis period (2007-2009) and post-crisis period (2010-2015) for unlisted and listed banks subsamples. The dependent variable is the dividend-to-equity ratio (*DivEq*). See Table 3.1 for variable definitions. Columns 1-2 display the results of our extended model (Equation 3.2) for unlisted banks, Columns 3-4 display the result of the extended model for listed banks before adding *MBV* ratio, and Columns 5-6 displays the results when the *MBV* ratio is added. For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Columns 3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). Variables winsorised are: *DivEq*, *AGrowth*, *RETE*, and *CAP* at the 1% and 99% quantiles. All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

Table B2 *Robustness Check: All banks*

	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)
	DivAs	*DivAs*	*DivAs*	*DivAs*
SND	2.850***	-0.527		
	(0.997)	(0.331)		
	[-0.007]	[0.013]		
SNDXRiskH			1.134***	0.00639
			(0.313)	(0.0970)
			[0.070]	[0.045]
SNDXRiskL			0.326**	0.291***
			(0.138)	(0.105)
			[-0.008]	[0.010]
OWNSHIP	0.762*	0.119	0.0939	0.191***
	(0.405)	(0.0875)	(0.116)	(0.0680)
	[-0.021]	[0.066]	[-0.016]	[0.069]
AGrowth	-0.00948**	-0.00591***	-0.00869***	-0.00406***
	(0.00399)	(0.00171)	(0.00255)	(0.00120)
	[-0.004]	[-0.002]	[-0.004]	[-0.002]
Size	-0.444**	0.116***	-0.0311	0.0560**
	(0.189)	(0.0449)	(0.0404)	(0.0267)
	[0.010]	[0.028]	[0.007]	[0.031]
ROA	0.629***	0.772***	0.696***	0.769***
	(0.240)	(0.0235)	(0.207)	(0.0227)
	[0.291]	[0.328]	[0.300]	[0.328]
DDEPAS	-0.000533	0.00354	0.00928**	0.00160
	(0.0151)	(0.00241)	(0.00406)	(0.00171)
	[0.004]	[0.001]	[0.004]	[0.001]
RETE	0.00346	-0.00263***	0.00133	-0.00215***
	(0.00409)	(0.000971)	(0.00139)	(0.000718)
	[-0.000]	[-0.001]	[0.000]	[-0.001]
CAP	0.123**	-0.0856***	0.0454**	-0.0516**
	(0.0588)	(0.0301)	(0.0204)	(0.0202)
	[0.009]	[-0.025]	[0.010]	[-0.025]
Pressure	-1.559*	-0.0253	-0.163	-0.173
	(0.800)	(0.163)	(0.155)	(0.112)
	[-0.004]	[-0.082]	[-0.017]	[-0.086]
Z-Score	-0.0134	0.0181	-0.131**	0.0613***
	(0.0926)	(0.0479)	(0.0560)	(0.0183)
	[-0.076]	[0.036}	[-0.066]	[0.031]
TBTF	-2.854**	0.00791	-0.430**	-0.487***
	(1.251)	(0.282)	(0.202)	(0.158)
	[-0.015]	[-0.154]	[-0.022]	[-0.161]
Loss	0.743	1.118***	0.645**	1.084***
	(0.479)	(0.114)	(0.294)	(0.100)
	[0.379]	[0.457]	[0.311]	[0.461]
BHC	-2.530***	0.488	-0.346*	-0.133
	(0.934)	(0.315)	(0.177)	(0.0813)
	[-0.014]	[-0.008]	[-0.011]	[-0.004]
PLC	-0.365	0.0991	-0.0223	0.118*
	(0.416)	(0.0988)	(0.0897)	(0.0663)
	[0.022]	[0.050]	[0.016]	[0.049]
Constant	3.683*	-1.598***	-0.125	-1.393***
	(2.034)	(0.453)	(0.534)	(0.364)
Observations	1,770	3,926	1,770	3,926
No of Banks	610	684	610	684
Exogeneity test (Prob>chi2)	0.004	0.091	0.000	0.058

Table B2 *Robustness Check: All banks (cont.)*

	2007-2009 (1) *DivAs*	2010-2015 (2) *DivAs*	2007-2009 (3) *DivAs*	2010-2015 (4) *DivAs*
p value: Effect of SND for RiskH = effect of SND for RiskL (Wald test)			0.014**	0.017**

Note: The table displays the full results of the robustness check results Table 3.5 that reports the impact of subordinated debt on dividend payouts during the crisis period (2007-2009) and post-crisis period (2010-2015). The dependent variable is the dividend-to-asset ratio (*DivAs*). See Table 3.1 for variable definitions. Columns 1-2 display the results for the baseline model (Equation 3.1), whereas Columns 3-4 display the result for the extended model (Equation 3.2). For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Columns 3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). Variables winsorised are: *DivEq*, *AGrowth*, *RETE*, and *CAP* at the 1% and 99% quantiles. All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

Table B3 *Robustness check: Unlisted banks and listed banks*

	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)	(5)	(6)
	DivAs	*DivAs*	*DivAs*	*DivAs*	*DivAs*	*DivAs*
SNDXRiskH	2.049***	-0.322	0.225***	0.0511**	0.120***	0.0743***
	(0.731)	(0.232)	(0.0756)	(0.0242)	(0.0350)	(0.0275)
	[-0.038]	[0.028]	[0.023]	[0.002]	[0.016]	[0.010]
SNDXRiskL	0.796**	0.346	0.0630**	0.107***	0.0241	0.168***
	(0.353)	(0.266)	(0.0281)	(0.0288)	(0.0282)	(0.0320)
	[0.001]	[0.006]	[-0.007]	[0.009]	[0.003]	[0.001]
MBV					1.567***	1.843***
					(0.278)	(0.360)
					[1.279]	[1.191]
OWNSHIP	0.227	0.267**	0.00855	-0.0489	-0.00978	-0.00493
	(0.254)	(0.108)	(0.0589)	(0.0371)	(0.0628)	(0.0532)
	[0.018]	[0.097]	[-0.028]	[-0.038]	[-0.029]	[-0.002]
AGrowth	-0.00799***	-0.00461***	-0.00357***	-0.00172**	-0.00337***	-0.00223**
	(0.00299)	(0.00161)	(0.00131)	(0.000722)	(0.00119)	(0.000902)
	[-0.004]	[-0.002]	[-0.003]	[-0.001]	[-0.003]	[-0.002]
Size	-0.121*	0.0892**	0.0381**	0.0149	0.0287*	-0.00654
	(0.0702)	(0.0416)	(0.0183)	(0.0137)	(0.0170)	(0.0141)
	[-0.001]	[0.041]	[0.031]	[0.016]	[0.026]	[0.001]
ROA	0.809***	0.785***	0.0895**	0.105***	0.0482***	0.0627**
	(0.199)	(0.0132)	(0.0387)	(0.0202)	(0.0161)	(0.0247)
	[0.336]	[0.316]	[0.049]	[0.068]	[0.033]	[0.045]
DDEPAS	0.00966	0.00247	0.00538***	-0.000118	0.00402**	-0.000954
	(0.00734)	(0.00291)	(0.00200)	(0.000954)	(0.00195)	(0.00109)
	[0.005]	[0.001]	[0.003]	[0.000]	[0.004]	[0.000]
RETE	0.00467**	-0.000994	0.000702	9.01e-05	0.000517	0.000246
	(0.00221)	(0.00112)	(0.000646)	(0.000451)	(0.000513)	(0.000385)
	[0.001]	[-0.001]	[0.000]	[0.000]	[0.000]	[0.000]
CAP	0.0717**	-0.0720**	0.0122	0.00961	0.0249***	0.0304***
	(0.0286)	(0.0280)	(0.0101)	(0.00809)	(0.00899)	(0.00770)
	[0.011]	[-0.032]	[0.008]	[0.004]	[0.020]	[0.018]
Pressure	-0.348	-0.212	-0.203**	-0.101*	-0.0514	-0.00353
	(0.352)	(0.164)	(0.0974)	(0.0521)	(0.0606)	(0.0539)
	[0.120]	[-0.086]	[-0.100]	[-0.060]	[-0.046]	[-0.021]
Z-Score	-0.129**	0.0866***	0.0113	0.0314***	0.00198	0.0170*
	(0.0595)	(0.0278)	(0.0175)	(0.00911)	(0.0128)	(0.0100)
	[-0.060]	[0.040]	[0.004]	[0.024]	[-0.001]	[0.020]
TBTF	-0.556	-0.487*	-0.161	-0.181**	0.0117	-0.170**
	(0.375)	(0.260)	(0.0980)	(0.0740)	(0.0894)	(0.0786)
	[0.018]	[-0.163]	[-0.048]	[-0.099]	[0.046]	[-0.038]
Loss	0.791**	0.910***	-0.0546	0.0709	-0.0498	0.0109
	(0.325)	(0.171)	(0.0672)	(0.0483)	(0.0542)	(0.0600)
	[0.390]	[0.361]	[-0.058]	[0.052]	[-0.058]	[0.026]
BHC	-0.736**	-0.178	-0.126	-0.0133	-0.0451	-0.0909
	(0.352)	(0.159)	(0.0864)	(0.0723)	(0.0880)	(0.0821)
	[-0.041]	[-0.025]	[-0.011]	[0.032]	[-0.017]	[0.030]
Constant	0.363	-1.955***	-0.475	-0.346*	-1.995***	-1.982***
	(0.883)	(0.578)	(0.293)	(0.208)	(0.377)	(0.408)
Observations	1,237	2,632	533	1,294	427	1,023
No of Banks	422	451	188	233	149	189
Exogeneity test (Prob>chi2)	0.000	0.028	0.001	0.008	0.053	0.000

Table B3 *Robustness check: Unlisted banks and listed banks (cont.)*

	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)	(5)	(6)
	DivAs	*DivAs*	*DivAs*	*DivAs*	*DivAs*	*DivAs*
p value: Effect of SND for RiskH = effect of SND for RiskL (Wald test)	0.059*	0.030**	0.030**	0.055*	0.024**	0.003***

Note: The table displays the full results of the robustness check results of Table 3.6 that reports the impact of subordinated debt on dividend payouts during the crisis period (2007-2009) and post-crisis period (2010-2015) for unlisted and listed banks subsamples. The dependent variable is the dividend-to-asset ratio (*DivAs*). See Table 3.1 for variable definitions. Columns 1-2 display the results of the extended model (Equation 3.2) for unlisted banks, Columns 3-4 display the result of the extended model for listed banks before adding *MBV* ratio, and Columns 5-6 displays the results when the *MBV* ratio is added. For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Column3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). Variables winsorised are: *DivEq*, *AGrowth*, *RETE*, and *CAP* at the 1% and 99% quantiles. All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

Table B4 *F-Statistics results for the first stage instruments*

Panel A: Summary results for first-stage regressions (Pre-Crisis Period) before introducing the interactions		
Variable	F(1, 609)	P-val
SND	15.92	0.0001

Panel B: Summary results for first-stage regressions (Post-Crisis Period) before introducing the interactions		
Variable	F(1, 703)	P-val
SND	12.59	0.0007

Panel C: Summary results for first-stage regressions (Pre-Crisis Period) after introducing the interactions		
Variable	F(2, 624)	P-val
SNDXRiskH	19.16	0.0000
SNDXRiskL	52.04	0.0000

Panel D: Summary results for first-stage regressions (Post-Crisis Period) after introducing the interactions		
Variable	F(2, 703)	P-val
SNDXRiskH	40.68	0.0000
SNDXRiskL	59.59	0.0000

Note: The table displays the F-Statistics results for the first stage instruments of all the regressions in Chapter 3. Panel A shows the results before introducing the interaction terms for the pre-crisis period, Panel B shows the results before introducing the interaction terms for the post-crisis period, Panel C shows the results after introducing the interaction terms for the pre-crisis period, and Panel D shows the results after introducing the interaction terms for the post-crisis period.

Appendix C. Extra Tables for Chapter 3 with lagged *Z-Score*

Table C1 *Regression results for the effect of subordinated debt on dividend payouts using lagged Z-Score: All banks*

	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)
	DivEq	*DivEq*	*DivEq*	*DivEq*
SND	13.39***	-2.937		
	(4.875)	(1.840)		
	[.169]	[0.203]		
SNDXRiskH			5.342***	-0.699
			(1.177)	(0.748)
			[0.571]	[0.595]
SNDXRiskL			1.239	0.775
			(0.764)	(0.710)
			[0.085]	[0.158]
OWNSHIP	4.157**	0.971	1.121	1.218**
	(2.078)	(0.691)	(0.723)	(0.568)
	[0.325]	[0.550]	[0.354]	[0.569]
AGrowth	-0.0408**	-0.0265***	-0.0424***	-0.0197**
	(0.0186)	(0.00882)	(0.0108)	(0.00778)
	[-0.027]	[-0.009]	[-0.026]	[-0.009]
Size	-1.574*	0.912***	0.548**	0.615***
	(0.899)	(0.229)	(0.219)	(0.177)
	[0.386]	[0.293]	[0.377]	[0.305]
ROA	1.365***	0.560**	1.607***	0.550**
	(0.371)	(0.259)	(0.280)	(0.261)
	[0.772]	[0.262]	[0.857]	[0.263]
DDEPAS	0.0530	-0.0238	0.0926***	-0.0320**
	(0.0790)	(0.0161)	(0.0325)	(0.0134)
	[0.046]	[-0.014]	[0.048]	[-0.014]
RETE	0.0251	0.0180**	0.0140*	0.0193***
	(0.0211)	(0.00794)	(0.00772)	(0.00692)
	[0.003]	[0.009]	[0.004]	[0.009]
CAP	0.214	-0.443***	-0.245**	-0.289***
	(0.299)	(0.120)	(0.101)	(0.0835)
	[-0.185]	[-0.139]	[-0.181]	[-0.140]
Pressure	-7.266**	0.405	-1.323	-0.243
	(3.578)	(1.320)	(0.954)	(1.012)
	[-0.463]	[-0.287]	[-0.562]	[-0.336]
lZScore	1.239***	0.166	0.937***	0.452***
	(0.312)	(0.295)	(0.168)	(0.121)
	[0.380]	[0.263]	[0.411]	[0.220]
TBTF	-15.41**	-0.912	-4.314***	-3.150***
	(6.150)	(1.750)	(1.151)	(1.002)
	[-1.621]	[-1.504]	[-1.531]	[-1.519]
Loss	-0.111	-2.144**	-0.203	-2.224**
	(1.375)	(1.068)	(0.949)	(0.937)
	[0.587]	[-1.179]	[0.052]	[-1.077]
BHC	-13.22***	2.265	-2.395***	-0.748
	(4.688)	(1.878)	(0.900)	(0.727)
	[-0.781]	[-0.419]	[-0.675]	[-0.366]
PLC	-0.814	0.560	0.513	0.642
	(1.953)	(0.767)	(0.589)	(0.576)
	[0.420]	[0.313]	[0.383]	[0.293]
Observations	1,737	3,844	1,737	3,844
No of Banks	600	684	600	684

Table C1 *Regression results for the effect of subordinated debt on dividend payouts using lagged Z-Score: All banks (cont.)*

	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)
	DivEq	*DivEq*	*DivEq*	*DivEq*
Exogeneity test (Prob>chi2)	0.008	0.071	0.001	0.048

Note: The table displays the results of the impact of subordinated debt on dividend payouts during the crisis period (2007-2010) and post-crisis period (2010-2016). The table is equivalent to Table 3.3 but with *Z-Score* lagged by one year. The dependent variable is the dividend-to-equity ratio (*DivEq*). See Table 3.1 for variable definitions. Columns 1-2 display the results for the baseline model (Equation 3.1), whereas Columns 3-4 display the result for the extended model (Equation 3.2). For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for the interactions terms (Columns 3-4) are calculated at the mean value of the explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). Variables winsorised are: *DivEq*, *AGrowth*, *RETE*, and *CAP* at the 1% and 99% quantiles. All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

Table C2 *Regression results for unlisted and listed banks using lagged Z-Score*

	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)	(5)	(6)
	DivEq	*DivEq*	*DivEq*	*DivEq*	*DivEq*	*DivEq*
SNDXRiskH	9.880***	-3.322*	2.601***	0.891**	0.957**	1.250***
	(3.649)	(1.884)	(0.854)	(0.367)	(0.447)	(0.426)
	[-0.309]	[0.548]	[0.459]	[0.525]	[0.129]	[0.978]
SNDXRiskL	3.396*	-0.876	0.382	1.315***	0.133	1.685***
	(1.952)	(1.810)	(0.354)	(0.292)	(0.323)	(0.312)
	[0.256]	[0.139]	[-0.006]	[0.122]	[-0.002]	[0.069]
MBV					17.30***	19.37***
					(3.344)	(3.570)
					[14.551]	[11.893]
OWNSHIP	1.963	2.197**	0.0245	-0.654	-0.0671	-0.143
	(1.528)	(0.892)	(0.742)	(0.572)	(0.714)	(0.634)
	[0.666]	[1.089]	[-0.294]	[-0.485]	[-0.201]	[-0.062]
AGrowth	-0.0353**	-0.0189*	-0.0295**	-0.0187**	-0.0325***	-0.0248**
	(0.0148)	(0.0104)	(0.0149)	(0.00807)	(0.0119)	(0.00976)
	[-0.021]	[-0.008]	[-0.027]	[-0.011]	[-0.032]	[-0.016]
Size	0.229	0.975***	0.511**	0.0167	0.386**	-0.168
	(0.388)	(0.268)	(0.200)	(0.153)	(0.186)	(0.156)
	[0.354]	[0.385]	[0.380]	[0.082]	[0.335]	[-0.031]
ROA	1.925***	0.556**	0.507	0.900***	0.0322	0.510**
	(0.413)	(0.258)	(0.326)	(0.185)	(0.177)	(0.204)
	[1.045]	[0.241]	[0.191]	[0.555]	[-0.036]	[0.372]
DDEPAS	0.114**	-0.0592***	0.0609**	0.00367	0.0477**	-0.00184
	(0.0570)	(0.0226)	(0.0245)	(0.0120)	(0.0227)	(0.0134)
	[0.059]	[-0.026]	[0.041]	[0.009]	[0.042]	[0.007]
RETE	0.0320**	0.0349***	0.0112	0.00585	0.00889	0.00916
	(0.0136)	(0.0103)	(0.00726)	(0.00795)	(0.00621)	(0.00751)
	[0.008]	[0.016]	[0.006]	[0.004]	[0.006]	[0.006]
CAP	-0.196	-0.426***	-0.149**	-0.110	-0.0725	0.0680
	(0.166)	(0.123)	(0.0727)	(0.0707)	(0.0690)	(0.0697)
	[-0.206]	[-0.162]	[-0.112]	[-0.091]	[-0.070]	[0.011]
Pressure	-2.176	0.355	-0.595	-0.528	-0.847	0.948
	(1.796)	(1.338)	(1.127)	(0.995)	(0.842)	(1.126)
	[0.220]	[-0.001]	[-0.216]	[-0.443]	[-0.731]	[0.343]
lZScore	1.231***	0.529***	0.460***	0.232**	0.241**	0.187*
	(0.277)	(0.192)	(0.146)	(0.102)	(0.0984)	(0.112)
	[0.519]	[0.250]	[0.239]	[0.145]	[0.158]	[0.121]
TBTF	-6.039***	-2.621	-1.784	-1.333	0.465	-1.229
	(2.073)	(1.867)	(1.092)	(0.848)	(0.933)	(0.875)
	[-1.554]	[-1.720]	[-0.766]	[-0.618]	[0.668]	[-0.150]
Loss	0.0208	-4.465***	-1.152	1.158	-0.885	1.242
	(1.624)	(1.235)	(0.745)	(0.918)	(0.618)	(1.187)
	[0.546]	[-1.869]	[-1.033]	[0.752]	[-0.863]	[0.936]
BHC	-4.510***	-0.0550	-0.294	-0.135	0.490	-0.671
	(1.722)	(1.310)	(0.983)	(0.701)	(0.968)	(0.809)
	[-0.925]	[-0.556]	[0.379]	[0.336]	[0.587]	[0.343]
Observations	1,218	2,601	519	1,243	417	991
No of Banks	417	451	183	233	145	189

Table C2 *Regression results for unlisted and listed banks using lagged Z-Score (cont.)*

	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)	(5)	(6)
	DivEq	*DivEq*	*DivEq*	*DivEq*	*DivEq*	*DivEq*
Exogeneity test (Prob>chi2)	0.000	0.075	0.056	0.000	0.203	0.000

Note: The table displays the results of the impact of subordinated debt on dividend payouts during the crisis period (2007-2010) and post-crisis period (2010-2016) for unlisted and listed banks subsamples. The table is equivalent to Table 3.4 but with *Z-Score* lagged by one year. The dependent variable is the dividend-to-equity ratio (*DivEq*). See Table 3.1 for variable definitions. Columns 1-2 display the results of our extended model (Equation 3.2) for unlisted banks, Columns 3-4 display the result of the extended model for listed banks before adding *MBV* ratio, and Columns 5-6 displays the results when the *MBV* ratio is added. For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Columns 3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). Variables winsorised are: *DivEq*, *AGrowth*, *RETE*, and *CAP* at the 1% and 99% quantiles. All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

Appendix D. Extra Tables for Chapter 3 with *LLP ratio* as a risk measure

Table D1 *Regression results for the effect of subordinated debt on dividend payouts using LLP ratio: All banks*

	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)
	DivEq	*DivEq*	*DivEq*	*DivEq*
SND	23.98***	-6.433***		
	(8.595)	(2.170)		
	[0.187]	[0.134]		
SNDXRiskH			6.820***	-1.532*
			(1.552)	(0.874)
			[0.591]	[0.572]
SNDXRiskL			2.700***	0.486
			(0.789)	(0.829)
			[0.111]	[0.167]
OWNSHIP	8.452**	0.631	1.991***	1.032*
	(3.856)	(1.016)	(0.763)	(0.611)
	[0.514]	[0.473]	[0.554]	[0.517]
AGrowth	-0.0578*	-0.0290***	-0.0442***	-0.0127
	(0.0296)	(0.0112)	(0.0118)	(0.00872)
	[-0.029]	[-0.006]	[-0.027]	[-0.006]
Size	-3.421**	1.202***	0.312	0.661***
	(1.564)	(0.283)	(0.237)	(0.190)
	[0.361]	[0.310]	[0.349]	[0.317]
ROA	1.211**	0.510***	1.652***	0.487**
	(0.584)	(0.185)	(0.312)	(0.196)
	[0.778]	[0.236]	[0.870]	[0.238]
DDEPAS	0.0491	-0.0146	0.0982***	-0.0262*
	(0.139)	(0.0236)	(0.0370)	(0.0143)
	[0.053]	[-0.013]	[0.054]	[-0.012]
RETE	0.0350	0.0111	0.0174**	0.0207***
	(0.0336)	(0.0100)	(0.00851)	(0.00668)
	[0.003]	[0.011]	[0.004]	[0.010]
CAP	0.664	-0.683***	-0.135	-0.339***
	(0.492)	(0.152)	(0.110)	(0.0775)
	[-0.161]	[-0.161]	[-0.157]	[-0.159]
Pressure	-15.35**	1.551	-2.250**	-0.421
	(7.604)	(1.794)	(1.069)	(1.047)
	-0.352]	[-0.463]	[-0.456]	[-0.490]
LLP	-0.135*	0.703**	-0.148***	0.300
	(0.0714)	(0.331)	(0.0482)	(0.281)
	[-0.061]	[0.136]	[-0.072]	[0.134]
TBTF	-25.42**	1.509	-5.114***	-3.134***
	(11.13)	(2.301)	(1.420)	(1.091)
	[-1.582]	[-1.533]	[-1.467]	[-1.607]
Loss	-3.707	-1.942	-0.938	-2.691***
	(2.581)	(1.343)	(1.121)	(0.982)
	[0.206]	[-1.552]	[-0.278]	[-1.382]
BHC	-20.13***	5.035**	-2.951***	-0.791
	(7.666)	(2.224)	(0.951)	(0.786)
	[-0.722]	[-0.511]	[-0.592]	[-0.504]
PLC	-4.272	0.504	-0.147	0.573
	(3.643)	(1.129)	(0.658)	(0.599)
	[0.383]	[0.283]	[0.322]	[0.265]
Observations	1,635	3,624	1,635	3,624
No of Banks	560	631	560	631

Table D1 *Regression results for the effect of subordinated debt on dividend payouts using LLP ratio: All banks (cont.)*

	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)
	DivEq	*DivEq*	*DivEq*	*DivEq*
Exogeneity test (Prob>chi2)	0.006	0.002	0.000	0.013

Note: The table displays the results of the impact of subordinated debt on dividend payouts during the crisis period (2007-2009) and post-crisis period (2010-2015). The table is equivalent to Table 3.3 but with *Z-Score* replaced by the ratio of loan loss reserves (*LLP*). The dependent variable is the dividend-to-equity ratio (*DivEq*). See Table 3.1 for variable definitions. Columns 1-2 display the results for the baseline model (Equation 3.1), whereas Columns 3-4 display the result for the extended model (Equation 3.2). For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for the interactions terms (Columns 3-4) are calculated at the mean value of the explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). Variables winsorised are: *DivEq*, *AGrowth*, *RETE*, and *CAP* at the 1% and 99% quantiles. All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

Table D2 *Regression results for unlisted and listed banks using LLP ratio*

	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015
	(1)	(2)	(3)	(4)	(5)	(6)
	DivEq	*DivEq*	*DivEq*	*DivEq*	*DivEq*	*DivEq*
SNDXRiskH	15.69**	-5.748**	2.782***	1.025***	0.865*	1.112***
	(6.853)	(2.281)	(1.059)	(0.383)	(0.465)	(0.402)
	[-0.264]	[0.526]	[0.293]	[0.537]	[0.113]	[0.862]
SNDXRiskL	6.728***	-1.938	0.880**	1.494***	0.0920	1.780***
	(2.294)	(2.290)	(0.407)	(0.331)	(0.342)	(0.335)
	[0.377]	[0.122]	[-0.044]	[0.139]	[-0.011]	[0.045]
MBV					17.60***	19.38***
					(2.990)	(3.545)
					[14.590]	[11.861]
OWNSHIP	4.039**	1.863*	0.207	-0.669	-0.459	-0.170
	(1.862)	(1.028)	(0.728)	(0.600)	(0.780)	(0.620)
	[0.954]	[1.083]	[-0.279]	[-0.496]	[-0.529]	[-0.049]
AGrowth	-0.0434**	-0.0127	-0.0284*	-0.0191**	-0.0394***	-0.0229**
	(0.0179)	(0.0118)	(0.0161)	(0.00904)	(0.0132)	(0.0105)
	[-0.022]	[-0.004]	[-0.027]	[-0.012]	[-0.037]	[-0.017]
Size	-0.376	1.121***	0.412*	-0.00340	0.447**	-0.170
	(0.454)	(0.300)	(0.218)	(0.157)	(0.197)	(0.156)
	[0.325]	[0.412]	[0.310]	[0.079]	[0.382]	[-0.014]
ROA	2.042***	0.499***	0.429	0.977***	-0.00884	0.501**
	(0.564)	(0.187)	(0.342)	(0.183)	(0.172)	(0.209)
	[1.123]	[0.218]	[0.157]	[0.600]	[-0.060]	[0.345]
DDEPAS	0.121*	-0.0580**	0.0559**	0.00230	0.0537**	-0.00157
	(0.0706)	(0.0259)	(0.0259)	(0.0126)	(0.0227)	(0.0143)
	[0.067]	[-0.027]	[0.037]	[0.009]	[0.047]	[0.007]
RETE	0.0377***	0.0358***	0.0125	0.00829	0.0103*	0.0104
	(0.0146)	(0.0105)	(0.00807)	(0.00771)	(0.00598)	(0.00738)
	[0.010]	[0.017]	[0.005]	[0.005]	[0.007]	[0.007]
CAP	0.0629	-0.561***	-0.127	-0.121*	-0.0500	0.0690
	(0.194)	(0.131)	(0.0880)	(0.0720)	(0.0675)	(0.0701)
	[-0.163]	[-0.202]	[-0.101]	[-0.100]	[-0.053]	[0.005]
Pressure	-4.567	0.211	-1.234	-0.500	-0.813	0.916
	(2.909)	(1.476)	(0.974)	(0.997)	(0.783)	(1.119)
	[0.442]	[-0.220]	[-0.025]	[-0.366]	[-0.675]	[0.309]
LLP	-0.331	0.490*	0.145	-0.270	-0.415	-0.0420
	(0.293)	(0.297)	(0.280)	(0.221)	(0.264)	(0.263)
	[-0.166]	[0.214]	[0.244]	[-0.166]	[-0.325]	[-0.125]
TBTF	-7.193**	-2.054	-1.941	-1.477*	0.572	-1.324
	(2.854)	(2.176)	(1.271)	(0.876)	(0.935)	(0.885)
	[-1.738]	[-1.800]	[-0.436]	[-0.654]	[0.733]	[-0.133]
Loss	-0.918	-5.381***	-1.810**	1.456	-0.892	1.059
	(2.178)	(1.388)	(0.896)	(0.960)	(0.611)	(1.198)
	[0.362]	[-2.408]	[-1.476]	[0.906]	[-0.816]	[0.864]
BHC	-5.201**	0.288	-0.570	-0.337	0.274	-0.715
	(2.235)	(1.498)	(0.906)	(0.723)	(0.937)	(0.820)
	[-0.953]	[-0.695]	[0.546]	[0.298]	[0.346]	[0.376]
Observations	1,118	2,384	517	1,240	428	1,017
No of Banks	379	409	181	222	148	188
Exogeneity test (Prob>chi2)	0.000	0.007	0.002	0.000	0.191	0.000

Note: The table displays the results of the impact of subordinated debt on dividend payouts during the crisis period (2007-2010) and post-crisis period (2010-2016) for unlisted and listed banks subsamples. The table is equivalent to Table 3.4 but with *Z-Score* replaced by the ratio of loan loss reserves (*LLP*). The dependent variable is the dividend-to-equity ratio (*DivEq*). See Table 3.1 for variable definitions. Columns 1-2 display the results of our extended model (Equation 3.2) for unlisted banks, Columns 3-4 display the result of the extended model for listed banks before adding *MBV* ratio, and Columns 5-6 displays the results when the *MBV* ratio is added. For each variable, the first row shows regression coefficient, second row shows standard error (round brackets), and third row shows marginal effect (square brackets). In all regressions, the marginal effect is calculated following Skeels and Taylor (2015) to account for endogeneity. The marginal effects for our interactions terms (Columns 3-4) are calculated at the mean value of our explanatory variables conditional on paying dividend $E(Y_{i,t}|X_{i,t}, Y_{i,t} > 0)$, for risky banks ($RiskH = 1, RiskL = 0$) and safe banks ($RiskH = 0, RiskL = 1$). Variables winsorised are: *DivEq*, *AGrowth*, *RETE*, and *CAP* at the 1% and 99% quantiles. All regressions are estimated with robust standard errors, clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.

Appendix E. Additional Tables for Chapter 4

Table E1 *Securitisation and equity capital adjustment for low capitalised banks*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CGrowth	*LIQASGR*	*EAGrowth*	*CGrowth*	*LIQASGR*	*EAGrowth*
Surplus $_{t-1}$	1.951**	-1.202*	-1.121***	1.026	-0.687**	-1.034***
	(0.781)	(0.697)	(0.319)	(0.805)	(0.340)	(0.308)
Shortage $_{t-1}$	1.796	0.638	4.770***	3.527**	0.367	3.780***
	(1.868)	(1.967)	(0.929)	(1.698)	(1.294)	(0.715)
$LowCap_tXSurplus_{t-1}$	-0.881	2.606*	-0.789			
	(1.134)	(1.544)	(0.963)			
$SecActive_tXSurplus_{t-1}$	-2.025***	1.601*	0.0220			
	(0.599)	(0.954)	(0.248)			
$SecActive_tXLowCap_tXSurplus_{t-1}$	-0.417	3.853***	-2.187***			
	(2.094)	(1.069)	(0.583)			
$LowCap_tXShortage_{t-1}$	0.364	-3.458*	-1.503			
	(1.754)	(1.985)	(1.127)			
$SecActive_tXShortage_{t-1}$	2.335	-1.416	-1.247			
	(3.480)	(2.774)	(1.407)			
$SecActive_tXLowCap_tXShortage_{t-1}$	-3.252	0.318	-1.042			
	(2.058)	(2.324)	(1.109)			
$LowCap_tXSurplus_{t-1}$				0.110	2.247*	-0.960
				(1.104)	(1.287)	(0.881)
$High_tXSurplus_{t-1}$				-1.183**	1.654***	-0.298
				(0.525)	(0.366)	(0.239)
$High_tXUnderCap_tXSurplus_{t-1}$				0.557	3.546***	-2.728***
				(2.669)	(0.877)	(0.679)
$LowCap_tXShortage_{t-1}$				-2.615	-1.762	-0.328
				(1.777)	(1.472)	(0.626)
$High_tXShortage_{t-1}$				-2.063	-2.648	1.120
				(2.364)	(1.735)	(0.910)
$High_tXLowCap_tXShortage_{t-1}$				-5.986***	0.780	0.435
				(2.115)	(1.971)	(0.752)
CGrowth $_{t-1}$	0.0799***			0.0826***		
	(0.0261)			(0.0257)		
LIQASGR $_{t-1}$		-0.0234			-0.0243	
		(0.0241)			(0.0240)	
EAGrowth $_{t-1}$			-0.327***			-0.331***
			(0.0375)			(0.0352)
SecActive $_t$	0.396	-2.633	1.251**			
	(1.540)	(1.732)	(0.624)			
High $_t$				-1.209	-1.548	0.916
				(1.407)	(1.336)	(0.571)
LowCap $_t$	1.270	2.390	-9.058***	1.010	2.512*	-9.118***
	(1.438)	(1.463)	(0.705)	(1.379)	(1.369)	(0.746)

Table E1 *Securitisation and equity capital adjustment for low capitalised banks (cont.)*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CGrowth	*LIQASGR*	*EAGrowth*	*CGrowth*	*LIQASGR*	*EAGrowth*
NII $_{t-1}$	0.00460	-0.0673*	-0.0212	0.0244	-0.0718*	-0.0257
	(0.0493)	(0.0389)	(0.0186)	(0.0537)	(0.0401)	(0.0186)
CDEPAS $_{t-1}$	-0.0318	-0.0886	0.122***	-0.0314	-0.0710	0.111***
	(0.0925)	(0.0790)	(0.0440)	(0.0974)	(0.0802)	(0.0407)
CostIncome $_{t-1}$	0.0197	-0.0551	0.0339*	0.0242	-0.0520	0.0336*
	(0.0474)	(0.0436)	(0.0185)	(0.0465)	(0.0422)	(0.0184)
PLC $_{t}$	-1.068	-2.198	-1.987	-1.581	-1.999	-1.770
	(1.876)	(1.965)	(1.321)	(1.742)	(1.966)	(1.312)
TBTF $_{t}$	-0.828	1.571	-4.106***	-0.497	2.077	-4.384***
	(2.208)	(1.534)	(1.063)	(2.194)	(1.619)	(1.012)
GDPGrowth $_{t-1}$	-0.785	-7.173***	0.886	-0.854	-6.326***	0.449
	(2.470)	(2.029)	(1.106)	(2.531)	(1.940)	(0.997)
IBRate $_{t-1}$	4.151*	-0.188	-2.221**	4.116*	-0.861	-1.817**
	(2.241)	(1.889)	(1.000)	(2.302)	(1.842)	(0.900)
Crisis $_{t}$	-8.418***	26.62***	1.774	-7.841**	25.82***	1.914
	(3.095)	(4.236)	(1.641)	(3.037)	(4.184)	(1.632)
Observations	3,955	3,955	3,955	3,955	3,955	3,955
No. of Banks	375	375	375	375	375	375
Instruments	32	30	34	32	30	34
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.11	0.77	0.55	0.10	0.79	0.43
Hansen	0.26	0.18	0.11	0.28	0.17	0.10

Note: The table reports the full results of the estimation results of Equation 4.5 after introducing low capitalisation dummy. Column 1 displays the estimation results when the dependent variable is loan growth ratio (*CGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets (*LIQASGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of total equity to total assets (*EAGrowth*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaces by the dummy *High*. The dummy *LowCap* takes the value one if a bankǿs equity capital ratio (equity to asset) is below the median, and zero otherwise. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table E2 *Securitisation and equity capital adjustment during the 2007-2009 financial crisis*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CGrowth	*LIQASGR*	*EAGrowth*	*CGrowth*	*LIQASGR*	*EAGrowth*
Surplus $_{t-1}$	0.665	-0.178	-0.793**	0.254	-0.336	-0.604***
	(0.715)	(0.609)	(0.350)	(0.614)	(0.413)	(0.227)
Shortage $_{t-1}$	2.023	-1.700	2.836***	2.040*	-1.270	2.387***
	(1.544)	(1.520)	(0.525)	(1.152)	(0.879)	(0.441)
Crisis$_t$XSurplus $_{t-1}$	1.899*	-0.261	-0.0795			
	(1.031)	(1.415)	(0.369)			
SecActive$_t$XSurplus $_{t-1}$	-0.969	-0.0289	0.332			
	(0.730)	(0.886)	(0.356)			
SecActive$_t$XCrisis$_t$XSurplus $_{t-1}$	-0.569	1.392*	-0.305			
	(0.811)	(0.799)	(0.390)			
Crisis$_t$XShortage $_{t-1}$	-0.751	4.762	0.355			
	(2.622)	(3.252)	(1.852)			
SecActive$_t$XShortage $_{t-1}$	-1.021	1.204	-0.535			
	(2.517)	(2.136)	(0.832)			
SecActive$_t$XCrisis$_t$XShortage $_{t-1}$	-2.922	4.854	1.731			
	(2.446)	(2.965)	(1.216)			
Crisis$_t$XSurplus $_{t-1}$				2.204**	0.0166	-0.283
				(0.877)	(1.420)	(0.291)
High$_t$XSurplus $_{t-1}$				-1.328	0.996	0.0364
				(1.398)	(1.098)	(0.437)
High$_t$XCrisis$_t$XSurplus $_{t-1}$				-0.0947	1.598**	-0.520*
				(0.609)	(0.716)	(0.306)
Crisis$_t$XShortage $_{t-1}$				-0.459	5.063**	0.826
				(2.230)	(2.422)	(1.113)
High$_t$XShortage $_{t-1}$				-3.014*	1.075	0.389
				(1.559)	(1.233)	(0.588)
High$_t$XCrisis$_t$XShortage $_{t-1}$				-5.532**	1.552	4.313***
				(2.628)	(2.814)	(1.169)
CGrowth $_{t-1}$	0.0807***			0.0820***		
	(0.0249)			(0.0256)		
LIQASGR $_{t-1}$		-0.0260			-0.0248	
		(0.0242)			(0.0241)	
EAGrowth $_{t-1}$			-0.209***			-0.208***
			(0.0288)			(0.0273)
SecActive$_t$ $_{t-1}$	-0.621	-0.792	1.095*			
	(1.844)	(1.769)	(0.614)			
High$_t$				-0.992	-0.659	0.834
				(1.473)	(1.378)	(0.623)
NII $_{t-1}$	0.0177	-0.0758*	-0.0304*	0.0299	-0.0807*	-0.0347**
	(0.0487)	(0.0409)	(0.0163)	(0.0520)	(0.0419)	(0.0166)
CDEPAS $_{t-1}$	-0.0304	-0.0492	0.0416	-0.0301	-0.0476	0.0403
	(0.0972)	(0.0816)	(0.0397)	(0.0977)	(0.0791)	(0.0380)

Table E2 *Securitisation and equity capital adjustment during the 2007-2009 financial crisis (cont.)*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CGrowth	*LIQASGR*	*EAGrowth*	*CGrowth*	*LIQASGR*	*EAGrowth*
CostIncome $_{t-1}$	0.0426	-0.0432	0.0342*	0.0414	-0.0378	0.0331*
	(0.0479)	(0.0424)	(0.0189)	(0.0498)	(0.0414)	(0.0185)
PLC_t	-0.964	-2.194	-1.693*	-1.527	-2.321	-1.520
	(2.097)	(1.875)	(1.017)	(1.923)	(1.902)	(0.933)
$TBTF_t$	-0.721	1.132	-2.331***	-0.278	1.484	-2.535***
	(2.267)	(1.526)	(0.884)	(2.131)	(1.559)	(0.858)
GDPGrowth $_{t-1}$	-0.798	-6.531***	0.638	-0.831	-6.302***	0.454
	(2.498)	(2.073)	(1.013)	(2.346)	(1.929)	(0.946)
IBRate $_{t-1}$	4.049*	-0.766	-2.361**	4.069*	-1.001	-2.163**
	(2.264)	(1.974)	(0.927)	(2.134)	(1.867)	(0.858)
$Crisis_t$	-8.225***	22.52***	1.308	-9.088***	23.16***	1.187
	(3.026)	(4.447)	(1.883)	(2.908)	(4.513)	(1.865)
Observations	3,955	3,955	3,955	3,955	3,955	3,955
No. of Banks	375	375	375	375	375	375
Instruments	31	29	33	31	29	33
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.17	0.84	0.82	0.12	0.78	0.80
Hansen	0.20	0.16	0.24	0.13	0.18	0.27

Note: The table reports full results of the estimation results for Equation 4.5 after introducing the crisis interactions. Column 1 displays the estimation results when the dependent variable is loan growth ratio (*CGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets (*LIQASGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of total equity to total assets (*EAGrowth*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaces by the dummy *High*. The dummy *Crisis* is interacted with the key variables of interest. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table E3 *Robustness check: Securitisation and equity capital adjustment*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
Surplus $_{t-1}$	0.198	-0.157	-1.122***	0.141	-0.347	-1.002***
	(0.192)	(0.493)	(0.257)	(0.116)	(0.328)	(0.284)
Shortage $_{t-1}$	0.641*	-1.083	2.506***	0.494**	-0.812	2.299***
	(0.385)	(1.153)	(0.482)	(0.223)	(0.701)	(0.514)
SecActive$_t$*XSurplus* $_{t-1}$	-0.255	0.140	-0.0127			
	(0.233)	(0.591)	(0.208)			
SecActive$_t$*XShortage* $_{t-1}$	-0.604	0.886	0.181			
	(0.614)	(1.658)	(0.731)			
High$_t$*XSurplus* $_{t-1}$				-0.283**	0.779*	-0.215
				(0.136)	(0.469)	(0.220)
High$_t$*XShortage* $_{t-1}$				-0.687*	0.649	1.018
				(0.370)	(1.015)	(0.657)
CCGrowth $_{t-1}$	0.0653**			0.0645**		
	(0.0296)			(0.0296)		
LIQGR $_{t-1}$		-0.0478*			-0.0477*	
		(0.0253)			(0.0251)	
SHETAGr $_{t-1}$			-0.234***			-0.231***
			(0.0331)			(0.0325)
SecActive$_t$	0.318	-0.409	0.961*			
	(0.576)	(1.597)	(0.580)			
High$_t$				0.439	-0.781	0.658
				(0.358)	(1.141)	(0.558)
NII $_{t-1}$	0.0139	-0.0412	-0.0273*	0.0157	-0.0428	-0.0314*
	(0.0118)	(0.0305)	(0.0164)	(0.0117)	(0.0312)	(0.0163)
CDEPAS $_{t-1}$	-0.0235	-0.0342	-0.0123	-0.0254	-0.0329	-0.00695
	(0.0255)	(0.0737)	(0.0422)	(0.0248)	(0.0715)	(0.0408)
CostIncome $_{t-1}$	0.0400**	-0.0486	0.0260	0.0386**	-0.0439	0.0264
	(0.0156)	(0.0356)	(0.0192)	(0.0155)	(0.0347)	(0.0189)
PLC$_t$	0.510	-2.068*	-0.641	0.473	-2.071*	-0.607
	(0.452)	(1.083)	(0.886)	(0.489)	(1.132)	(0.908)
TBTF$_t$	-1.129*	2.771**	-1.788*	-1.160*	2.940**	-1.933**
	(0.645)	(1.382)	(0.935)	(0.683)	(1.410)	(0.909)
GDPGrowth $_{t-1}$	1.520**	-5.406***	-0.819	1.445**	-5.330***	-0.803
	(0.627)	(1.775)	(1.181)	(0.571)	(1.669)	(1.103)
IBRate $_{t-1}$	0.170	-0.788	-0.865	0.234	-0.809	-0.876
	(0.609)	(1.762)	(1.019)	(0.563)	(1.670)	(0.959)
Crisis$_t$	-6.662***	21.87***	3.347*	-6.609***	21.52***	3.357*
	(1.141)	(3.650)	(1.915)	(1.143)	(3.635)	(1.888)
Observations	3,955	3,955	3,621	3,955	3,955	3,621
No. of Banks	375	375	340	375	375	340
Instruments	27	25	50	27	25	50
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00

Table E3 *Robustness check: Securitisation and equity capital adjustment (cont.)*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
AR(2)	0.12	.69	.87	0.38	0.63	0.79
Hansen	.47	0.37	0.54	0.47	0.33	.59

Note: The table reports the full results of the estimation results of the robustness check for Equation 4.5. Column 1 displays the estimation results when the dependent variable is loan growth ratio including credit commitments (*CCGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets including trading assets (*LIQGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of equity to total assets excluding retained earnings (*SHETAGr*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaces by the dummy *High*. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table E4 *Robustness check: Securitisation and equity capital adjustment for low capitalised banks*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
Surplus $_{t-1}$	0.293	-0.691	-1.089***	0.191*	-0.679**	-1.051***
	(0.183)	(0.519)	(0.241)	(0.115)	(0.307)	(0.246)
Shortage $_{t-1}$	0.143	0.666	4.617***	0.279	0.114	3.864***
	(0.547)	(1.825)	(0.859)	(0.272)	(1.162)	(0.820)
$LowCap_tXSurplus_{t-1}$	-0.311	2.037	-2.879***			
	(0.534)	(1.392)	(0.338)			
$SecActive_tXSurplus_{t-1}$	-0.329	0.476	-0.0720			
	(0.223)	(0.599)	(0.175)			
$SecActive_tXLowCap_tXSurplus_{t-1}$	-0.667	3.245***	-2.900***			
	(0.413)	(0.877)	(0.578)			
$LowCap_tXShortage_{t-1}$	0.957**	-3.374*	-1.431			
	(0.482)	(1.799)	(1.069)			
$SecActive_tXShortage_{t-1}$	0.252	-1.800	-0.441			
	(0.899)	(2.512)	(1.813)			
$SecActive_tXLowCap_tXShortage_{t-1}$	-0.363	-0.0763	-1.210			
	(0.696)	(2.134)	(1.006)			
$LowCap_tXSurplus_{t-1}$				-0.314	2.235*	-3.138***
				(0.489)	(1.228)	(0.346)
$High_tXSurplus_{t-1}$				-0.334***	0.925**	-0.215
				(0.114)	(0.453)	(0.172)
$High_tXLowCap_tXSurplus_{t-1}$				-0.375	3.126***	-2.608***
				(0.579)	(0.757)	(0.475)
$LowCap_tXShortage_{t-1}$				0.420	-1.691	-0.859
				(0.398)	(1.322)	(0.786)
$High_tXShortage_{t-1}$				0.167	-2.234	2.433**
				(0.485)	(1.577)	(0.993)
$High_tXUnderCap_tXShortage_{t-1}$				-0.810	0.873	0.349
				(0.505)	(1.725)	(0.916)
CCGrowth $_{t-1}$	0.0660**			0.0616**		
	(0.0303)			(0.0297)		
LIQGR $_{t-1}$		-0.0428			-0.0450*	
		(0.0260)			(0.0256)	
SHETAGr $_{t-1}$			-0.344***			-0.354***
			(0.0369)			(0.0327)
$SecActive_t$	0.618	-1.636	1.105*			
	(0.533)	(1.463)	(0.564)			
$High_t$				0.555	-1.222	0.175
				(0.381)	(1.180)	(0.525)
$LowCap_t$	-0.381	1.358	-7.742***	-0.430	1.487	-7.672***
	(0.409)	(1.287)	(0.625)	(0.403)	(1.250)	(0.638)

Table E4 *Robustness check: Securitisation and equity capital adjustment for low capitalised banks (cont.)*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
NII_{t-1}	0.0134	-0.0392	-0.0264	0.0153	-0.0413	-0.0308*
	(0.0116)	(0.0296)	(0.0175)	(0.0118)	(0.0308)	(0.0175)
$CDEPAS_{t-1}$	-0.0209	-0.0508	0.0823*	-0.0237	-0.0425	0.0824*
	(0.0262)	(0.0713)	(0.0436)	(0.0255)	(0.0713)	(0.0422)
$CostIncome_{t-1}$	0.0413***	-0.0545	0.0416**	0.0402***	-0.0535	0.0434**
	(0.0154)	(0.0352)	(0.0198)	(0.0155)	(0.0351)	(0.0194)
PLC_t	0.539	-2.028	-2.170*	0.489	-2.012	-2.139*
	(0.483)	(1.275)	(1.204)	(0.509)	(1.261)	(1.232)
$TBTF_t$	-1.248**	3.215**	-3.258***	-1.281*	3.388**	-3.478***
	(0.630)	(1.366)	(1.126)	(0.678)	(1.444)	(1.058)
$GDPGrowth_{t-1}$	1.580**	-5.721***	0.170	1.435**	-5.308***	0.0272
	(0.640)	(1.757)	(1.154)	(0.586)	(1.638)	(1.120)
$IBRate_{t-1}$	0.135	-0.537	-1.363	0.254	-0.823	-1.221
	(0.614)	(1.722)	(0.954)	(0.570)	(1.625)	(0.930)
$Crisis_t$	-6.728***	22.18***	2.214	-6.618***	21.65***	2.225
	(1.139)	(3.667)	(1.749)	(1.132)	(3.643)	(1.723)
Observations	3,955	3,955	3,621	3,955	3,955	3,621
No. of Banks	375	375	340	375	375	340
Instruments	32	30	55	32	30	55
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.42	0.85	0.45	0.39	0.54	0.30
Hansen	0.48	0.35	0.19	0.49	.37	0.21

Note: The table reports the full results of the estimation results of the robustness check for Equation 4.5 after introducing low capitalisation dummy. Column 1 displays the estimation results when the dependent variable is loan growth ratio including credit commitments (*CCGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets including trading assets (*LIQGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of equity to total assets excluding retained earnings (*SHETAGr*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The dummy *LowCap* takes the value one if a bankǿs equity capital ratio (equity to asset) is below the median, and zero otherwise. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table E5 *Robustness check: Securitisation and equity capital adjustment during the 2007-2009 financial crisis*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
Surplus $_{t-1}$	0.174	-0.274	-1.133***	0.161	-0.570*	-0.776**
	(0.217)	(0.599)	(0.410)	(0.110)	(0.321)	(0.307)
Shortage $_{t-1}$	0.679	-1.648	2.229***	0.680***	-1.502*	1.893***
	(0.424)	(1.364)	(0.587)	(0.227)	(0.768)	(0.463)
Crisis$_t$*XSurplus* $_{t-1}$	-0.0180	0.558	-0.0208			
	(0.404)	(1.148)	(0.413)			
SecActive$_t$*XSurplus* $_{t-1}$	-0.0980	-0.277	0.604			
	(0.232)	(0.722)	(0.398)			
SecActive$_t$*XCrisis*$_t$*XSurplus* $_{t-1}$	-0.355	0.840	-0.0543			
	(0.230)	(0.878)	(0.435)			
Crisis$_t$*XShortage* $_{t-1}$	-0.363	3.870	1.502			
	(0.660)	(2.941)	(2.022)			
SecActive$_t$*XShortage* $_{t-1}$	-0.483	0.963	-0.198			
	(0.649)	(1.889)	(0.868)			
SecActive$_t$*XCrisis*$_t$*XShortage* $_{t-1}$	-1.245	3.096	3.051**			
	(0.765)	(2.579)	(1.332)			
Crisis$_t$*XSurplus* $_{t-1}$				-0.0921	0.839	-0.351
				(0.377)	(0.962)	(0.324)
High$_t$*XSurplus* $_{t-1}$				-0.308	0.994	0.412
				(0.305)	(1.092)	(0.464)
High$_t$*XCrisis*$_t$*XSurplus* $_{t-1}$				-0.323**	1.154*	-0.404
				(0.125)	(0.680)	(0.314)
Crisis$_t$*XShortage* $_{t-1}$				-1.119**	4.396**	1.563
				(0.560)	(2.071)	(1.286)
High$_t$*XShortage* $_{t-1}$				-0.973***	1.576	0.676
				(0.351)	(1.058)	(0.672)
High$_t$*XCrisis*$_t$*XShortage* $_{t-1}$				-0.180	-0.251	6.313***
				(0.831)	(2.551)	(1.348)
CCGrowth $_{t-1}$	0.0636**			0.0656**		
	(0.0297)			(0.0298)		
LIQGR $_{t-1}$		-0.0453*			-0.0431*	
		(0.0256)			(0.0252)	
SHETAGr $_{t-1}$			-0.201***			-0.198***
			(0.0312)			(0.0323)
SecActive$_t$	0.226	-0.129	0.607			
	(0.545)	(1.518)	(0.606)			
High$_t$				0.391	-0.604	0.144
				(0.380)	(1.194)	(0.630)
NII $_{t-1}$	0.0147	-0.0463	-0.0250	0.0171	-0.0504	-0.0294*
	(0.0120)	(0.0317)	(0.0157)	(0.0120)	(0.0324)	(0.0160)

Table E5 *Robustness check: Securitisation and equity capital adjustment during the 2007-2009 financial crisis (cont.)*

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	CCGrowth	*LIQGR*	*SHETAGr*	*CCGrowth*	*LIQGR*	*SHETAGr*
$CDEPAS_{t-1}$	-0.0262	-0.0277	-0.000764	-0.0266	-0.0308	0.0103
	(0.0261)	(0.0740)	(0.0399)	(0.0247)	(0.0721)	(0.0410)
$CostIncome_{t-1}$	0.0398***	-0.0433	0.0261	0.0381**	-0.0379	0.0240
	(0.0153)	(0.0354)	(0.0193)	(0.0152)	(0.0341)	(0.0192)
PLC_t	0.507	-2.119*	-1.024	0.494	-2.221**	-0.841
	(0.464)	(1.098)	(0.914)	(0.479)	(1.100)	(0.906)
$TBTF_t$	-1.132*	2.887**	-1.696*	-1.178*	3.065**	-1.842**
	(0.650)	(1.372)	(0.943)	(0.684)	(1.404)	(0.907)
$GDPGrowth_{t-1}$	1.493**	-5.325***	-0.710	1.447**	-5.326***	-0.554
	(0.643)	(1.809)	(1.121)	(0.570)	(1.692)	(1.126)
$IBRate_{t-1}$	0.203	-0.867	-1.030	0.271	-0.899	-1.107
	(0.623)	(1.784)	(0.954)	(0.563)	(1.691)	(0.971)
$Crisis_t$	-6.032***	18.86***	1.658	-6.229***	19.32***	1.384
	(1.153)	(3.811)	(1.982)	(1.159)	(3.808)	(2.003)
Observations	3,955	3,955	3,621	3,955	3,955	3,621
No. of Banks	375	375	340	375	375	340
Instruments	31	29	54	31	29	54
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.37	0.52	0.70	0.33	0.47	0.60
Hansen	0.48	0.36	0.33	0.43	0.40	0.31

Note: The table reports the full results of the estimation results of the robustness check for Equation 4.5 after introducing the crisis interactions. Column 1 displays the estimation results when the dependent variable is loan growth ratio including credit commitments (*CCGrowth*), Column 2 displays the estimation results when the dependent variable is the growth ratio of liquid assets including trading assets (*LIQGR*), and Column 3 displays the estimation results when the dependent variable is the growth ratio of equity to total assets excluding retained earnings (*SHETAGr*). For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaces by the dummy *High*. The dummy *Crisis* is interacted with our key variables of interest. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2011-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table E6 *Extra analysis: Securitisation and equity capital adjustment impact on C&I loans and consumer loans*

	Panel A		Panel B	
	(1)	(2)	(1)	(2)
	CIGrowth	*ConsumerGr*	*CIGrowth*	*ConsumerGr*
Surplus $_{t-1}$	-1.481**	1.547	-0.720	-0.481
	(0.647)	(1.505)	(0.765)	(0.830)
Shortage $_{t-1}$	-1.109	1.889	0.490	0.0844
	(1.670)	(1.707)	(0.849)	(1.074)
SecActive$_t$*XSurplus* $_{t-1}$	1.221*	-2.561*		
	(0.645)	(1.534)		
SecActive$_t$*XShortage* $_{t-1}$	2.843	-2.115		
	(2.066)	(2.105)		
High$_t$*XSurplus* $_{t-1}$			0.391	0.349
			(0.698)	(1.557)
High$_t$*XShortage* $_{t-1}$			1.034	1.537
			(1.204)	(1.997)
CIGrowth $_{t-1}$	0.0987***		0.103***	
	(0.0292)		(0.0294)	
ConsumerGr $_{t-1}$		0.0525*		0.0547*
		(0.0294)		(0.0289)
SecActive$_t$	-1.718	1.613		
	(1.602)	(2.238)		
High$_t$			-0.892	2.713
			(1.237)	(2.062)
NII $_{t-1}$	0.0709*	0.0851	0.0661	0.0702
	(0.0399)	(0.0624)	(0.0407)	(0.0637)
CDEPAS $_{t-1}$	-0.222	0.0133	-0.240	0.0466
	(0.190)	(0.165)	(0.192)	(0.161)
CostIncome $_{t-1}$	0.0219	0.151**	0.0233	0.137*
	(0.0532)	(0.0708)	(0.0539)	(0.0716)
PLC$_t$	-1.983	-5.990	-1.924	-5.217
	(1.404)	(4.089)	(1.377)	(4.107)
TBTF$_t$	-2.404	6.518***	-2.323	5.708**
	(1.763)	(2.340)	(1.729)	(2.433)
GDPGrowth $_{t-1}$	3.028	-3.005	3.096	-3.164
	(2.539)	(2.166)	(2.475)	(2.072)
IBRate $_{t-1}$	29.52	-43.98	30.60	-45.66
	(35.47)	(30.46)	(34.55)	(29.16)
Crisis$_t$	-81.93	105.9	-84.71	109.9
	(85.75)	(73.72)	(83.56)	(70.63)
Observations	3,217	3,232	3,217	3,232
No. of Banks	334	335	334	335
Instruments	25	26	25	26
AR(1)	0.00	0.00	0.00	0.00
AR(2)	0.56	0.32	0.57	0.34
Hansen	0.50	0.23	0.55	0.22

Note: The table reports the full results of the estimation results of the extra analysis for the impact on C&I loans and consumer loans. Column 1 displays the estimation results when the dependent variable is the growth ratio of C&I loans, and Column 2 displays the estimation results when the dependent variable is the growth ratio of consumer loans. For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2012-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table E7 *Extra analysis: Securitisation and equity capital adjustment impact on C&I loans and consumer loans for low capitalised banks*

	Panel A		Panel B	
	(1)	(1)	(2)	(2)
	CIGrowth	*ConsumerGr*	*CIGrowth*	*ConsumerGr*
Surplus $_{t-1}$	-1.557**	0.792	-0.809	-0.909
	(0.652)	(1.639)	(0.821)	(0.713)
Shortage $_{t-1}$	-4.420**	0.237	-0.320	-0.224
	(1.973)	(2.813)	(1.208)	(1.963)
UnderCap$_t$*XSurplus* $_{t-1}$	0.0441	3.739		
	(1.625)	(3.068)		
SecActive$_t$*XSurplus* $_{t-1}$	1.135*	-2.042		
	(0.679)	(1.646)		
SecActive$_t$*XUnderCap*$_t$*XSurplus* $_{t-1}$	5.417**	3.461		
	(2.516)	(3.932)		
UnderCap$_t$*XShortage* $_{t-1}$	5.208***	3.232		
	(1.861)	(2.787)		
SecActive$_t$*XShortage* $_{t-1}$	6.819***	1.137		
	(2.507)	(2.861)		
SecActive$_t$*XUnderCap*$_t$*XShortage* $_{t-1}$	6.243***	-0.875		
	(2.264)	(3.311)		
UnderCap$_t$*XSurplus* $_{t-1}$			0.200	5.134**
			(1.705)	(2.480)
High$_t$*XSurplus* $_{t-1}$			0.298	0.135
			(0.649)	(1.282)
High$_t$*XUnderCap*$_t$*XSurplus* $_{t-1}$			6.224*	7.103*
			(3.272)	(4.258)
UnderCap$_t$*XShortage* $_{t-1}$			1.346	1.325
			(1.469)	(2.217)
High$_t$*XShortage* $_{t-1}$			2.255	3.983
			(1.747)	(3.562)
High$_t$*XUnderCap*$_t$*XShortage* $_{t-1}$			2.340	1.403
			(1.763)	(3.149)
CIGrowth $_{t-1}$	0.0952***		0.0968***	
	(0.0286)		(0.0283)	
ConsumerGr $_{t-1}$		0.0512*		0.0518*
		(0.0294)		(0.0288)
SecActive$_t$	-1.714	1.659		
	(1.501)	(2.189)		
High$_t$			-1.398	3.096
			(1.286)	(2.079)
UnderCap$_t$	-1.509	-2.895*	-1.008	-3.370*
	(1.172)	(1.750)	(1.241)	(1.736)
NII $_{t-1}$	0.0635	0.0794	0.0591	0.0689
	(0.0411)	(0.0621)	(0.0418)	(0.0645)
CDEPAS $_{t-1}$	-0.214	-0.238	0.00172	0.0332
	(0.189)	(0.198)	(0.173)	(0.177)
CostIncome $_{t-1}$	0.0271	0.0288	0.144**	0.129*
	(0.0530)	(0.0543)	(0.0710)	(0.0725)
PLC$_t$	-2.010	-1.873	-6.294	-5.242
	(1.352)	(1.436)	(4.404)	(4.148)
TBTF$_t$	-2.319	-2.270	5.901**	4.998**
	(1.685)	(1.741)	(2.328)	(2.449)
GDPGrowth $_{t-1}$	2.999	3.158	-2.596	-2.709
	(2.477)	(2.513)	(2.229)	(2.245)
IBRate $_{t-1}$	28.92	30.78	-38.26	-39.91
	(34.65)	(35.03)	(31.44)	(31.48)

Table E7 *Extra analysis: Securitisation and equity capital adjustment impact on C&I loans and consumer loans for low capitalised banks (cont.)*

	Panel A		Panel B	
	(1)	(1)	(2)	(2)
	CIGrowth	*ConsumerGr*	*CIGrowth*	*ConsumerGr*
$Crisis_t$	-80.74	-85.37	91.79	95.86
	(83.88)	(84.81)	(76.11)	(76.17)
Observations	3,217	3,217	3,232	3,232
No. of Banks	334	334	335	335
Instruments	30	30	31	31
AR(1)	0.00	0.00	0.00	0.00
AR(2)	0.75	0.69	0.30	0.30
Hansen	0.45	0.49	0.23	0.23

Note: The table reports the full results of the estimation results of the extra analysis for the impact on C&I loans and consumer loans for low capitalised banks. Column 1 displays the estimation results when the dependent variable is the growth ratio of C&I loans, and Column 2 displays the estimation results when the dependent variable is the growth ratio of consumer loans. For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The dummy *LowCap* takes the value one if a bankôs equity capital ratio (equity to asset) is below the median, and zero otherwise. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2012-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table E8 *Extra analysis: Securitisation and equity capital adjustment impact on C&I loans and consumer loans during the 2007-2009 financial crisis*

	Panel A		Panel B	
	(1)	(1)	(2)	(2)
	CIGrowth	*ConsumerGr*	*CIGrowth*	*ConsumerGr*
$Surplus_{t-1}$	-0.745	-0.324	-0.468	-0.954*
	(0.843)	(1.539)	(0.891)	(0.573)
$Shortage_{t-1}$	-0.941	1.228	0.825	0.146
	(1.706)	(1.805)	(0.875)	(1.152)
$Crisis_tXSurplus_{t-1}$	-2.018	5.449**		
	(1.530)	(2.386)		
$SecActive_tXSurplus_{t-1}$	0.606	-0.595		
	(1.081)	(1.577)		
$SecActive_tXCrisis_tXSurplus_{t-1}$	0.299	-1.531		
	(0.759)	(1.980)		
$Crisis_tXShortage_{t-1}$	0.500	3.798		
	(4.306)	(2.871)		
$SecActive_tXShortage_{t-1}$	2.965	-1.170		
	(2.009)	(2.170)		
$SecActive_tXCrisis_tXShortage_{t-1}$	0.156	-5.681*		
	(2.248)	(3.276)		
$Crisis_tXSurplus_{t-1}$			-2.233*	4.363*
			(1.339)	(2.489)
$High_tXSurplus_{t-1}$			0.793	1.735
			(1.229)	(1.403)
$High_tXCrisis_tXSurplus_{t-1}$			0.0253	0.00551
			(0.749)	(1.957)
$Crisis_tXShortage_{t-1}$			-3.151	-1.713
			(2.642)	(3.183)
$High_tXShortage_{t-1}$			0.883	1.634
			(1.250)	(2.046)
$High_tXCrisis_tXShortage_{t-1}$			1.284	2.863
			(1.950)	(3.637)
$CIGrowth_{t-1}$	0.0949***		0.0962***	
	(0.0304)		(0.0304)	
$ConsumerGr_{t-1}$		0.0545*		0.0538*
		(0.0295)		(0.0291)
$SecActive_t$	-1.327	1.068		
	(1.551)	(2.209)		
$High_t$			-1.248	2.319
			(1.336)	(1.985)
NII_{t-1}	0.0688*	0.0828	0.0703	0.0697
	(0.0415)	(0.0625)	(0.0427)	(0.0642)
$CDEPAS_{t-1}$	-0.228	0.00714	-0.241	0.0431
	(0.192)	(0.162)	(0.192)	(0.159)
$CostIncome_{t-1}$	0.0251	0.149**	0.0222	0.129*
	(0.0544)	(0.0707)	(0.0545)	(0.0721)
PLC_t	-1.945	-6.298	-1.827	-5.166
	(1.450)	(4.314)	(1.385)	(4.014)
$TBTF_t$	-2.448	6.741***	-2.447	5.713**
	(1.758)	(2.341)	(1.744)	(2.394)
$GDPGrowth_{t-1}$	3.009	-2.857	3.081	-3.047
	(2.561)	(2.122)	(2.484)	(2.041)
$IBRate_{t-1}$	28.84	-41.12	29.93	-43.94
	(35.87)	(29.79)	(34.71)	(28.66)

Table E8 *Extra analysis: Securitisation and equity capital adjustment impact on C&I loans and consumer loans during the 2007-2009 financial crisis (cont.)*

	Panel A		Panel B	
	(1)	(1)	(2)	(2)
	CIGrowth	*ConsumerGr*	*CIGrowth*	*ConsumerGr*
Crisis$_t$	-78.23	98.58	-80.31	104.5
	(86.83)	(72.34)	(84.13)	(69.69)
Observations	3,217	3,232	3,217	3,232
No. of Banks	334	335	334	335
Instruments	29	30	29	30
AR(1)	0.00	0.00	0.00	0.00
AR(2)	0.49	0.30	0.47	0.29
Hansen	0.44	0.23	0.46	0.22

Note: The table reports the full results of the estimation results of the extra analysis for the impact on C&I loans and consumer loans during the 2007-2009 financial crisis. Column 1 displays the estimation results when the dependent variable is the growth ratio of C&I loans, and Column 2 displays the estimation results when the dependent variable is the growth ratio of consumer loans. For variable definitions, see Table 4.1. Panel A displays the estimation results when the dummy *SecActive* is used, whereas in Panel B it is replaced by the dummy *High*. The dummy *Crisis* is interacted with our key variables of interest. The *Crisis* dummy accounts for the period 2007-2009 and year fixed effect is included for years 2012-2018. The estimations employ the Blundell and Bond (1998) method using two-step system GMM with Windmeijer (2005) corrected standard errors. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.