Deciphering Securitisation and Covered Bonds:

Economic analysis and regulations

Een vergelijking van securitisatie en gedekte obligaties:

Economische analyse en regulering

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Dedication

To my loving parents who always taught me to be optimistic, hard-working, and respectful.

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List of Acronyms

ABCP	Asset-Backed Commercial Paper
ABS	Asset-Backed Securities
AFME	Association for Financial Markets in Europe
ASF	Available Stable Funding
ATE	Average Treatment Effect
ATT	Average Treatment Effect on the Treated
BBA	British Bankers Association
BCBS	Basel Committee on Banking Supervision
CAPM	Capital Asset Pricing Model
CAR	Capital Adequacy Ratio
CB	Covered Bond
CBO	Collateralised Bond Obligation
CBPP	Covered Bond Purchase Programme
CBPS	Covariate Balancing Propensity Score
CDO	Collateralised Debt Obligation
CDS	Credit Default Swap
C/I	Cost to Income
CLO	Collateralised Loan Obligation
CMBS	Commercial Mortgage-Backed Securities
CMO	Collateralised Mortgage Obligation
CMU	Capital Market Union
COR	Charge-Off Ratio
CoVaR	Conditional Value at Risk
CP	Commercial Paper
CQS	Credit Quality Step
CRA	Credit Rating Agency

CRD	Capital Requirement Directive
CRR	Capital Requirement Regulations
DGS	Deposit Guarantee Schemes
DID	Difference-in-Differences
DPO	Dividend Payout
DTA	Deposit to Total Assets
EBA	European Banking Authority
EC	European Commission
ECAI	External Credit Assessment Institution
ECB	European Central Bank
ECBC	European Covered Bond Council
ECON	Committee on Economic and Monetary Affairs
EL	Empirical Likelihood
ELE	Encyclopaedia of Law and Economics
EP	European Parliament
ES	Expected Shortfall
ESMA	European Securities and Markets Authority
FE	Fixed Effect
FHLMC	Federal Home Loan Mortgage Corporation
FI	Financial Institution
FNMA	Federal National Mortgage Association
GAM	Generalised Additive Model
GBM	Generalised Boosted Models
GFC	Global Financial Crisis
GMM	Generalised Method of Moments
GNMA	Government National Mortgage Association
GSME	Government Sponsored Mortgage Enterprise
HQLA	High-Quality Liquid Assets
IAA	Internal Assessment Approach
IDI	Insured Depository Institution
IPTW	Inverse Probability of Treatment Weighting
IRB	Internal Ratings Based
JCESA	Joint Committees of the European Supervisory Authorities
LAFST	Liquid Assets Funded by Short Term Funding

LCB	Legislative Covered Bond
LCR	Liquidity Coverage Ratio
LIQ	Liquid Assets to Total Assets
LLP	Loan Loss Provision
LoC	Letter of Credit
LRMES	Long-Run Marginal Expected Shortfall
LTA	Loans to Total Assets
LTV	Loan-to-Value
MBS	Mortgage-Backed Securities
MES	Marginal Expected Shortfall
MGH	Mortgage Guarantee House
MLE	Maximum Likelihood
NIM	Net Interest Margin
OTD	Originate-to-Distribute
OTH	Originate-to-Hold
PCS	Prime Collateralised Securities
PS	Propensity Score
PSM	Propensity Score Methods
QSPE	Qualified Special Purpose Entity
RE	Random Effect
REMIC	Real Estate Mortgage Investment Conduit
RMBS	Residential Mortgage-Backed Securities
ROE	Return on Equity
RRR	Risk Retention Regulations
RTS	Regulatory Technical Standards
RW	Risk Weight
RWATA	Risk-Weighted Assets to Total Assets
SA	Standardised Approach
SB	Securities and Bonds
SCB	Structured Covered Bond
SDC	Sovereign Debt Crisis
SEC-ERBA	Securitisation External Ratings-Based Approach
SEC-IRBA	Securitisation Internal Ratings-Based Approach
SIFI	Systemically Important Financial Institution

SIFMA	Securities Industry and Financial Markets Association
SME	Small and Medium Enterprise
SPE	Special Purpose Entity
SPV	Special Purpose Vehicle
SRI	Systemic Risk Intensity
SSPE	Securitisation Special Purpose Entity
STC	Simple, Transparent and Comparable
STS	Simple, Transparent and Standardised
T1Cap	Tier 1 Capital Ratio
TFEU	Treaty on the Functioning of European Union
UCITS	Undertakings for Collective Investment in Transferable Securities
VIF	Cariance Influence Factor
Vol	Volatility
WLS	Weighted Least Square

Chapter 1

Introduction

"If we do not learn from history, we are unlikely to fully recover from it."

The Financial Crisis Inquiry Report (FCIC) (2011)

1.1 Background of the Study

Polarising views about securitisation — a process generating Asset-Backed Securities (ABS) — were advanced in the aftermath of the Global Financial Crisis (GFC). However, it should not be taken as a bad or good development in the financial markets, as it has certain costs and benefits. This point of departure may stand in contrast with the views prevailing in the market after the GFC. This study compares ABS and Covered Bonds (CBs). CBs are selected to compare with ABS as they are close counterparts and most of the blames that are placed on securitised products do not apply to them. The study performs an economic analysis of the regulations of these two instruments in the first place and then an empirical analysis has been performed in order to further evaluate these regulations. These regulations have been critically reviewed at the end of the study on the basis of this empirical analysis.

Securitisation was considered having a benign impact on the banking system, until the unfolding of the sub-prime crisis of 2007 (Reinhart & Felton, 2008). It was perceived to support the financial system and economy through various channels. A bank may reduce its funding cost and use its capital in a more economised manner by the virtue of securitisation (Duffie, 2008). A better risk diversification becomes possible as risk is distributed among different classes of assets (through tranching process), instead of being concentrated in the one market segment (Jiangli, Pritsker, & Raupach, 2007; Segoviano, Jones, Lindner, & Blankenheim, 2013). The transformation of illiquid loans into tradable securities and an

economised use of the capital resulting from the transfer of assets from a bank's balance sheet result into an increase in the flow of funds in the economy.[1]

A knee-jerk reaction was seen right after the GFC and securitising banks were considered having an occult malevolence associated with securitisation. It was believed that banks did not properly estimate their resilience in the macroeconomic downturns while securitising (Kara, Marqués-Ibáñez, & Ongena, 2015). Large-scale securitisation of loans increased banks' exposure to the losses emanating from the elevated credit risk (Keys, Mukherjee, Seru, & Vig, 2010; Keys, Seru, & Vig, 2012).[2] Surti (2010) explains two prime reasons for this wider exposure to losses. At the lending node, securitisation eroded incentives of the banks to screen their borrowers and underestimated their default propensity. At the funding node, market participants did not properly perform the pricing of the risk. The loan performance largely deteriorated allegedly causing the collapse of securitisation market.[3]

A number of researchers argue that banking problems during the GFC can be sourced to the debacle of the securitisation market (Acharya & Naqvi, 2012; Battaglia, Gallo, & Mazzuca, 2014; Carbó-Valverde, Marqués-Ibáñez, & Rodríguez-Fernández, 2012; Pagès, 2013). The literature widely documents that securitisation distorted banks' incentives for monitoring and screening their borrowers (Cerbioni, Fabrizi, & Parbonetti, 2014; Demiroglu & James, 2012; Keys et al., 2010, 2012; Nadauld & Sherlund, 2013). Rating agencies underestimated the credit risk of securitised loans and the absence of an appropriate regulatory framework exacerbated the incentive alignment problem (Guo & Wu, 2014; IOSCO, 2012; Keys, Mukherjee, Seru, & Vig, 2009).

As a result of the above understanding, securitisation became the *bête noire* of the financial industry. The confidence of investor was largely traumatised making it harder for the banks to use securitisation as a mean of financing their credit line and manage their liquidity needs. A decline of 51% in the issuance of ABS was observed right after the GFC during 2009 in Europe that is continued till today and reached up to 80% during 2013.[4] Moreover, a small fraction of the issued securities was placed with investors and rest of them were retained by

[1]Banks can issue limited amount of loans because they are required to hold capital against their assets. Securitisation helped banks overcome this barrier as loans were moved out of the balance sheet resulting into free capital. Securitisation in this way increases the lending capacity of banks that is otherwise restrained because of the capital constraints.

[2]Securitisation resulted in lax lending standards. As a result, banks issued large scale loans. This increased the credit risk for these banks. This is a major blame placed on the securitisation.

[3]The off-balance sheet nature of securitisation is often linked with lax lending and monitoring standards. It is generally perceived that as the loans are transferred out of the balance sheet, banks might not have incentives to properly screen and continuously monitor their borrowers.

[4]These figures have been calculated on the basis of data collected from Securities Industry and Financial Markets Association (SIFMA).

the issuers (AFME, 2014).[5] The shifting of banks to alternative sources of financing, like repo market,[6] turned to be expensive because of increasing haircuts[7] and repo rates[8] during this period. Funding and liquidity crises spawned out of this situation (Gorton & Metrick, 2012) — resulting in serious implications for the profitability and stability of the banks. This baseline scenario stipulated the amelioration of incentive problems for better risk management and stimulating future growth of the financial sector on a stable footing. The collapse of the securitisation market prompted many market commentators to emphasise that banks should look for the alternative means to finance their credit lines and to meet their liquidity needs (Kreitzer, 2012; Larsson, 2013; Schwarcz, 2011). However, it is important to preserve benefits of the securitisation framework while looking for an alternative.

The financial crisis in 2007 and concerns related to Sovereign Debt Crisis (SDC) in Europe diverted the attention of banks towards the issuance of CBs to meet their financing needs. The unsecured funding market — the substratum of banks — was frozen, especially after the collapse of Lehman Brothers and remained strained for a long period afterwards. CBs market emerged as a key funding source and an antidote to the problems emerging after the GFC. The market participants and regulators started considering that CBs can resuscitate the freezing funding market for banks as they can use these bonds to obtain funds to finance the mortgage loans and provide liquidity to banks (Pinedo & Tanenbaum, 2010).[9] Despite the existence of some structural differences in ABS and CBs, they are expected to provide similar economic benefits (Dinca, 2014; IOSCO, 2012; Murphy, 2013).[10] However, the holders of CBs have a preferential claim over the collateral assets in case of default of the issuing bank. Hence, CBs provide a high level of confidence to investors as compared to ABS. Banks using covered bonds for funding their credit line and to meet their liquidity needs may enjoy a stable source

[5]A number of loans were generated with a view to securitise them but securitisation ability was largely hampered by the collapse of the securitisation market during the GFC. The banks were not able to sell the already issued securities and they were being retained by them as investors were not interested in these securities. Hence, the risk that was supposed to be transferred stayed on banks' balance sheets.

[6]Repo is short of repurchase agreement. This is a market used for overnight borrowing against collateral of securities. The holder of securities sells them to a lender and agrees to purchase them a later period.

[7]Securities are generally devalued when they are used as collateral because lending parties need a cushion to compensate for decline in the market value. The haircut is the difference between the market value of the securities and amount of loans obtained against these securities.

[8]Repo rate is the rate charged on the funds borrowed from the repo market.

[9]Covered Bond Purchase Programme (CBPP) was introduced by the European Central Bank (ECB) in 2009 under this understanding.

[10]Both types of instruments are issued against specific assets generated by a Financial Institution (FI). The cash flows generated from the underlying assets are used to satisfy the claims of the holders of these securities and bonds. Both instruments provide the benefits of creating liquidity, controlling funding cost and transferring risk (except credit risk in case of CBs).

of financing mortgage loans (Rosen, 2008).

CBs are more appealing instruments because of their on-balance sheet structure. They provide access to capital the market funding along with the on-balance sheet credit risk management. The incentive problem can be controlled with the help of CBs because of their on-balance sheet nature. Prudent underwriting is the primary benefit of CBs but it is not a free lunch. CB issuers are required to outlay a larger capital relative to the securitisers. One of the primary benefits of securitisation is the risk distribution. The same benefit is provided by CBs also but credit risk is originally retained by the issuer (Packer, Stever, & Upper, 2007). Moreover, the issuance of CBs might lead to an increase in the capital cost for the issuers as assets held in the cover pool are maintained on the balance sheet and the issuers are required to hold capital against these assets. Resultantly, the borrowing costs may rise in the home purchase market (Surti, 2010). The efficient distribution of risk to market participants, most willing and able to absorb it, is an important argument made in favour of the securitisation.

The interest in CBs mainly arose because of their stable performance in Europe where they were juxtaposed with unsecured bonds and ABS for many years. The evidence of this stable performance can be seen in many European countries. The different protection provisions provided to CB holders helped maintaining the investors' confidence in this market. The interest in this asset class was also incited because of the regulatory reforms. A favourable treatment was offered to CB holders in the regulations devised after the GFC. The US proposal for the mortgage market reforms assumes that the issuance of CBs is a way to address the problems resulted by the issuance of securitisation (Boyce, 2008; IOSCO, 2012). The demand for a safe collateral increased in over-the-counter (OTC) derivatives markets. The liquidity requirements were better met through the issuance of covered bonds. Keeping in view all these features of CBs, they became less risky for the investors and issuers were also able to borrow long terms funds at a cheaper cost (Anand, Chapman, & Gai, 2012).

Currently, CBs receive a favourable treatment, as they exhibited their resilience and avoided shocks during the GFC when other funding sources remained frozen for the banks. For these reasons, the issuance of CBs has been highly incentivised. The focus of issuers and investors significantly shifted to this market. However, the adoption of CBs as an alternative of securitisation can be questionable for many reasons (AFME, 2014; Anand et al., 2012; Boyce, 2008; EBA, 2014). A higher focus on CB market — possibly incited by these regulatory reforms — is likely to cause encumbrance of high-quality assets of banks. Depositors (unless they are covered by deposit insurance) and other unsecured bond holders are treated as subordinate to CB holders. This situation is likely to give rise to a tension between the claims of CB holders and depositor/unsecured creditors. Therefore, securitisation should be

continued as an alternative mean of funding to reduce the over-reliance on CB issuance (IMF, 2011).

It is imperative for regulators to evaluate the merits of a reformed securitisation market and its effects on other markets. The regulators should play an important role in creating a balance between the issuance of CBs and ABS. The positive role of securitisation in increasing the flow of funds in the economy is recognized by regulators and efforts are being made by them to restart this market. However, many of strict regulations are still hindering the revival of the securitisation market. Regulators have been trying to follow two somehow competing goals i.e. mitigating risks in the banking system and ensuring the flow of credit in the economy. However, in pursuit of the former goal, the latter is likely to be jeopardised. Making the balance right is currently a great challenge for regulators.

1.2 Problem Statement

Regulators on both sides of the Atlantic were criticised after the GFC for a lax treatment given to securitisation. Frantic efforts by the regulatory authorities were ensued to control the alleged negative externalities generated by the securitisation market. These efforts resulted into strict regulations for securitisation causing further shrinkage of this market (Anand et al., 2012; Avesani, Pascual, & Ribakova, 2007; IMF, 2011; Murphy, 2013; Segoviano et al., 2013), as investors and issuers lost interest in this market. However, most of the allegations placed on securitisation are largely challengeable and so are the regulations based on such allegations. CBs are close counter parts of ABS, but allegations placed on ABS are not applicable to CBs.

CB market did not face a collapse similar to the one experienced by the securitisation market. For the reasons such as above, a relatively favourable treatment in regulations is provided to CBs. However, market stakeholders became concerned that a favourable regulatory treatment given to CBs may result in a higher focus of issuers and investors on the CB market that may have unintended consequences for the banking and financial system.[11] CB may prove to be a more secured investment for the investors but it should also be evaluated how they are likely to affect the issuers and financial system in the wider spectrum. The favourable regulatory treatment of CBs should not be solely based on the retention feature and resilience during the GFC (Surti, 2010).

[11]The new regulations being implemented in the banking system, as laid out in Basel III, Capital Requirement Directive (CRD) IV and Capital Requirement Regulations (CRR) (EU) are likely to affect incentives of banks to get involved in a particular market.

Despite numerous efforts, regulating securitisation still remains a challenge for the regulators. Regulators are attempting to restart the securitisation market in Europe but relatively strict regulations are one of the potential barrier in the resumption of this market. The regulations for CBs have also been subject to market criticism and there have been many calls to revise these regulations. CBs, because of their similarities with ABS, serve as a good candidate to evaluate the authenticity of the allegations placed on ABS. On the one hand, their comparison can evaluate if criticism on securitisation can be justified and on the other hand, it will also help understand if CBs deserve a favourable treatment in regulations.

1.3 Research Questions

The background and the problem explained above highlight that regulating securitisation is a challenging task for the regulatory bodies and regulators are still struggling to devise an effective regulatory framework for this market. The study addresses the basic question: How markets for CBs and ABS should be regulated? In order to answer this question, it is imperative to comprehend the nature of problems in these markets. This understanding along with a review of the current regulations will provide a basis for rethinking regulations. To this end, this study develops the below 4 research questions.

1. What are the misalignments between the regulations of securitisation and covered bonds, and their intended objectives?

2. What is the impact of securitisation and covered bond on the credit risk taking behaviour of banks?

3. What are the effects of securitisation and covered bonds on bank stability?

4. How should regulations of securitisation and covered bonds be redefined to promote the financial stability?

The first question here is about the possible misalignment of regulations devised for ABS and CBs with the intended objectives of these regulations. This question can be divided in some sub questions. For instance, the first legal question is what are the regulations introduced for ABS and CBs? What are the premises of these regulations? Are there any substantial differences in regulations of these two markets? If yes, how can these differences affect these two markets? To answer these, this study describes the recent regulations in Europe. The intended objectives and premises of these regulations are explained and it is assessed to

what extent these premises can be justified and the regulations have the potential to meet the intended objectives. The possible discrepancies in the premises and misalignments between regulations and intended objectives have been highlighted. The regulations concerning both markets (ABS and CBs) have also been reviewed and compared. The asymmetries in the regulations of these instruments have also been elucidated. The explanation helps understand how CBs are getting a favourable treatment in the recent regulations.

The second question is motivated by the widespread allegations placed on securitisation. A major allegation on securitisation is that it leads to the lax lending behaviour of banks. Securitising banks do not screen and monitor their borrowers, as they do not maintain a 'good skin in the game' because of the off-balance sheet nature of the securitisation activity. Many regulations are also premised on this understanding. This question has been framed to test this understanding. I make a comparison of ABS and CB issuing banks as CB issuing banks have strong 'skin in the game' because of the on-balance sheet nature of CBs. Hence, these banks cannot be subject to the same criticism. The answer of this question helps evaluate the regulations based on the above explained understanding.

One of the major goal of the regulators is to increase banks' stability. The strict regulations have been devised for the securitisation, as it is perceived to negatively affect the bank stability. Therefore, the third question has been devised to test if the issuance of ABS and CBs is likely to affect bank stability. However, this study goes one step further in this analysis and investigate this relationship beyond linearity. The study argues here that this relationship may not be as simple as it is perceived by some of the previous studies. If this belief is correct, then flat regulations may not be suitable to overcome the problems in these markets and to promote financial stability.

The last question is the ultimate objective of this study. This question is answered in the light of the answers of prior questions. The answers to the first three questions provides the foundation to answer the last one. To this end, the recent regulations concerning securitisation and covered bond markets have been revisited in the light of the prior investigation. The answer to this question is extremely important as current regulations are actively revised and subject to widespread market criticism for not being aligned with the actual market dynamics.

1.4 Rationale of the Study

Regulating securitisation has always been a hot potato for regulators in the US and Europe. Securitisation faced an Armageddon after the GFC and many attempts were made to regulate

this market. These regulations are considered hampering the revival of securitisation market that is already comatose. Most of the benefits previously associated with securitisation may not be accessible after compliance with these new regulations Schwarcz (2013b). These new regulations are considered encouraging the issuance of CBs as they are receiving a preferable treatment. Regulations are highly influenced by the criticism made on securitisation after the GFC. However, this criticism is controversial and so are the regulations. The current regulations must be reviewed if CBs cannot help banks to achieve stability as compared to securitisation.

The interest in the CB market was incited by the fact that this market sustained the economic shocks of the GFC and showed a stable performance (although, some market analysts are of the view that this market sustained because of the CBPP of the ECB in 2008). The investors' confidence was well maintained in this market and investors from securitisation market also shifted to the CB market. However, the impact of CBs on issuers has not been evaluated. Therefore, the overarching motivation of this study is to uncover effects of CBs in conjunction with securitisation on the banking and financial system. Gorton and Metrick (2010) highlight that attributes of the recent financial crisis are like the previous crises when safe instruments suddenly appeared to be vulnerable. CBs are also considered highly safe instruments by the different stakeholders in the banking system. It is quite imperative to perform a comprehensive analysis of its various aspects before it becomes the next "next thing".

1.5 Significance of the Study

Most of the literature focusing on securitisation after the outburst of the financial crisis argues that securitisation distorted banks' monitoring incentive that ultimately led to the collapse this market. This situation is mainly ascribed to the absence of so-called 'skin in the game'. Other allegations on securitisation also stem from this main issue. This study evaluates the situation by making a comparison of ABS with a similar instrument, CB, in which banks have a strong 'skin in the game'. The study helps understand if the 'skin in the game' in form of the on-balance sheet retention makes some difference.

Schwarcz (2011) is of the view that CBs have been given an undeserved aura of innocence by the regulators and market analysts. There are widespread concerns that a discriminatory treatment of securitisation as compared to CBs may not be justified. The higher focus on CBs may provide safety to investors but it might increase the financial fragility of the banking sector. Against this backdrop, this study attempts to identify some flaws in the current

regulations and evaluates the financial stability implications of securitisation and CBs on the banks in the European market. In pursuit of this aim, the present study is expected to make a fourfold contribution to the literature.

Firstly, the study helps understand the rationale of various regulations devised for the securitisation and CB market and how these regulations are affecting the banks' incentives for issuing ABS and CBs. Secondly, the study attempts to evaluate if the allegations placed on the securitisation are justifiable. Thirdly, the study attempts to identify some real problems involved in the market from the perspective of bank stability. Lastly, this study elucidates if there is a need to review the current regulations pertaining to securitisation and CBs based on the analysis performed here. It highlights how regulators should make adjustment in the current regulatory framework to develop a stable financial market.

1.6 Research Gap

There are a number of articles explaining the causes of the financial crisis and the role of securitisation in it. On the contrary, CBs did not receive a significant attention in the financial press and academic research, despite a large size of the market and increasing interest of investors, issuers and regulators after the denunciation of securitisation. Most of the information is available in different surveys, European Covered Bond Council (ECBC) fact books, and research by some banks and rating agencies etc. Besides, the available studies about CBs are mostly written by authors with an axe to grind, or about interest of investors ignoring issuers and market. Therefore, a significant gap is existent with respect to CBs. Moreover, most of the academic research on securitisation focuses on the US market and the European market is still under investigated. There is a need to conduct a study explaining the differences between ABS and CBs in details, evaluating these two important funding sources from issuers' perspectives and their role in the financial stability in the light of the recent regulatory interventions. The present study is intended to make some contribution to fill this gap.

1.7 Classification of the Study

The study is classified under article 5850 of Encyclopaedia of Law and Economics (ELE). Heremans (1999) explained in his paper in the ELE that a wave of deregulation was experienced after 1996 with a motive to increase the efficiency that ultimately affected the motive of

stability. The dynamic evolution of financial systems poses great challenges for the regulators. The changing market conditions require updating regulations for banks and financial markets on a continuous basis. He emphasises that a stable system of payment is crucial for the stability of the whole banking system that plays a vital role in the stability of entire financial and economic system. Therefore, regulations should keep in view all aspects of the whole framework for controlling the volume and means of transactions of payments. The current study is also focused on providing a basis for regulating two important financial instruments widely used by banks in these days.

1.8 Scope of the Study

The CB market in the US is in its nascent stages and many of the investors are still hesitant while entering this market because of the absence of an appropriate regulatory framework. Contrarily, this market is strongly rooted in Europe and CBs are juxtaposed with ABS. Therefore, the present study is focused on the banking system in Europe. The study focuses on the major financial markets in Europe that have been involved in the issuance of both financial instruments targeted in this study i.e. CBs and ABS. The study excludes the developing and emerging economies as the collection of data can be a challenging issue in these markets because of their immaturity.

1.9 Snapshot of the Research Methodology

The study raises both theoretical and empirical questions. Therefore, a pure qualitative or quantitative research methodology cannot be followed in this study, rather a mixed method is more suitable approach. A mixed method research employs the combination of quantitative and qualitative approaches. This type of research is becoming increasing popular as it uses the strengths of both quantitative and qualitative research. Mixed methods are also more suitable because of the interdisciplinary nature of this research.[12]

The main questions being addressed by the current study is a complex one: How markets for CBs and ABS should be regulated? This question is normative in nature and not readily subject to the scientific investigation because of the opacity and complexity of the ABS and CB markets. There is a need to answer many positive questions before answering this normative question.The subsequent questions as raised under the section 1.3 stem from this

[12]See (Creswell, 2009, Chapter 10) for further details about mixed methods research.

main question. These questions involve lot of complexities. The use of a single methodology might not be adequate to resolve this complexity. The nature of the research questions in this study calls for a separate research design for the each question.

I follow a systematic approach in this study to answer the main research questions about the optimal regulations. It is imperative to understand the structure and various characteristics of these securities before moving to the economic or legal analysis. The answering of the main research question requires a thorough understanding of both markets (ABS and CBs), their regulations, and the actual underlying problems. I attempt to cover all these aspects before thinking about the optimal regulations.

I start with a detailed description of ABS and CBs. This description helps in understanding the complexity of the ABS and CB markets. After explaining ABS and CBs, I review the recent regulatory developments in both markets. I perform an economic analysis of the recent regulations against their intended objectives and premises. This analysis is performed in the light of the prior theoretical and empirical studies. This analysis helps evaluate the premises of these regulations and raises some questions on them. These questions motivates the empirical investigation. One of the important question is about the impact of ABS on credit risk taking behaviour of banks, as regulations are based on the perception that securitisation leads to lax lending standards resulting into the issuance of risky loans. CB is a good candidate for the comparison with ABS, as the allegations placed on ABS are not applicable to CBs. The other important question is about the impact of these two instruments on bank stability. The answer to these two questions is important to propose optimal regulations.

The empirical investigation entails a number of challenges. The most important challenge in this investigation is dealing with the endogeneity in the decision of issuing ABS and CBs. An ideal situation to deal with this endogeneity problem is to perform a natural experiment. It is also known as "shock-based design".[13] A situation or event is required in this research design that can randomly assign the elements of the study population to different groups. In this way, the natural experiment mimics a situation akin to a randomized experiment. However, finding a shock or a situation in observational studies is a challenging task because of the exogeneity requirements of this shock.

This study deals with two financial instruments concurrently. Despite both instruments have many similar characteristics, they performed differently during and after the GFC. The market for CBs remained active when the ABS market was frozen. Moreover, these two instruments are structured differently (ABS are off-balance sheet whereas CBs are on balance

[13]See Atanasov and Black (2014) for further details about the "shock-based causality"

sheet instruments).

I use Propensity Score Methods (PSM) in the first empirical investigation about credit risk taking behaviour of banks. The use of PSM is increasing in accounting and finance literature to deal with the problem of endogeneity. A major criticism on PSM is that it is based on observable factors and does not take in account the unobservable factors. However, I have used Difference-in-Differences (DID) approach along with PSM to control for the time-invariant unobservables. Moreover, I have used Covariate Balancing Propensity Score (CBPS) that is more robust than traditional PSMs.[14]

The second empirical study investigates the relationship of ABS and CBs with the bank stability beyond the setting of a linear relation. It starts the analysis with a simple quadratic model and then extends it to more sophisticated techniques. The analysis is later performed using Tobit and Generalised Additive Model (GAM). Multiple methods have been used to add rigour thereby ensuring that results are not driven by a particular method. The data is also divided into subsets with respect to the bank size. This division helps making a deeper investigation. Moreover, multiple measures of bank stability are used in this analysis. These measures include both market and accounting measures of stability.

Up to this point, the detailed description of ABS and CBs, review of regulations and empirical investigation provide the foundation to revisit the regulations reviewed earlier. The merits of the recent regulations are evaluated on the basis of all this information, especially on the basis of the empirical findings. The normative question raised in the section 1.3 about the optimal regulations for the securitisation and CBs is addressed at the end. This question is answered on the basis of the positive analysis performed earlier in the study.

1.10 Structure of the Study

This study performs a de-constructed analysis of securitisation and CBs. The structure of the remainder of the study has been provided below.

- **Chapter 2: Securitisation and Covered Bonds**
  This chapter explains the securitisation and covered bonds in detail. It sheds light on the history of securitisation and CBs and explains how transactions in securitisation and CBs issuance take place. The various parties involved in these transactions are identified here and their roles are explained. The various features of both instruments have also

[14]See chapter 4 and Imai and Ratkovic (2014) for further details about CBPS.

been explained. At the end of the chapter, a brief comparison of both instruments has been made that highlights their similarities and differences.

- **Chapter 3: Regulatory Overview of Securitisation and Covered Bonds**
  This chapter provides a complete description of the regulations governing both types of transactions. The recent legal developments in the regulatory frameworks for them are discussed in this chapter. The chapter provides the initial economic analysis of the regulations. The potential outcome of the regulations has been identified in this chapter.

- **Chapter 4: Securitisation, Covered Bonds and Credit Risk Taking Behaviour of Banks**
  This chapter empirically investigates the impact of ABS and CBs on credit risk-taking behaviour of banks using data of 253 banks from 7 European countries for the period 2000-2014. The analysis has been performed using the covariate balancing propensity score methodology for the analysis. Results show that European banks do not securitise for credit risk transfer, rather the main motive behind securitisation and CBs is liquidity generation. The impact of ABS and CBs on credit risk-taking behaviour is examined in the short and long-run. Results do not show a significant impact of securitisation on credit risk-taking behaviour of banks. Results also negate the perception that securitising banks under-price their risk. However, a significant positive impact of CBs on credit risk-taking in the long run is visible. These results are attributed to the recourse provided in securitisation transactions, competitive pressure and asset encumbrance in case of large scale CB issuance. The results suggest that European banks use securitisation as a funding tool instead of a tool for risk management. The 'skin in the game' in form of on-balance sheet retention does not help reduce credit risk-taking.

- **Chapter 5: Effects of Securitisation and Covered Bonds on Bank Stability**
  This chapter empirically investigates the relationship of ABS and CBs with bank stability and highlights that this relation varies with the level of a bank's involvement in a specific instrument. The data come from 46 securitising and covered bond issuing listed banks in Europe for 2000-2014. The initial results show that some banks have been heavily involved in the securitisation activity, while banks cannot issue CBs beyond a certain limit. The results obtained using a quadratic model and a GAM showed a U-shaped relationship between securitisation and systemic risk of banks. However, this relationship is reversed for covered bonds. Small issuances of these bonds fail to provide the intended benefits and increase the bank's risk. Further investigation

revealed the presence of a strong size effect. The systemic risk of smaller banks is found increasing after issuance of covered bonds, while that of larger banks remains unaffected. The results obtained in this chapter do not support imposing uniform limits on the CB issuance, instead such limits should be linked with the bank size. On the contrary, some framework is needed to limit the banks' involvement in securitisation.

- **Chapter 6: Critical Review of Regulations of Securitisation and Covered Bonds**
  This chapter revisits the key regulations concerning securitisation and CBs in the light of economic analysis performed in the earlier chapters. The economic analysis provides a foundation for this analysis. After the crisis, there are many regulations introduced in EU and US market to address the shortcomings of securitisation market. However, the current study is only focused on EU. This chapter elucidates how regulators need to make adjustments in the current regulatory framework of ABS and CBs.

- **Chapter 7: Conclusion and Recommendations**
  This is the final chapter of the thesis that concludes the book and provides some recommendations for the future researchers.

Chapter 2

Securitisation and Covered Bonds - Characteristics and Participants

Capitalism must be constantly updated through innovation in order to be successful in its purpose of achieving society's goals.

(Shiller, 2013)

This chapter explains the characteristics of Asset-Backed Securities (ABS) and Covered Bonds (CBs) in detail. It explains how these two financial instruments are structured and identifies participants involved in these transactions along with their respective roles. At the end, this chapter explicates the similarities and differences between these two products that help understand how these two financial instruments become competing products.

2.1 Securitisation

The financial innovation during the last few decades brought major transformations in the banking system. Traditionally, banks were meant to perform the role of financial intermediaries, i.e. taking deposits and distributing the same to cash starved individuals in the market (Diamond, 1984). Banks were supposed to retain loans until maturity and their growth was mainly dependent on deposits. Banks had lending officers looking for lending opportunities in the market. The loans issued against these opportunities were financed by deposits and banks used to hold these issued loans till maturity. This model of the banking business was termed as "Originate-to-Hold (OTH)".[1]

[1]Most of the originated loans under the OTH models are illiquid and banks have to retain these loans on their balance sheet till their maturity.

Securitisation, the most protuberant financial innovation of the modern era (Gorton & Metrick, 2013) that gained popularity during 1990s in the financial markets across the globe, reshaped the banking business. It appeared as a red-hot financing technique for the Financial Institutions (FIs). It enabled banks to decrease their reliance on deposits and provided them with a financial independence through the sale of loans. This model of the banking is termed as "Originate-to-Distribute (OTD)" (Buchanan, 2014).[2] The OTD model gained popularity during the 2000s. Securitisation is a part of this OTD model, but not all securitisation transactions fall under the definition of OTD model.[3] Securitisation market experienced a massive and rapid growth till the outburst of the Global Financial Crisis (GFC). This growth started from the USA and spread to other countries across the globe. Banks have been extensively involved in securitisation to mainly ameliorate their credit risk management, meet their liquidity needs and stimulate lending activities while controlling the capital requirements (Cerasi & Rochet, 2014).[4]

Securitisation is meant to turn illiquid assets of a financial institution into marketable securities. The process of securitisation is shown in Figure 2.1. It starts with isolation of assets from the balance sheet of a bank in a separate pool. This bank is known as originator in the process. The assets placed in the pool are generally homogeneous with respect to their risk profile and characteristics of cash flows. This pool of segregated assets is sold to an artificial firm that is called a Special Purpose Vehicle (SPV) or Special Purpose Entity (SPE). This entity issues securities, called asset-backed securities (ABS), against the assets held in the pool purchased from the originator. These securities are sold in the secondary market and proceeds generated from their sale are used to finance the purchase of assets from the originator. The cash flows generated from the underlying assets are used to make payments to investors (OSFI, 2004).

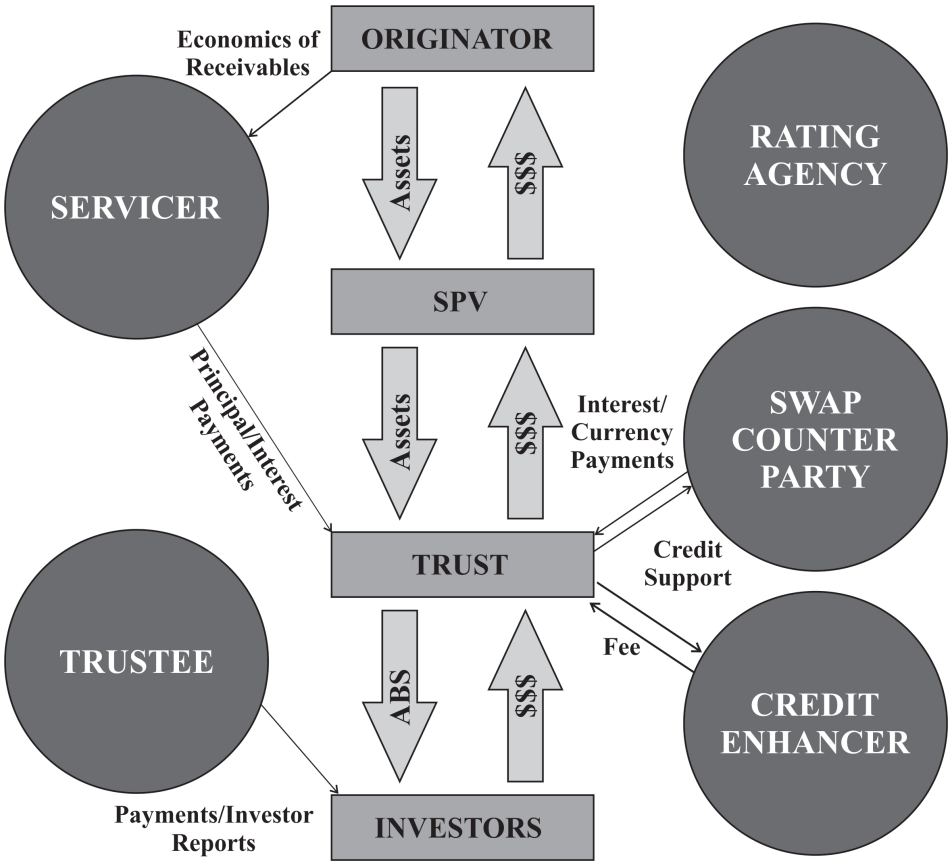
These securities are classified into different classes known as tranches and are ranked with respect to their seniority. Mainly, there are three classes of tranches i.e. senior, mezzanine

[2]Banks were no longer supposed to hold the originated assets on the balance sheet till maturity because of securitisation. These illiquid assets were sold to a separate entity that issued securities backed by these assets. These securities were sold in the market that were generally called ABS. These securities were also called Mortgage-Backed Securities (MBS) if they were backed by mortgage loans. Securitisation did not only provided banks with a mean of generating the liquidity but it also resulted in an increase of credit supply in the market.

[3]The motive of banks behind originating loans in the OTD model is to securitise them after the origination. Therefore, banks issued many loans with a view to securitise them at a later stage. Hence, it is argued that a bank may have a little or no economic interest in these originated loans (Segoviano, Jones, Lindner, & Blankenheim, 2015). However, all loans used in securitisation transactions are not issued with a view to securitise them later on.

[4]The assets backing the issuance of securitisation are transferred from the balance sheet of the originator. Therefore, banks are not required to hold capital against these assets.

Figure 2.1: The Securitisation Process



and junior tranches. Junior tranches are the riskiest ones. Any possible losses against the underlying pool are initially absorbed by these tranches.[5] There are number of participants involved in this process. The role of each participants has been discussed in the subsequent sections in detail. The involvement of these various participants in securitisation makes it a highly complex process.[6]

[5]Senior tranches only face losses when the losses exceed the amount of the junior tranches. Therefore, thickness of the tranches is an important element that must be considered while evaluating the riskiness of a particular class of ABS.

[6]Many participants might have overlapping roles. A single entity can be playing the roles of multiple participants. For instance, an originators also plays the role of servicer and sponsor in most of the cases.

2.1.1 History of Securitisation

The early precedents of securitisation are found during 1860s when farm rail-road mortgage bonds were issued in America (Riddiough & Thompson, 2012). These bonds were issued against the mortgage loans with an adjustable rate[7] and backed by farm properties. These loans had a maturity of 3 to 5 years. The banks issuing these mortgage loans were called Mortgage Guarantee Houses (MGHs). However, there was no secondary market at that time and investors were supposed to hold these bonds till maturity (McConnell & Buser, 2011). This form of securitisation was visible till the Great Depression of 1930s when real estate market faced a collapse resulting in failure of MGHs in redeeming their outstanding bonds. Consequently, these bonds disappeared from the market during the panic of Great Depression and a great funding source for real estate markets was frozen (Klaman, 1961).

The modern form of securitisation is a quite recent development. Its present form took birth in the USA. The Government Sponsored Mortgage Enterprises (GSMEs) in the USA played a major role in the evolution of this market. There are three most prominent GSMEs who laid the foundation of the modern-day securitisation i.e. Federal National Mortgage Association (FNMA), Government National Mortgage Association (GNMA) and Federal Home Loan Mortgage Corporation (FHLMC). FNMA, colloquially known as Fannie Mae, was established in 1938. Its main role was to provide federal funds to banks for promoting the house ownership and facilitating the affordable housing. Fannie Mae was privatised in 1968 as a shareholder owned enterprise. After its privatisation, GNMA, colloquially known as Ginnie Mae, was established. FHLMC, known as Freddie Mac, was established in 1970 to compete with Fannie Mae for developing a robust and efficient secondary market. These GSMEs started pooling mortgage loans and using them as collaterals for the securities issued against them. The objective was to channelise the flow of funds from global investors to facilitate the affordable housing (Davidson, Sanders, Wolff, & Ching, 2003, p. 75)

Ginnie Mae guaranteed the first private issuance of MBS in 1968. The first issuance of MBS by Ginnie Mae itself took place in 1970 with a face value of $ 70 million. Freddie Mac and Fannie Mae issued their first MBS in 1971 and 1981 respectively. The securities issued by Freddie Mac were called participation certificates. The underlying collateral pool of these participation certificates was comprised of private mortgages. All these securities were pass-through in nature.[8] The investors buying these securities were entitled to receive a

[7] An adjustable-rate is a type of interest rate that is applied to mortgages loans. The applicable interest varies on the outstanding balance throughout the life span of the loan. Mostly, the interest rates is fixed for a short initial period and it changes afterwards on pre-set values after every year and even every month in some cases.

[8] The monthly payments against the underlying assets are collected by the servicer. The servicer takes its fee

pro rata amount of principal and interest from the underlying loan collaterals. The mortgage loans in the collateral pool were originated by banks and they were servicing these loans till the maturity of these securities.

The securitisation market started gaining a boom during the 1990s. This was fuelled by the Tax Reform Act of 1986 (Ambrose, Lacour-Little, & Sanders, 2005). This act included Real Estate Mortgage Investment Conduit (REMIC)[9] provisions, enabling the issuers to structure the bonds and securities with multiple maturities and varying risk profiles (Davidson et al., 2003). The growth of investments funds and entry of other institutional investors including insurance companies and pension funds in the secondary market further conflagrated this growth. The securitisation structure started getting more sophisticated during this time when Freddie Mac and Fannie Mae issued their Collateralised Mortgage Obligations (CMOs) for the first time in 1983 and 1985 respectively.[10] FIs started securitising commercial mortgages and many other countries devised securitisation friendly laws.

The regulatory capital relief created through transfer of assets to off-balance sheet vehicles was an appealing factor for many of the FIs who started other forms of securitisation. The first securitisation of auto-mobile loans and receivables against credit cards took place during the midst of 1980s. The first Asset-Backed Commercial Paper (ABCP) was also developed during this period.[11] All these activities were off-balance sheet resulting into free regulatory capital (Cetorelli & Peristiani, 2012). British banks also started issuing MBS by structuring a collateral pool comprised of residential mortgage loans and the securities issues against these loans were Residential Mortgage-Backed Securities (RMBS).

The expansion in the consumer culture through credit access for buying houses, cars, and other utilities elevated the volume of the securitisation market. Apart from the commercial and saving banks, many other FIs started securitising their assets to finance their activities. The entry of many unregulated players in the market increased the competition that is thought to be resulting into lax lending standards (Bronzwaer, 2012; Dübel, 2013). The first issuance of securities against subprime mortgage took place during early 1990s that kept on growing till the outburst of the GFC (Watkins & Alley, 2008).

During the last two decades, the financial markets across the globe were bombarded with securitised products. Several complex forms of securitised products were seen during this period. The complexity of the securitisation was amplified when the issuers started layering

and pass on the principal and interest payment to the securities holders through the SPV.

[9] A REMIC is an entity that holds the pool of assets and issues multiple classes of interests to investors. It is used for the pooling of assets and issuing securities against them.

[10] See section 2.1.5 for details about the CMOs

[11] See section 2.1.5 for details about the ABCPs

various transactions with swaps, report and credit support. It became unclear during this period that who is ultimately bearing the risk associated with these transactions. The workout situations also became complicated because of this complexity. These factors are jointly considered to be contributing towards the collapse of the securitisation market during the GFC (C. Calomiris & Calomiris, 2009; Chamley, Kotlikoff, & Polemarchakis, 2012; IOSCO, 2011; Petrus, 2013). The pooling process was not limited to the assets originated by banks but many non-banking institutions also entered into the market (Bank of England, 2014; Nassr & Wehinger, 2014). Moreover, many securitised instruments were also placed in the pools used for the securitisation.[12] These factors further increased the complexity of the securitisation process.

2.1.2 Legal Structure of Securitisation

The securitisation process entails a legal isolation of the originator's assets from its balance sheet. The reason of such an isolation is the creation of a structure that should be independent of the credit situation and not be affected by the financial health and existence of the originator. The securities are rated on the own strength of the underlying pool of assets. For this, it is important that assets must be distanced from the originator. Therefore, this legal isolation provides a foundation for the rating of issued securities. This isolation takes place through a transfer of the assets from the originator to a separate entity through a true sale. The originator sells its assets to this separate entity and records the sale in its books of account.

The transferee entity is mostly known as the SPV that is only created for holding the assets transferred by the originator. This entity cannot perform any other business activities and does not have any assets, liabilities or income/losses. Hence, the quality of issued securities is solely determined on the basis of the quality of underlying assets. The SPV is a bankruptcy remote entity meaning that it is not affected by the bankruptcy of the originator. For these reasons, the rating agency does not consider the credit quality of the issuer while rating ABS and only the credit quality of assets is assessed for the rating purpose. This is only possible because of the special nature of the SPV. The situation would be different if the SPV has assets/liabilities and income/losses.

There are numerous legal issues involved in the securitisation structure explained above. A significant legal challenge is to identify if the assets are isolated from the originator through an actual commercial sale of assets or it is just a ruse for dedicating specific set of assets to a group of investors and making them unavailable to other creditors of the originating institution.

[12]It is referred as 're-securitisation'.

This differentiation becomes very important during the bankruptcy state of the originator. A bankruptcy judge tries to ensure the fair distribution of losses. Every stakeholder is affected during the bankruptcy and distribution of losses is more difficult than distribution of profits. The ABS investors claim that they are immune from the losses more than the dedicated set of assets. The question of true commercial sale arises here and the judge has to evaluate if the asset isolation was achieved by a true commercial sale or it was just a manoeuvre (Gorton & Souleles, 2007).

The true sale is often assailed because of lacking the commercial reality. It does not entail the complete transfer of risks and rewards in many instances. The investors in a securitisation transaction are entitled to receive a pre-fixed rate of return that is backed by credit enhancements which shows the level of risk retained by the originator. The excess return from the collateral pool over the pre-fixed return promised to investor is the residual return for the originators. The notion of form and substance is often discussed by the lawyers here. An utter reliance on form for all the transactions that looks like securitisation may negate the role of courts completely. However, the evaluation of substance may animadvert that all the transactions are some form of funding. However, the form vs substance question is highly subjective in nature and a court may not be able to remove this subjectivity. Hence, a bankruptcy judge will always look for a mid-point (Kothari, 2006). The nature of the SPV also creates many issues. The SPV, as explained earlier, is a company created for purpose of securitisation only and it has no assets, liabilities, net worth, income and losses, employees, or physical location. Hence, it is virtually nothing and sale to nothing is itself nothing and if it is a substantive entity then it cannot be bankruptcy remote.

2.1.3 Participants in Securitisation

There are various participants involved in the securitisation process with defined roles. An overview of the parties involved in the securitisation process and their roles and duties have been provided below.

Borrowers

Borrowers are liable for making payments against the loans held in the collateral pool. Therefore, the performance of ABS ultimately depends on borrowers. However, borrowers are often not aware of the fact that their loans have been sold. The originator is responsible for maintaining customer relationship. These borrowers are placed in various classes by banks depending on their credit histories. The borrowers with a primeval credit history are

placed in A and ones with a shoddier credit history are placed in D category. However, this classification is not very rigid as a borrower may have different credit histories with different banks.

Originators

The institutions that create the assets used in the collateral pool of ABS are known as originators in the securitisation process. Originators may include commercial banks, finance companies, securities firm, thrifts and many other institutions. However, this study is only focused on banks. Banks issues loans to borrowers that are placed in a pool together. This pool can be comprised of mortgage loans, credit card receivable, auto loans or business loans. However, most common loans used in securitisation process are mortgage loans and securities issued against them are known as Mortgage-Backed Securities (MBS). These loans are sold to an SPV.[13]

Special Purpose Vehicle (SPV)

A Special Purpose Vehicle (SPV) or a Special Purpose Entity (SPE) is a legal entity created for carrying out a set of demarcated activities. It is created by an independent firm that is known as sponsor or originator. An SPV does not perform any other activity apart from the purpose for which it is created. This is a remote entity that does not have any physical location, staff, assets, liabilities, net worth and income/losses.[14] This entity purchases the assets from the originator and issues ABS against them. The proceeds generated from the sale of ABS are used to finance the purchase of assets from the originator.

Legal Structure of SPV Legally, SPV can take a form of limited partnership, a trust, a limited liability company or a corporation. It can be established as a subsidiary of the sponsoring firm or as an orphan entity that is not entitled to consolidate with the sponsoring firm. Mostly, it takes the form of a trust in the securitisation process.

Bankruptcy Remoteness Bankruptcy remoteness is an important feature of an SPV. It implies that a possible bankruptcy event of sponsoring firm will not affect the SPV. The creditors of the sponsoring firm cannot have claims over the assets held by SPV. The simplest way to achieve this bankruptcy remoteness is waiver of SPV's right for filing a voluntary

[13]The originator records the gain or loss on the sale in its books of accounts.
[14]See Gorton and Souleles (2007) for further information about SPV.

bankruptcy (Klee & Butler, 2002). The activities of the SPV are highly restricted to ensure the bankruptcy remoteness. These restrictions are related to its obligations, liquidation and transfer of assets, amendments in incorporation documents, consolidations, and merger etc. Simply, an SPV cannot go beyond the purpose for which it is established.

Trust

Gorton and Souleles (2007) explains a risk related to bankruptcy remoteness of the SPV. A judge may re-characterize the true sale of assets to the SPV as a secured financing that may result into transfer of assets back to the balance sheet of the sponsor. A consolidation of SPV and sponsor's assets may also take place. One such incident was seen in the case of LTV Steel's bankruptcy when the judge allowed LTV Steel to consolidate SPVs's assets to its balance sheet and an uncertainty was created about the bankruptcy remoteness.[15] However, this risk is mitigated by following a two-step process using two SPVs. After purchase of assets from the originator, these assets are transferred to a trust, often called a Qualified SPE (Qualified Special Purpose Entity (QSPE)). This trust is responsible for issuing securities to investors in the market.

Servicer

The originator, in most of the cases, also acts as a servicer who continues to service the collateral pool sold to the SPV. Servicing contracts are also made with third parties in case of a pool comprised of mortgage loans. The servicer is responsible for providing customer

[15]The bankruptcy case of Loan-to-Value (LTV) Steel Co., a major steel manufacturer in USA, created a panic in the securitisation industry. The company had two securitisation transactions. These transactions were carried out with two different banks groups and one was backed by inventory and other was backed by receivables. The assets were transferred to an SPV and this transfer was marked as a true sale in the light of opinion given by a law firm. However, during the bankruptcy procedure, LTV claimed that these transactions were not subject to a true sale but the financing was arranged "to deprive the Debtors' unsecured creditors of the ability to realize any meaningful recovery from the lenders' enormous equity cushion, and to enable the lenders to exercise remedies without any accountability to this court or any other parties in interest." It was further asserted by LTV that "through a bewildering and complex array of documents . . . the lenders have conjured the illusion that the debtors do not own their inventory, do not own their accounts and are not in the business of manufacturing and selling steel products." LTV was allowed to use the cash proceeds of transferred assets as "cash collateral" on an interim basis. The agent banks also showed their agreement to this order. However, the largest lender in the receivable transaction filed an emergency motion and argued that the assets were transferred as a true sale to the SPV and the transaction was based on the understanding among all parties that SPV is bankruptcy remote. Hence, the assets were not part of bankruptcy estate of LTV. However, this motion was denied by the court and it emphasised that cash collateral order was necessary to enable the debtor meet its obligations. This case raised serious concerns among the securitisation industry about the bankruptcy remoteness of SPVs. See Klee and Butler (2002) for further details.

services and receiving payments from the borrowers and transferring the same to the trust for the onward transfer to investors. All these activities are performed per a set of provisions laid out in the servicing agreement. The servicer is also responsible for liquefying the collateral against the loss in case of a default by the borrower. The servicer receives a fixed amount as servicing fee. It also prepares reports, usually on monthly basis, about the performance of securitised pool for the trustees and current disposition of the assets held by the trust. These reports are also provided to the credit enhancer, rating agencies and investors through trustees.

Trustee

A trustee is a third party that acts in a fiduciary capacity. It administers all the transactions performed by the trust for a fee. It ensures that all the transactions are being performed as per the terms and procedures laid out in the pooling and servicing agreement in a cost-effective manner. Its main job is to safeguard the interest of investors. For this purpose, it works in a close connection with the servicer and the issuer. All the responsibilities of the trustee are laid out in a separate agreement. It is pertinent to note here that this trustee must be an independent entity who is appointed to safeguard the interest of investors and to eliminate any conflict of interests. It continuously receives information from the originator and servicer about the performance of the underlying collateral and evaluates if the collateral is generating adequate cash flows to meet the claims of ABS holders. It also has the authority to replace the servicer if it fails to make a compliance with the defined terms and conditions (Cetorelli & Peristiani, 2012).

Underwriters

The underwriter is responsible for advising the issuer of securities about structuring, pricing, marketing and appropriate credit enhancement of securities. The selection of the underwriter is based on its market experience, relationship with the institutional investors and experience. The underwriter has a good knowledge of the market and relevant regulations. The underwriter also oversees the sale of securities by acquiring securities from the QSPE. Hence, they are also prone to the risks linked with these transactions. Traditionally, investment banks have been playing this role.

Investors

The securities issued by the trust are purchased by the investors. Largest purchases are made by the institutional investors including pension funds, insurance companies and commercial

banks. The high rate of return is the most inciting feature of ABS for the investors. However, it is pertinent to note here that there are no retail investors in this market. These securities are not suitable for trading in the open market because of their high level of complexity and retail investors cannot understand the structure of these securities.

Rating Agencies

Rating agencies are responsible for assigning rating to the securities issued by the trust. For this purpose, they evaluate the structure of transactions, the quality of the assets held in the collateral pool and their expected cash flows along with various forms of the credit enhancement provided for the securities. The rating is mainly assigned on the basis of quality of the underlying collateral and structure of the transaction. The level of protection against the possible losses is evaluated on the basis of various loan loss models and performance of the underlying loans is continuously monitored by them to update the rating of ABS.

Credit Enhancers

The issuers of ABS provide credit enhancement in some form to signal about the quality of issued securities and to provide a vent against the possible losses. It is not only provided internally but externally as well. The insurance companies and commercial banks provide this credit enhancement in various forms.[16]

Credit Default Swap Counter Parties

The holders of ABS can protect themselves against any of potential losses by purchasing Credit Default Swap (CDS). These contracts provide an insurance against the possible default of a security. The buyers of these contracts agree to pay a periodic fee to the seller of CDS and seller in return promises to cover any losses arising out of default of the bond or tranche. CDS became extremely popular instrument used for hedging in the period close to the crisis. According to a rough estimate, the gross amount of outstanding CDS in USA was around $62 trillion (Brunnermeier, 2009).

2.1.4 Features of Securitisation

The most important features of securitisation are being discussed as follows:

[16]See section 2.1.4 for the various forms of credit enhancement.

True Sale

The securitisation process starts with the sale of assets. An originator sells its assets to an SPV. This sale is recorded in accounting books of the originator. The SPV finances the purchase of these assets by issuing the securities against the same assets. These assets, in this way, are detached from the originator's balance sheet. The originator does not have access to these assets and it cannot use them for any other purpose. The originator also records any gain on the sale of these assets in its books of account.

Credit Enhancement

Credit enhancement is a common feature of ABS. This feature makes these securities distinct from conventional unsecured corporate bonds. This credit enhancement improves the credit worthiness of ABS that attract investors to these securities. It reduces the default risk and improves the credit rating of issued securities. This credit enhancement is performed in various ways through internal or external credit support. The various forms of credit enhancements are discussed below.

Internal Credit Enhancement The various forms of the internal credit enhancements are described below:

Tranching This is a very common form of the credit enhancement in securitisation. The issued securities are divided into various tranches in a hierarchical order. Usually, there are three classes of tranches known as senior, mezzanine and equity tranches. Equity tranche is the lowest class of ABS. The lower tranches provide a protective layer to the upper tranches of ABS. The losses in case of default in loans from the collateral pool are initially absorbed by these subordinated tranches. The upper tranche remains unaffected unless the loss exceeds the value of lower tranches. These senior tranches carry high rating and lower classes have lower rating but they are high-yielding securities.

Excess Spread This is the first layer of protection for the upper tranches. The average amount of coupon against the underlying loan collaterals is higher than the fee to the servicer and average coupon payment to the ABS holders. The difference is known as excess spread that is used to absorb the losses at the first place before they are spread to other forms of the credit enhancement. This excess spread helps ensure the payment of coupon to investors even when some of payment against underlying loans are late or default.

Over-collateralisation The amount of the financial assets held in the collateral pool exceeds the amount of securities issued against them. Hence, any incurring losses are covered by the excess assets in the collateral pool. This over-collateralisation is provided to address investors' concern about the possible deterioration of assets in the underlying pool.

Reverse Fund The issuer creates a separate fund for the reimbursement of losses to the trust. The funds remaining after various expenses including payment of interest and principal to investors and servicer's fee are accumulated in this account. These funds are used in case of delays in some payments from the borrowers. This form of credit enhancement is often used in combinations with others.

External Credit Enhancement Apart from the credit enhancement through internal credit support, third parties are also engaged for providing credit enhancement. Mostly, credit rating of the securities in the case of external credit enhancement depend on the rating of the third party providing credit enhancement. It may take the following forms.

Parental or Third Party Guarantee The parent company of the issuing entity or a third party i.e. usually a recognised insurance company provides a guarantee to reimburse the losses up to a specific amount to the trust. The guarantor may also promise to buy back the deteriorating loans.

Surety Bond Surety bond is also a form of guarantee that is issued by a well rated insurance company for the reimbursement of losses incurred on ABS. This bond is usually issued against ABS having rating equivalent to BBB/Baa. However, other levels of credit enhancement are also established before losses come to the insurance company. These insured ABS are rated per the rating of the insurance company.

Letter of Credit (LoC) This form of credit enhancement is provided by banks. These banks receive a fee for issuing the LoC and promise to reimburse a specific amount to the trust in case of any losses incurred on ABS.

Cash Collateral Account (CCA) The issuing entity borrows the amount required for credit enhancement from a commercial bank that is invested in highly rated short-term securities. The losses are covered up by the liquidation of this investment.

Credit Rating

All the securitisation transactions are rated by an independent rating agency. These ratings are initially assigned on the quality of assets in the collateral pool and level of the credit enhancement. The rating agencies are supposed to continuously monitor the performance of securities. The rating is updated in case of deterioration of assets in the collateral pool and changes in the credit enhancement structure or changes in the rating of credit enhancement providers. The investors' decisions are based on these ratings. The mechanism of rating ABS creates two important problems. Firstly, the originators, to get a better rating for the issued securities, may place the highest quality assets in the collateral pool or may provide excessive credit enhancement. This will affect the risk transfer incentive of securitisation. Secondly, the investors' decisions are based on this rating and they may not perform any due diligence for evaluating the quality of the securities and rely on the assigned ratings.

2.1.5 Forms of Securitised Instruments

The securities issued in the process of securitisation can be classified in various ways. This classification is based on the structure of securities and underlying pool of collaterals. The pool of the collateral can be comprised of different assets that can be mortgage or non-mortgage, commercial or residential, amortising or non-amortising, and tangible or intangible assets.

Mortgage-Backed Securities (MBS)

The securities issued against the mortgage loans are called Mortgage-Backed Securities (MBS). The most basic form of MBS is pass-through securities. These pass-through MBS are also called participation certification. The servicer is responsible for collecting the principal and interest payments from the borrowers of mortgage loans that are passed to MBS holders. These securities can be structured with different maturities and payment structures. The mortgage loans may carry a fixed or a floating rate of interest. The issuers enjoy a greater flexibility in structuring these securities.

The collateralised pool of mortgage loans can be comprised either of residential mortgages or commercial mortgages. The securities issued against residential mortgage loans are called Residential Mortgage-Backed Securities (RMBS) and securities issued against commercial mortgages are called Commercial Mortgage-Backed Securities (CMBS). MBS are usually highly rated securities because of the property securing the mortgage payments. Therefore, they can be sold to a wider base of investors. However, CMBS carries some additional risks

as compared to RMBS because these securities are backed by commercial tenants whose business or commercial land is prone to the market and economic shocks (Slaughter and May, 2015). The value of a commercial property may decline if the market is in a downfall situation.

Non-Mortgage Asset-Backed Securities

Non-mortgage ABS follows the structures like MBS. However, they are backed by a pool of non-mortgage loans. These securities are backed by multiple classes of assets generating interest and principal. The structure of these securities might be non-amortising in most of cases that is otherwise a distinguishing feature of MBS. Some of these assets might also have a revolving payment structure. The pool of assets backing these securities can be comprised of credit card receivables, auto loans, consumer loans, trade receivables, lease financing, ship loans and business loans. An increasing number of securities backed by these assets have been offered with a floating rate instead of a fixed one during the recent few years. These floating rate securities have been very attractive for the investors wanting to avoid a mismatch in the cash flows because of changing interest rates in the market. This mismatch is inevitable in the fixed rate securities.

The asset pool backing these securities has a more granular nature. These assets are associated with several unrelated obligors and each of them represents a small percentage in the entire collateral pool. The evaluation of these securities is a challenging task for the rating agencies and investors. It is hard to predict the default of individual obligors. The assessment of default characteristics of every single borrower is a cumbersome job. Therefore, it is generally believed that the pool as a whole will tend to show a consistent performance. These securities are considered riskier as compared to MBS, especially the securities backed by business loans as these loans are difficult (Loutskina, 2005) and entail greater associations with the market and economic conditions.

Collateralised Mortgage Obligations (CMOs)

CMOs are multi-class securities. They are backed by either a pool of mortgages or MBS. The issuer of CMO structure it in a way that cash flows generated by the pool of collaterals is distributed among the different tranches of securities. There are minimum two tranches in every CMO transaction. Each of the tranches has a specific expected maturity and cash flow characteristics. CMOs are structured to meet the objectives of different investors. The maturity of CMOs may vary from 2 years to 20 years. Therefore, they cater the investment

objective of many investors.

The basic form of a CMOs is called plain vanilla bond.[17] This type of CMOs follows a sequential payment structure. The payment received against the assets held in the collateral pool are transferred to investors. However, a segregation is made in payment of interest and principal. The interest payment is made to all tranches with respect to their pro rata coupon rate, but the all the scheduled payments of principal and unscheduled prepayments are firstly made to first tranche and all other tranches are paid subsequently. Thus, the payment of principal follows a sequential structure in CMOs. This sequence is continued till the last tranche in order and the one with longest maturity are retired.

Collateralised Debt Obligations (CDOs)

The asset pool transferred to an SPV in a CDO transaction is comprised of a set of debt obligations owed to the originating institution. These obligations can be in form of a loan and securities issued against them are called Collateralised Loan Obligations (CLOs) or bond and securities issued against them are called Collateralised Bond Obligations (CBOs). The receivables on these debt obligations are used to make payments to investors. These CDOs can follow multiple structures with respect to the maturity and type of the assets held in the collateral pool. Some of the CDO transactions also follow a hybrid structure where collateral pool can be comprised of a mixture of loans and various bonds.

An originator may use multiple loans for constructing the collateral pool. The investors in this transaction may receive a greater yield on CLOs along with a high risk emanating from the failure of businesses in paying the loans backing the CLO transactions. The losses can mount enormously in case of syndicated loans backing the CLOs.[18] The rationale behind CLOs was to support the growth of businesses by creating a greater availability of funds. CLOs also follow a tranche structure where each of the tranche receives higher interest payments as compared to next one but a higher risk as well.

The collateral pool in a CBO transaction is comprised of bonds. These bonds can be investment grade bond (high quality bonds having low risk of default) with lower yield or speculative grade bonds (low quality bonds having a high risk of default) with higher yield. Most of the CBOs are backed by junk bonds that are low rated bonds offering a higher yield.

[17] Plain vanilla is the most basic form a bond. It has a maturity date and a strike price. There are not additional features associated with this kind of bond.

[18] A syndicated loan is provided by a group of lenders. There are multiple banks involved in such loans and usually one bank plays the leading role that is called lead arranger. The lead bank retains the agent responsibilities and keep on servicing the syndicated loans.

However, the bonds are pooled in a way that they offer a diversification and reduce the risk of CBOs but offers a high yield to investors. CBOs are attractive for risk oriented investors looking for a higher yield. Like CLOs and CMOs, CBOs are also issued in tranches with varying levels of risk and return. Hence, the risk inherent in the bonds backing CBOs is further diversified through tranching.

Asset-Backed Commercial Papers (ABCP)

ABCPs are short term securities usually issued for a period less than 270 days. ABCPs are different from a traditional Commercial Paper (CP) in the respect that they are backed by a set of assets. They are either issued with an interest-bearing structure or on a discount. The vehicle used for the issuance of ABCPs are known as ABCP conduits. These conduits are thinly capitalised SPVs. These CPs are issued for obtaining interest in different assets. The proceeds generated are usually used to finance receivables, auto and equipment loans and CDOs. The ABCPs conduits usually take positions in revolving pools of assets. They may also invest in MBS and other forms of ABS. The repayment of these ABCPs is based on collection received from the assets created as a result of proceeds from the ABCP issuance or by the issuance of new CPs.

2.1.6 Securitisation in Europe

The securitisation experienced a rapid growth during the last decade in Europe, before the outburst of the financial crisis. The regulators, academicians and practitioners showed a high level of interest in this market. Special attention was given to this market by regulators after the GFC when it was considered culpable for spawning the financial crisis. An unprecedented decline in the value of shares of banks was experienced during this period. The banking system in Europe and the United States experienced an erosion of 3 trillion Euros from the capital market. The overall decline in the value of the banking system was around 82% from the period of May 2007 to March 2009 (Battaglia & Mazzuca, 2014).

Table 2.1: Securitisation Issuance in Europe - USD Millions

Year	Auto	Consumer	Credit Cards	Leases	Other	CDO	CMBS	Mixed	RMBS	SME	Other	Pubs	Total
1991	390.83						502.53		4,877.67				5,771.03
1992	279.72								1,483.12				1,762.84
1993	745.44	1,128.75		284.35	140	108.24	478.61		1,564.57				4,449.97
1994		905.85	371.59	382.07	278.22	364.9	841.76		6,108.83				9,253.22
1995		1,116.59	932.98	270	200		713.14		2,475.36		498.92	393.42	6,600.41
1996	1,354.16	1,417.37	824.14	1,462.50	2,626.08	11,558.57	1,609.19		4,113.36		132.52		25,097.89
1997	420.29	415.19	658.46	613.81	383.13	3,442.88	9,284.08		8,965.75		1,448.64		25,632.23
1998	1,151.76	1,594.33	2,287.67	1,106.51	3,051.02	4,761.94	1,097.40	942.92	14,152.49	2,386.55	685.88	1,057.93	34,276.40
1999	2,690.56	2,516.16	2,198.78	1,267.29	12,110.34	8,543.86	5,872.12	117.58	26,461.11	7,506.48	2,867.79	2,190.45	74,342.50
2000	1,909.17	2,574.95	3,711.88	910.05	3,742.71	15,704.72	10,476.48		41,756.03	1,262.69	1,294.73	2,655.38	85,998.78
2001	3,760.35	4,118.24	1,374.57	3,435.27	19,556.22	25,537.11	13,608.77	1,300.71	50,950.32	10,053.02	4,484.74	184.7	138,364.02
2002	7,875.83	4,061.48	5,144.47	6,772.36	6,774.40	14,030.01	14,973.96	7,331.15	66,386.13	6,700.01	6,534.20	3,915.19	150,499.19
2003	4,680.37	14,342.73	7,824.91	3,427.17	7,328.53	25,327.49	14,104.52	837.15	136,788.27	10,037.12	14,157.77	6,919.52	245,775.56
2004	9,530.89	2,490.38	8,234.03	10,989.35	25,514.02	43,302.33	26,019.81	56	154,201.87	14,742.56	6,975.06	2,795.62	304,851.93
2005	7,956.32	4,017.78	14,641.28	9,372.60	23,427.50	51,117.37	55,313.32	7,241.74	192,299.82	40,567.39	10,713.41	4,796.71	421,465.25
2006	14,824.73	16,074.60	3,785.70	8,879.74	29,260.59	79,160.20	79,359.56	2,936.87	322,441.43	35,583.06	10,832.38	3,580.08	606,718.94
2007	19,365.28	11,531.61	613.29	6,101.71	12,891.36	84,229.39	67,917.79	3,535.83	495,425.94	107,416.67	10,160.08	676.6	819,865.54
2008	18,630.48	36,690.13	18,210.58	19,178.73	5,513.66	130,650.01	8,123.70	7,274.43	897,020.54	67,958.30			1,209,250.57
2009	21,365.86	28,786.06	1,647.64	9,476.23	13,736.28	66,591.42	27,430.12	12,308.43	317,108.70	88,479.86	2,605.51		589,536.11
2010	18,847.18	10,102.87	7,584.18	2,459.29	3,023.88	37,296.03	8,572.25	841.44	361,033.06	53,090.87	5,904.89		508,755.94
2011	32,412.33	25,057.82	10,814.34	21,314.81	12,029.71	13,593.25	3,228.80	1,970.51	308,270.47	86,336.36	4,484.90		519,513.31
2012	34,513.36	16,038.09	10,728.04	2,549.71	3,403.71	17,799.75	6,545.81		171,542.06	57,592.10	4,760.70		325,473.32
2013	38,091.81	26,670.25	14,128.60	4,326.96	12,658.21	12,338.69	11,737.78		85,820.54	26,540.43	7,237.43		239,550.69
2014	38,950.52	8,714.78	9,903.23	3,603.37	1,851.02	19,602.04	8,198.37		148,148.33	44,132.82	5,037.17		288,141.66
2015	32,032.02	23,336.13	11,698.08	2,998.40	1,030.16	15,789.60	6,535.15	0	112,079.94	29,461.92	850.2	0	235,811.60

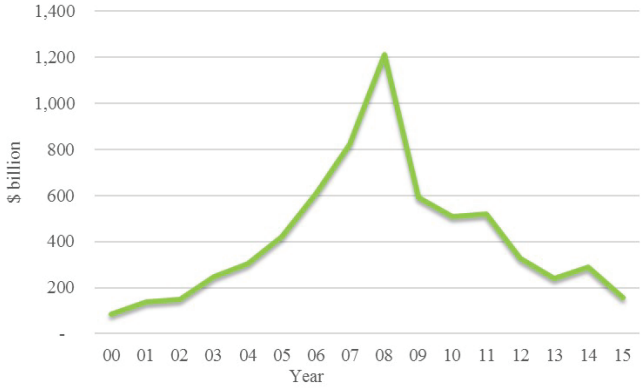
Source: Securities Industry and Financial Markets Association (SIFMA)

Table 2.2: Country Wise Securitisation Issuance in Europe - USD Millions

Year	Belgium	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	UK	Total
1991										5,771.03	5,771.03
1992										1,376.94	1,376.94
1993		561.03		140					98.55	3,449.97	4,249.55
1994		3,268.74				402			621.03	4,097.57	8,389.34
1995		2,321.99	96.32		482.17	470		336.24	391.53	1,843.24	5,941.49
1996	718.96	10,314.13	666.05			560	303.62		2,136.45	9,290.19	23,989.40
1997	1,544.83	3,696.21				557.56	1,693.44		868.06	16,809.00	25,169.11
1998	1,796.63	3,772.53	5,776.85		583.6	1,152.32	1,878.05	244.44	3,301.71	10,894.81	29,400.95
1999	821.58	6,487.34	13,281.95		1,213.93	8,514.62	6,064.43	1,111.69	7,095.42	25,046.93	69,637.90
2000	213.55	2,942.14	5,103.10	1,194.27	1,538.63	9,898.53	5,583.38	419.7	7,319.19	35,532.94	69,745.42
2001	153.52	4,295.86	3,299.56	316.2	1,620.89	30,006.25	13,773.18	2,355.65	6,601.04	43,267.88	105,690.03
2002		5,292.93	7,271.46			28,946.96	19,750.05	3,564.92	14,964.14	51,454.84	131,245.30
2003	2,778.10	7,409.38	7,797.85	423.04	2,138.90	35,948.83	28,496.66	13,039.20	28,524.63	90,000.70	216,557.29
2004	2,482.51	7,787.43	8,555.59	921.53		45,274.83	22,443.50	9,576.12	40,064.24	122,765.84	259,871.59
2005	586.1	4,289.29	27,809.36	2,770.65	2,042.95	39,678.80	48,608.14	9,127.54	52,325.79	165,289.54	352,528.17
2006	2,943.66	9,029.52	46,972.95	7,315.67	13,646.15	43,542.21	51,747.80	7,942.57	86,493.15	231,650.60	501,284.29
2007	5,715.55	7,800.80	27,870.90	7,488.24	21,132.32	48,497.62	137,461.20	12,194.57	170,667.57	252,422.41	691,251.19
2008	49,911.96	19,467.50	151,266.50	18,937.43	50,876.46	138,313.03	106,168.22	20,784.62	145,171.91	397,228.43	1,098,126.06
2009	38,807.19	9,605.43	23,398.49	30,363.67	35,589.83	96,796.80	61,529.45	14,384.40	88,595.26	125,307.47	524,377.99
2010	18,201.38	12,294.95	18,164.42	1,295.28	8,745.23	21,573.09	189,010.65	22,710.55	72,417.44	135,695.73	500,108.72
2011	25,242.83	22,155.45	17,900.06	8,760.87		70,116.80	118,386.90	13,693.10	85,336.04	140,423.40	502,015.45
2012	19,385.07	18,974.79	13,313.90	2,549.99	1,549.80	75,234.33	62,588.46	1,852.32	23,755.55	101,244.93	320,449.12
2013	2,648.63	13,263.60	28,991.09		1,372.12	35,547.11	52,180.60	4,425.39	36,625.57	44,515.03	219,569.13
2014	5,673.39	68,212.32	24,436.31	314.5	2,598.08	26,004.98	33,937.66	3,840.31	35,202.34	64,728.63	264,948.51
2015	34.21	5,317.65	41,078.24	0	417.29	22,112.10	22,427.85	3,440.93	17,944.17	29,549.66	157,526.01

Source: SIFMA

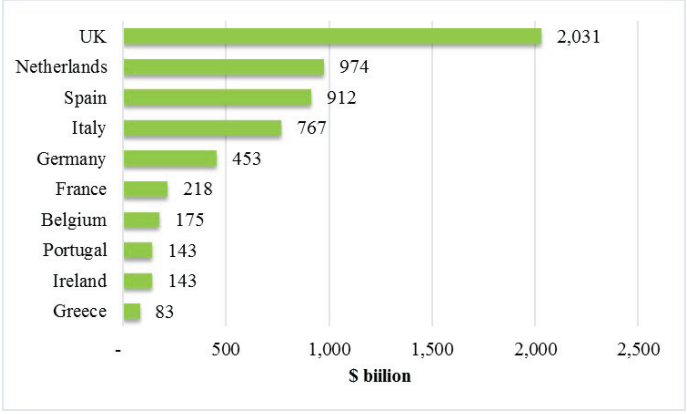
Figure 2.2: Securitisation Issuance in Europe



Source: SIFMA

The details of securitisation in Europe are provided in Table 2.1 and Table 2.2. Table 2.1 shows the amount of securitisation from 1991 to 2015. This table reveals that there was a rapid growth in securitisation in Europe after 2000. During the year 2008 it reached its maximum but a rapid decline is observed during the preceding years. This situation is prominently visible in Figure 2.2.

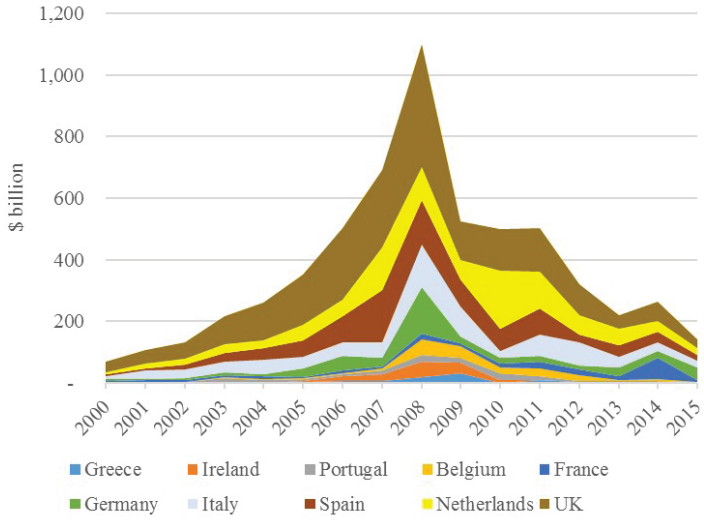
Figure 2.3: Securitisation Issuance in European Countries



Source: SIFMA

Table 2.2 shows the country wise level of the securitisation activity in Europe. The table shows that the UK has been leading the European securitisation market. Other major contributors in this market are Netherlands, Italy, Spain and Germany. The situation of the securitisation activity from 1991-2015 across various countries is prominently observable in Figure 2.3.

Figure 2.4: Country Wise Securitisation Issuance in Europe - USD Millions

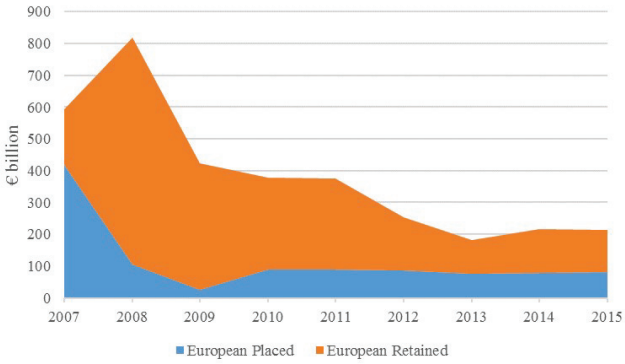


Source: SIFMA

Figure 2.4 shows the trend of securitisation over the years in different countries across Europe. This figure reveals that UK, Netherlands, Italy and Spain has been the market leaders over the years. The trend of securitisation is quite similar in most of the countries. The GFC affected this market in all countries but the Dutch market relatively showed some resilience and the decline here was lower than other countries.

The effects of the GFC on the securitisation market were not confined to the level of issuance only but banks also faced placement problems. Banks who were issuing ABS after the GFC were not able to place these securities with investors. The issuers were not able to restore the traumatised confidence of investors in this market. Thus, even the banks those were issuing these securities were not able to use them for the intended objectives. This situation is visible in Figure 2.5.

Figure 2.5: Placement and Retention of ABS in Europe



Source: AFME (2015)

2.1.7 Securitisation — Redefining the Banking Business

The role of banks as financial intermediaries utterly changed because of securitisation and it challenged the theories of financial intermediation (Gorton & Metrick, 2013). The banks as financial intermediaries are supposed to hold loans till maturity. According to theory, this provides an incentive for banks to actively monitor the borrowers during the course of loan to ensure the timely servicing of loan by the borrower.[19] It is often argued that banks may not have proper incentives to monitor the borrowers if they are not supposed to hold the loans. These incentives of the banks are linked with the non-marketability of loans. Securitisation distorted this incentive of monitoring and screening the borrowers (Kara et al., 2015; Kara, Marqués-Ibáñez, & Ongena, 2016; Keys et al., 2009, 2010, 2012) and it suggests that the theory of financial intermediation is not workable in this way (Gorton & Metrick, 2013).

Securitisation has weakened the concept of intermediation, thereby marginalizing the regulated banks as their balance sheets are moving into shadows. Cetorelli and Peristiani (2012) explain that the evolution of financial intermediation has an important normative implication. They explain that securitisation caused the banks to move away from their traditional role of financial intermediaries. This diminishing in the traditional bank-based system requires rethinking of monitoring and regulatory standards. Regulations working for the traditional banking system may not work in the light of the new role of banks. However,

[19]See Bhattacharya and Thakor (1993) and Gorton and Pennacchi (1995).

the involvement of many parties in the process of securitisation has increased the complexity for regulators because of the high level of opaqueness of the process (BCBS, 2008; Buchanan, 2014; EBA, 2014; Guo & Wu, 2014; Krahnen & Wilde, 2008).

Loutskina (2011) explains three main changes brought by securitisation to the traditional banking system. Firstly, the banks largely started managing their liquidity risk through securitisation. Banks were also taking in account the liquidity characteristic of their loan portfolio alongside traditional measures of the liquidity on their balance sheet. Secondly, banks increased the supply of credit to different sectors in the economy by the virtue of the liquidity generated through securitisation. Banks are able to securitise their illiquid mortgages thereby increasing their eagerness to extend illiquid loans to corporations. Thus, a structural shift is observable in the lending structure of the banking system. Now securitisation has emerged as a mean of financing for loans. This shift has caused a change in the risk profile of the FIs. Thirdly, the relationship of cost of funding and credit supply from banks became weaker because of securitisation. The lending activities of banks became less sensitive to the economic shocks and interventions of the regulatory authorities. However, a huge increase in the vulnerability of banks to the financial crisis was observed in 2007 because of the excessive reliance on securitisation to meet the funding and liquidity needs.

Securitisation and Banks

Securitisation provides multiple benefits to the banks. The individual illiquid assets of a bank can be converted into to tradable securities and banks can replenish their funding sources that can be used for additional origination of loans. These benefits can be divided into five broader categories: risk transfer, low funding cost and liquidity, revenue generation, regulatory capital arbitrage and accounting treatment.

Risk Transfer Securitisation is supposed to provide a vent to banks against the risk through transferring the same to a third party. The assets being securitised depart from the balance sheet of the bank. The securitising bank is considered no longer exposed to risks associated with these transferred loans. It is believed that taking some toxic assets out of their balance sheets may help the banks mellow down their credit risk exposure (Cabiles, 2012). The off-balance sheet treatment of the underlying assets is considered as a mean of transferring credit, interest rate, prepayment, and liquidity risk to investors.

There are many important considerations related with the (advocated) risk transfer benefit of securitisation. There are various structural and performance related triggers that can be

procyclical and highly interrelated with each other and have implications for the originator (BCBS, 2008). A scepticism is associated with the risk transfer in the presence of these triggers. The retention of lower tranches by the originators also raise questions on the risk transfer through securitisation (Acharya, Schnabl, & Suarez, 2013). Moreover, contractual support provided by the originators for the securitisation also influence the level of risk transfer from the originator to investors (Acharya & Naqvi, 2012; Gorton & He, 2008). However, insurance companies have been using securitisation to transfer their capricious risk to market investors by issuing catastrophe bonds (Hagendorff, Hagendorff, Keasey, & Gonzalez, 2014).[20]

Low Funding Cost and Liquidity The reliance of the banks on traditional funding sources restricts the bank activities and it can be expensive in a downturn situation as well. Securitisation provided the banks with a new source of funding. The bank started enjoying a financial independence by the virtue of securitisation. The lower funding cost is also associated with the credit rating enhancement benefits in case of securitisation. The assets used as collateral for the issued securities are separated from the originator. Therefore, smaller institutions with a non-investment grade credit rating can access the capital market because of securitisation as the securities are solely rated on the quality of the collateral. These institutions may get a AAA rating for the issued securities, depending on the quality of collateral, that helps them secure the financing at a lower cost. The empirical evidence in the previous studies suggests that this has been the strongest incentive for the banks to securitise (Cardone-Riportella, Samaniego-Medina, & Trujillo-Ponce, 2010).

Securitisation, before the GFC, served as a stable source of cheaper funding. The banks could produce liquidity on demand through securitisation thereby avoiding a liquidity crisis otherwise such a crisis may prove to be a slayer for a bank. The reliance of banks on retail deposit and issuance of commercial papers was significantly reduced because of it. Moreover, the tranching feature of securitisation enabled banks to access a broader investor base. This is helpful in further diversifying the funding base. However, there is a downside of this situation as well. The heavy reliance on securitisation for funding led to severe problems during the GFC when banks were not able to place these securities in the market (Loutskina, 2011).

Revenue Generation This benefit has been widely ignored by most of the studies conducted on the motives of securitisation. However, Basel Committee on Banking Supervision (BCBS,

[20]The payment against these bonds is deferred or excused in case a catastrophe event occurs. The risk is transferred to the market investors in this case.

2011) identifies it as an important incentive of securitisation for originators. Supervisors and international bodies have recognised it as an area where reforms are warranted. The banks have been using securitisation to generate revenue through several means. It improves the return on capital through conversion of on-balance sheet business to a less capital intensive off-balance sheet fee income stream (Buchanan, 2017). The banks generate fee for originating and servicing the collateral assets, underwriting and structuring the transactions and providing credit and liquidity enhancement for the issued securities. The accounting rules also encouraged the growth of securitisation as banks could recognise gain on sale after the transfer of assets to an SPV. The spread between the short term issued securities and the issuance of long term assets financed by them was also a source of revenue generation for the banks.

It is important to note here that fee generation through various activities, outlined above, motivated banks to repetitively use securitisation.[21] Many issuers in the securitisation process were relying on third party originators. Many of these originators were thinly capitalised and poorly regulated. Therefore, in a race of fee generation many institutions including various boutique lenders also entered into this market without comprehending its dynamics and underlying risks BCBS (2013).[22] The asset generation process became flawed and associated risks were under-estimated by the financial institutions (Kara et al., 2015). Consequently, many of ABS issuers faced a failure or severe problems during the GFC that led to extensive losses to the entire financial system.

Regulatory Capital Arbitrage Regulatory capital arbitrage is a widely documented incentive of securitisation for banks. Most of the financial institutions across Europe are supposed to follow the Basel Accords. These financial institutions are required to show their compliance with a framework of capital adequacy laid out in the Basel Accords. These banks are required to follow the minimum standards for the capital adequacy and other measures related to risk management initiatives in the banking system. This compliance requirement has compelled many of the banks to either raise their existing capital or to dispose-off some of their assets. The exercise of raising new capital is always extensive and expensive for banks. Securitisation provided banks with a mean to dispose off their existing assets to meet the minimum standards related to capital requirements (European Securitisation Forum, 1999).

[21] Bank started issuing several assets with a view to securitise them at a later stage. Banks were originating assets, transferring them and issuing securities against them. This process was being repeated with a view to increase the revenue.

[22] Boutique lenders are small firms who specialises in specific services. These firms extend their lending to certain sectors. Hence, their loan portfolio may not be well-diversified.

Banks are highly incentivised to securities when there is a huge gap between the necessary economic capital and required regulatory capital for an asset.[23] The transfer of assets from the originator's balance sheet were causing freeing up of regulatory capital. These assets were transferred from the balance sheet of the originator and they were not required to hold the capital against them. This enabled banks to generate further assets without increasing the capital. This also resulted into a greater availability of credit in the economy. The empirical evidence provided by various studies confirms that regulatory capital arbitrage was a strong incentive for banks to securitise (Carbó-Valverde et al., 2012; Panetta & Pozzolo, 2010). However, some other empirical studies do not support the claim that regulatory capital arbitrage is an important motive of securitisation for banks (Ambrose et al., 2005; Cardone-Riportella et al., 2010).

Accounting Treatment The off-balance sheet accounting treatment is a significant incentive for banks to securitise. The removal of some financial assets from the balance sheet leads to an improvement in several accounting rations e.g. leverage ratios, return on assets etc. Moreover, banks can record any gain on sale of assets in the income statement leading to an increase in the non-interest income. This increases the return on equity of the originator. The banks were also able to increase their market share without increasing balance sheet concentration because of the off-balance sheet treatment of the securitised assets. Moreover, a bank can better manage its balance sheet by dividing and redirecting the cash flows generated from the underlying assets. This also offers an efficient source of matching duration of the assets and liabilities.

Securitisation and Investors

Securitisation caused a fall in the rate of return on traditional fixed income securities.[24] The securities produced out of securitisation were offering a higher rate of return with a better credit risk profile as compared to the traditional securities. The payment rights against the issued securities are divided into 'tranches'. The holders of these tranches are paid in a pre-defined order with respect to the seniority. The payment structure is also supported by the credit enhancement mechanisms European Securitisation Forum (1999). Hence, investors face a diversified exposure to the credit risk that is tailored to the individual risk appetite of

[23] Regulatory capital is the capital required by the existing regulations with respect to the assets of a bank, whereas, the economic capital is the risk capital that a banks must have in the light of risk taken by it on realistic basis.

[24] These traditional securities include conventional corporate and sovereign bonds.

investors. These securities were perceived carrying low risk and many investors made their flight to this class of securities. However, a failure of the market to price the risk associated with ABS led to out of the blue losses for investors turning into a full blown financial crisis as these securities were embedded within the financial system (BCBS, 2011).

High Credit Quality Investors are often required to meet some prudential standards while making investment in different assets. They tend to invest in highly rated securities to meet these requirements. Securitisation provides them with such securities having the feature of credit enhancement and backed by the assets legally separated from the originator. However, the eruption of the GFC revealed many problems with this approach. Investors were overly relying on rating agencies and were not conducting any due diligence while evaluating the securities before making their investment decision (Hellwig, 2008; Kyl, 2003). This due diligence was actually outsourced to rating agencies. Moreover, investors' quest for highly rated securities created liquidity concerns during the crisis when they were forced to sell these securities. The prices were downgraded to the lowest level when a large number of investors started selling their securities (Benmelech, Dlugosz, & Ivashina, 2012; Z. Chen, Liu, Opong, & Zhou, 2017).

Portfolio Diversification ABS provide investors with the portfolio diversification. Their concentration in the equity market is decreased. The investors can also increase the diversification by taking exposure in different geographical locations. Moreover, the securitised products are less correlated with other investment products like bonds and equities. However, investors' assumptions about the low correlations of these securities with other market products were falsified after the eruption of the GFC (Blommestein, Keskinler, & Lucas, 2011). The interconnectivity of the financial systems across the globe also outweighed the perceived benefits of the geographical dispersion.

Attractive Yields ABS were highly attractive investment products for the investors looking for the higher yields. These securities were offering higher rate of returns as compared to other securities of similar ratings. Therefore, a large number of investors showed interest in this class of securities.

Securitisation and Economy

The economies with active securitisation market realised numerous economic and social benefits of it. Securitisation provided a mechanism of generating assets with higher yields

and (perceived) low credit risk. Therefore, it helped to close the gap between the demand and supply of such assets. The conversion of non-tradable financial assets into tradable securities through securitisation increased the credit availability and reduced its cost in the economy. Securitisation has also the ability to control regional disparities by linking the national credit activities with the global capital markets (European Securitisation Forum, 1999). Thus, the flow from the international capital market systems can increase by the virtue of securitisation. Shin (2009a) notes that foreign banks have been a major funding source for the residential mortgage lending market in the US.

It allows to diversify the risk through tranching process and mitigating the idiosyncratic risk of individual loans. Hence, it enabled the banks to dilute the risk in economy by segregating and prioritising cash flows and creating assets with multiple levels of credit risk. As a result, risk does not concentrate in one particular market segment bit it is dispersed among a large number of market participants. It increases the investment opportunities and facilitate the flow of capital in the economy. Moreover, securitisation also encourages the efficient allocation of capital.

For these reasons, the revival of securitisation has been on the agenda of regulatory agencies (AFME, 2014; European Commission, 2015a, 2015b). According to publicly available statistics provided by Standard & Poor's, Small and Medium Enterprise (SME) loans securitisation has played a significant role in providing liquidity to SMEs. From 2007 to 2013, S&P rated SME loan securitisation amounting to €103 billion. The cumulative default rate of these securitisation transactions for all tranches was 0.29% of the total issuance (cited in Association for Financial Markets in Europe (AFME), 2013). According to a survey conducted by European Central Bank (ECB), there is high gap between the demand and supply of SME loans (ECB, 2013). The loans securitisation can play a key role in filling this gap.

Risks with Securitisation

The most important risks associated with the securitised instruments are discussed below.

Default Risk The default risk is usually taken as the failure of a borrower to meet its obligations with respect to interest and principal payments. However, the default risk may also arise because of the failure of a borrower in meeting other obligations. An important obligation in securitisation transactions is related to maintaining a certain quality of the financial asset. The minimum criteria for the quality of financial assets is laid out in the relevant documents governing the securitisation transaction. The criteria are evaluated by the

rating agencies for assigning the rating to the issued securities. The changes in quality of the financial assets backing the issuance of ABS lead to changes in rating of these securities as well (Altomento & Bussoli, 2014).

An investor evaluates the default risk of an ABS on the basis of its assigned rating. The changes in ratings reflects the changes in default risk as well. The senior classes of the issued ABS, because of tranching, receive the highest rating. Therefore, the default probability of these securities is considered remote as the lower tranches are supposed to absorb all the losses before they reach to the most senior tranches (Gorton & Metrick, 2012). Conversely, the yield generated on these senior securities is also lower because of the low risk of default. The lower securities may have AA to C ratings or even they can be unrated as well. The investors need to consider if the amount of risk is balanced by the associated yield. The investors with a high-risk appetite are attracted towards low-rated securities as they generate higher yield. The reliance on the ratings proved fatal during the GFC as senior securities also started downgrading and it became evident that rating agencies underestimated the risk associated with these securities while assigning ratings. The ratings proved extremely misleading for the investors and they experienced unprecedented losses in the secondary market (Griffin, Nickerson, & Tang, 2013).

Interest Rate Risk The prices of ABS are subject to fluctuations like other fixed income securities because of changing interest rates in the economy. The prices face a downfall when interest rate rises and vice versa. The ABS are also issued with floating rates and prices of these securities are relatively stable with respect to changes in the interest rate as the relevant index of these ABS reflects such changes. However, changes in interest rate does not directly affect the prices of ABS always, rather they may affect the payment structure. The pace of the prepayment is also subject to changes in the interest rate that in turn affects the yield of these ABS. The prepayments are usually highly correlated with the interest rates changes in the case of residential mortgage loans (Dübel, 2005). Therefore, RMBS can be highly sensitive to changes in the interest rate. Non-mortgage loans are less sensitive to changes in the interest rate and securities backed by these assets are less affected by the prepayment activities.

Liquidity Risk The liquidity risk reflects the relative ease with which an ABS can be traded in the market at a price that is close to its intrinsic value. Several factors play a role in determining this relative ease. These factors may include the market conditions, prevailing interest rate and structure of demand and supply of these securities in the market. A good measure of liquidity risk of ABS can be the spread between the bid-ask prices (Amiram,

Landsman, Peasnell, & Shakespeare, 2011). The higher spread reflects a higher liquidity risk. However, this risk may become less important for those investors who are willing to hold their securities until maturity.

Prepayment Risk Prepayment risk reflects the risk of receiving payment of principal amount before the maturity of loans. The investors usually have apprehensions about the prepayment on the assets backing ABS. These concerns are normally high in case of MBS and RMBS. Therefore, the evaluation of prepayment risk is a fundamental element for investors to make the expectation about the life of a security as it affects the associated yield. A decline in the interest rate may accelerate the prepayments (Pagès, 2013).

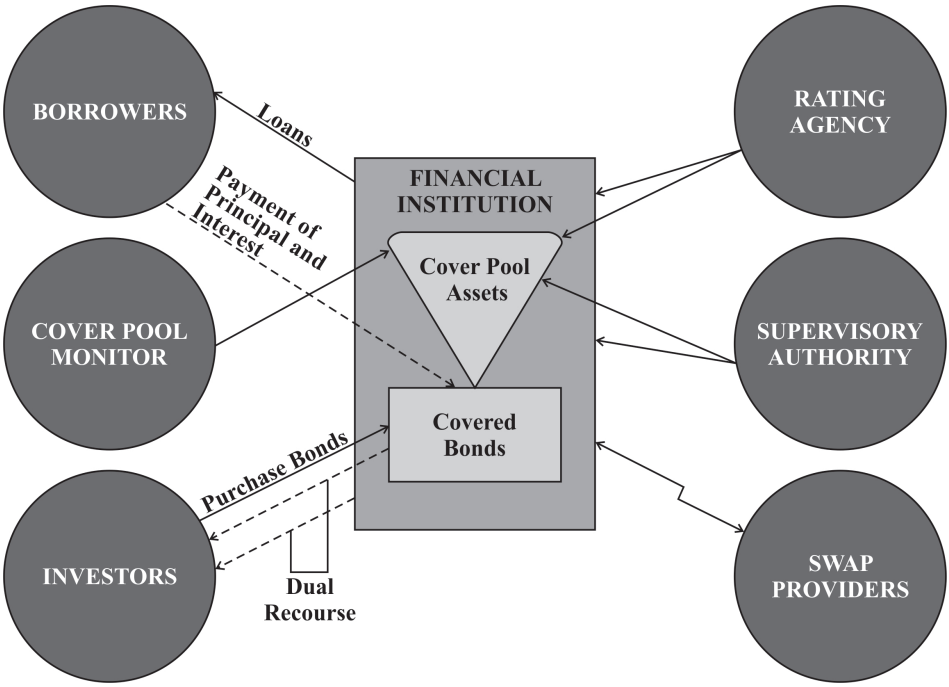
2.2 Covered Bonds

Covered Bond (CB), in its basic form, is a debt instrument paying fixed rate of interest. The interest payment against this bond is called coupon payment and the principal payment is made at the end of the maturity period. CBs are mainly collateralised by cash flows generated through a pool of ring-fenced assets. This pool of assets is called cover pool. The holders of CBs have preferential claims against the collateralised assets in case of issuer's default. Their claims can be extended to other assets of the issuer if the underlying cover pool is not sufficient to meet the claims of CB holders. This cover pool is supervised by an independent monitor. The complete process of a CB transaction is shown in Figure 2.6.

A single definition of existing CBs is hard to present because of structural differences in countries across Europe. Every country has a different structure and a set of regulations for CBs. Some countries allow the structuring of CBs by the virtue of private contracts. However, a strict conformity with the prescribed features is necessary for the provision of an enhanced level of protection to investors. European Covered Bond Council (ECBC) provides four essential features of a CB that can be considered as its definition: (1) a credit institution supervised by a regulatory authority can issue the CBs; (2) the holders of CBs have a priority claim against the assets in the cover pool over unsecured creditors of the institution; (3) it is necessary for the issuing institution to maintain the cover pool all the time for meeting the claims of CB holders; and (4) public or independent bodies should supervise the obligations of the issuing institutions with respect to the cover pool (ECB, 2008).

FDIC (2008) defines a covered bond as a "non-deposit, recourse debt obligation of an Insured Depository Institution (IDI) with a term greater than one year and no more than thirty years, that is secured directly or indirectly by perfected security interests under applicable

Figure 2.6: Process of Covered Bond Issuance



state and federal law on assets held and owned by the IDI consisting of eligible mortgages, or AAA-rated mortgage-backed securities secured by eligible mortgages if for no more than ten percent of the collateral for any covered bond issuance or series."

2.2.1 History of Covered Bonds

The traces of CBs can be found in the 18th century during the rule of King Frederick the Great. Prussia is considered the birthplace of CBs (Larsson, 2013). The aristocracy of the Prussian land was significantly thrashed during the seven years of war (1756-1763). There were substantial losses on the agricultural production and a severe credit shortage was hampering the efforts to rebuild the empire. King Frederick the Great introduced a new scheme of the mortgage financing to cope with this situation. This scheme was meant to restore the liquidity for Prussia and remove the credit shortage problem. By a decree issued in 1769, the King mandated establishment of Law Associations comprised of landed nobles. These associations were called "*Landscaften*". The members of the *Landscaften* had the right to get credit from

the associations by providing a full recourse to their land. This credit was provided in form of a security that was called *Pfandbrief* and members were able to get cash by selling this security to investors (Schwarcz, 2011). This *Pfandbrief* is considered the first CB (Quirk, 2010).

These *Pfandbriefe* were like CBs issued these days in terms of over-collateralisation requirement. The holders of the *Pfandbriefe* were also enjoying two layers of protection like the dual recourse in the case of modern CBs. They had a claim both against the individual estate of a borrower and collective pool of the assets established by the *Landscaften*. This structure of the mortgage financing proved successful for Prussia and the problem of credit shortage was successfully handled through this structure. Subsequently, this structure spread to other countries like Denmark, Sweden, Finland, Austria and Baltic region (Verband Deutscher Pfandbriefbanken, 2005).

The German Mortgage Bank Act was enacted on January 1, 1990. This was an important development for the growth of the *Pfandbrief* system. This act codified the characteristics of CBs like dual recourse of CB holders to the asset pool and the issuer in case of default and ring-fencing of assets in the cover pool on the balance sheet of the issuer. The *Pfandbrief* system burgeoned in Europe after this act and it became a popular mean of refinancing. However, during the middle of 20th century this system was widely replaced by the retail deposits, but CBs surged back in Europe in 1995 when the issuance of first Jumbo *Pfandbrief* took place in Germany.[25] Afterwards, *realkreditobligationer* in Denmark and Austrian CBs markets also started flourishing Packer et al. (2007). Many countries enacted laws for CBs later on and a higher interest was visible after the GFC.

CBs have an important place in the bond market in Europe now. Thy are subject to a set of well-defined regulations and have well grown markets in various countries across Europe. However, the CB market in the USA is still in nascent stages. The first issuance of CBs in the USA took place in September 2006. Washington Mutual Bank issued structured CBs those were backed by a cover pool comprised of the US residential mortgage loans. A similar transaction was performed by the Bank of America later on (Dechert, 2008). Some other banks also tried entering this market. However, unlike Europe the CB market is not well-developed in the USA. The market participants and banks are reluctant in investing and

[25] Jumbo *Pfandbrief* were introduced to attract international investors to the CB market that previously focused only on domestic investors. The issuance volume of the Jumbo *Pfandbrief* must be e1 billion. The average size of the issuance is about e1.5 billion. The issuance is not made by an individual bank but an issuing syndicate is formed. There are minimum five banks required to formulate this syndicate. These banks are known as market-makers. The issued Jumbo *Pfandbriefe* must be listed on German Stock Exchange. The market for the Jumbo *Pfandbrief* is highly liquid, mainly because of its size.

issuing CBs because of the absence of a legislative framework.

2.2.2 Legal Structure of Covered Bonds

Covered bonds, in most of the European jurisdictions, are issued by the financial institutions that is subject to certain regulations and supervision. However, the structure of CBs varies across these jurisdictions. The issuer of CBs in some countries, like Denmark, Germany and Latvia, must have licence from the competent authorities to issue CBs. CB issuers in other countries, like Italy and Spain, are not required to get licence from the authorities. However, they can only issue CBs if they show compliance with the requirements laid out in the relevant legal framework of the country. Banks in some jurisdictions are also required to provide an ex-ante notification to the authorities about their CB programme (EBA, 2013).

The regulatory authorities provide guidelines to the CB issuers about the eligibility of the assets those can be collateralised against the CB issuance. An important criterion used to evaluate the eligibility of the assets, apart from the eligibility with respect to the asset class, is LTV ratio.[26] The loans placed in cover pool are required to meet certain threshold of LTV in all jurisdictions. The requirement varies across countries, but in most of the cases LTV should not exceed 80% limit.[27] These eligible assets are placed in a cover pool and ring-fenced on the issuer's balance sheet. The assets in the cover pool are segregated by the law from the insolvency estate of the issuer, providing a status of bankruptcy remoteness to the cover pool. Hence, these assets cannot be used for any other purpose until CBs issued against them are retired. There are two legal structures followed for the issuance of CBs i.e. Special Law Based Structure and General Law Based Structure.

Special Law Based Structure

Most of the CBs issued in various countries of Europe are subject to a defined set of regulations. These regulations are specifically devised for regulating the CB issuance. The CBs issued in compliance with these regulations benefit from a preferential treatment with respect to risk weightings.[28] CBs issued under this structure are called Legislative Covered Bonds (LCBs).

[26]LTV is used to assess the risk associated with the mortgage lending. This ratio shows that how much loans has been issued against the value of the mortgage. The higher LTV ratio shows a higher risk. Consequently, if the loan with high LTV is issued by the bank it may cost higher to a borrower because of higher risk associated with it. A loan with high LTV may become ineligible as a collateral for CB.

[27]Some countries have more strict limits. For instance, the LTV threshold in Germany is 60%. See Table 3.2 for the details of LTV in different jurisdictions.

[28]These bonds receive lower risk weights as compared to other instruments of similar rating.

Apart from the local legislations, LCBs are subject to compliance with Undertakings for Collective Investment in Transferable Securities (UCITS) and Capital Requirement Directive (CRD). These legislations provide bankruptcy protection to investors. By virtue of these regulations, investors enjoy the strength of underlying assets at first place and not the strength of the issuer. Most of the legislations supervising LCBs require the issuer to maintain a dynamic cover pool and provide a dual recourse to investors.

Many countries, like Germany, require the issuers to have a licence before issuing CBs. It is expected that the LCB issuance is not an erratic or opportunistic, but it is a regular activity of the FI. The regulators also provide guidelines about the eligibility of the assets backing the LCB issuance. The assets other than eligible ones cannot be used for LCB issuance. For instance, German Pfandbriefe can only be issued against mortgage loans, public loans, ship loans and aircraft loans. Commercial and consumer loans cannot be used in the issuance of Pfandbriefe. The assets backing the Pfandbriefe are recorded in the cover register and these registered assets cannot be included in bankruptcy estate of the issuer if such proceedings are started. The holders of LCBs can only participate in the insolvency to the extent their claims remain unsatisfied by the assets recorded in the cover register. Usually, if bankruptcy proceedings are opened against an LCB issuer, the court appoints two administrators of the cover assets. These administrators either continue to service the assets or dispose them off at once and make payments to the LCB holders.

General Law Based Structure

Some countries follow a general law based structure for the issuance of CBs. These CBs are not subject to any special law but they are issued under contractual arrangements. The laws governing the issues of these bonds are based on general laws or contract laws. These CBs are called Structured Covered Bonds (SCBs). SCBs are more flexible as compared to LCBs. The eligibility criteria for the assets backing these bonds is not very rigid and issuers may decide to place the asset according to their requirements. The main purpose of issuing SCBs is to get an uplift in the rating of these bonds, as these bonds can get a better rating than their issuers.

SCBs follow a structure that is similar to ABS. The assets used as collateral for SCBs are not held by the issuers but are sold to an SPE. However, unlike securitisation, bonds backing these assets are not issued by the SPE but are issued by the originator. Therefore, these bonds are the direct obligation of the issuing institution. The SPE in this transaction plays the role of a guarantor. The proceeds generated from the SCB issuance are lent to the SPE that is used

by it to purchase the assets from the originator. Hence, SPE becomes the legal owner of these assets. A guarantee is issued by the SPE to investors about making the payment if the issuer SCBs faces a bankruptcy. This is an irrevocable guarantee that is secured by the cover pool. The originator makes the payment of principal and interest to investors. The loan to SPE and assets purchased by it are squared-off when bonds are repaid by the originator.

Though SCBs are not subject to a special law enacted for CBs but a monitor is assigned to ensure that a level of credit enhancement is well-maintained till the maturity of the issued SCBs. The guarantee issued by the SPE to investors is enforced if bankruptcy proceedings are opened against the issuer. The assets backing the bonds are passed on to an administrator. The claims of the bondholders are settled from the sale of the assets held in cover pool. If these assets are not sufficient to meet the claim of bondholders, they will have a recourse to the issuer along with its other creditors.

2.2.3 Participants in Covered Bonds Transactions

There are different participants in a CB transaction like securitisation. Each participant has well-defined responsibilities. The role of most of the participants is to protect the interest of CB holders. The details about these participants along with their roles in the transaction have been provided below.

Borrowers

Borrowers have the same role in CBs as in securitisation. They are responsible for making the payments of principal and interest against the loans held in the cover pool. These borrowers are ex-ante not aware about the placement of their loans in the cover pool. The class of the borrower plays an important role in the CBs issuance. CBs are financed by high quality assets. Therefore, loans issued to lower class borrowers may not be placed in the cover pool. The default of a borrower or prepayment from a borrower disturbs the cover pool as such loans are replaced with other assets.

Financial Institution / Covered Bond Issuer

Financial institution, usually a bank, originates the assets. The cash flows being generated from the assets are used to back the CB issuance. The originating bank, in a direct issuance structure, does not transfer the assets backing CB issuance to a separate entity but retain them on its balance sheet and issues the CBs that are also placed on its balance sheet. Therefore,

the banks have a very strong 'skin in the game' as CBs are their direct and unconditional obligation. A bank has to show its compliance with many legal provision before issuing CBs.

Supervisory Authorities

The supervisory authorities play an important role in a CB transactions. They define the regulations for the eligibility of assets backing the CB issuance. They provide the guidelines about the eligibility criteria for the assets to be placed in the cover pool. They ensure that banks show their compliance with the defined regulations while issuing CBs with respect to the eligibility of assets, over-collateralisation requirement, LTV criterion, and required actions in case of deterioration of assets in the cover pool.

The supervisory authorities do not play role at the time of issuance of CBs only. They have a continuous role to play during the life time of CBs. They provide instructions to CB issuers to provide periodical reports about the performance of assets held in the cover pool. Many a times they also perform on-site inspections to check the authenticity of the reports provided to them. They review the changes in the features of the CB programme. Banks also need to get approval from the supervisory authorities to make such changes. These changes may relate to structure of the cover pool or various figures involved in the programme. Supervisory authorities also ensure that prompt corrective actions are taken by the CB issuer in case of any possible disruptions in the programme.

Rating Agencies

Rating agencies are responsible for rating CBs. Unlike securitisation, this rating does not solely take place on the basis of cover pool but it is partly assigned on the basis of the issuer's credit strength and partly on the basis of collateral pool. The rating agency not only assesses the quality of the assets held in cover pool but they also evaluate the level of over-collateralisation. The rating agency does not take into account the legal minimum standard of the over-collateralisation but any voluntary over-collateralisation provided to bondholders is also taken in consideration. The assessment of this voluntary over-collateralisation is a grey area for the rating agencies in many CB programmes (Fitch, 2016).

The different rating agencies have different criteria for the assigned rating to CBs. The legal framework of a specific country also plays a significant role in the rating of CBs. For this reason, the rating of a bond may change significantly even if rating agencies do not change their rating criteria. These changes can be attributed to legal frameworks or market conditions. Recently, many of the rating agencies have redefined their rating methodologies

for CBs to account for the favourable regulatory treatment and exemption of CBs from the bail-in regime (Dierick, 2015).

Cover Pool Monitor

An independent cover pool monitor is assigned to supervise the assets held in the cover pool.[29] This monitor is a qualified and independent entity to perform the role of a monitor. This cover pool monitor performs the audit of the cover pool to ensure that all assets in the cover pool meet the eligibility criteria defined in the relevant legal framework. It verifies the compliance with over-collateralisation and LTV requirements and reports any discrepancies to the national authorities. It continuously monitors that cover pool does not drop down the notional value at any time during the maturity of CBs. For this purpose, it continuously keeps a track of movements of assets in the cover pool and instructs issuers about replacement of any deteriorating assets. A CB issuer cannot make any changes in the cover pool without approval of the cover pool monitor. However, a cover pool monitor may not be required where similar tasks are directly performed by the competent authority (EBA, 2013).

Swap Providers

The CB issuers often enter into swap agreements with various parties that are usually some other financial institutions. The SWAP agreements are made for a hedge against fluctuations in interest rates and exchange rates when CBs are issued in another currency or in some other jurisdiction. The losses arising from the difference in interest received on assets held in the cover pool and interest paid on CBs are mitigated in this way. The SWAP provider is required to take remedial actions in case of a downgrade or provide support from another back-up SWAP provider. The CB issuers also have to make a compliance with the payment terms mentioned in the agreement otherwise SWAP provider may not be considered liable to meet its obligations. The termination of this agreement may result into a payment from the SWAP provider or the CB issuer.

[29]The cover pool monitor works under different titles in various jurisdictions e.g. trustee (*Treuhänder*) in Germany, special reviewer (*reviseur special*) in Luxembourg, special controller (*controlleur specifique*) in France and independent auditor (*auditor independente*) in Portugal. However, it performs approximately a similar set of responsibilities irrespective of the title.

Investors

CBs are highly attractive instruments for the investors looking for secured financial instrument. The quest for secured instrument was highly increased in the aftermath of the GFC. The investor looking for return yielding options prior to the GFC started looking for the safe investment options. The interest of investors is highly protected in case of CBs because of various provisions provided by the regulations. Investors are less concerned about the payment from CBs unless bankruptcy proceedings are opened against the issuer.

2.2.4 Features of Covered Bonds

CBs have distinctive features that make them prominent securities in a crowd of securities being traded in the secondary market. Most important features of covered bonds are explained below:

On-Balance Sheet Nature

CBs are on-balance sheet instruments. Unlike ABS, collateral against CBs does not leave the balance sheet of the issuer and issuer has a strong incentive for active monitoring of the cover pool. This ensures that issuer's incentives regarding the performance of reference collateral are in full alignment with investors' interest. This feature of the CBs is highly attractive for the investors who are concerned about off-balance sheet nature of the collateral pool in securitisation.[30] However, these assets are separated from other assets and separately mentioned that they are held against covered bonds.[31] Banks are also required to hold capital against these assets. Therefore, CB issuers do not enjoy the regulatory capital arbitrage benefit as enjoyed by securitising banks.

Over-Collateralisation

Over-collateralisation is a method of credit enhancement used in CB transactions. The value of the collateralised assets is greater than the amount of CBs issued against them. The minimum level of over-collateralisation is either set by a special law or by the contract made for the issuance of CBs. The legal requirement of over-collateralisation varies across different

[30]The concerns about 'skin in the game' do not exist in case of CBs because of their on-balance sheet nature.

[31]These assets held against the issuance of CBs are recorded in a cover register in the case of issuance of famous German bonds, *Pfandbrief*. An independent monitor ensures that the cover pool is well maintained all the time and necessary adjustment are made timely and recorded in the cover register. A certificate is also issued by this monitor before the issuance of CBs.

jurisdictions.[32] However, many banks perform voluntary over-collateralisation in excess of the required level to obtain a higher rating of the issued CBs. The over-collateralisation preserves the claims of CB holders in the insolvency estate of the issuer and provide protection to investors against the market risk.

Dynamic Cover Pool

A key feature of CBs that differentiate them from ABS is the dynamic nature of the collateral pool against which they are issued. The CBs issuers are required to maintain the notional value of the cover pool at all times. It implies that in case of a drop down in the value of the collateral, issuer will put some other assets to match the notional value and for compensation of the moribund in the collateral. This is a distinguishing feature of CBs. Contrastingly, the sponsors in a traditional securitisation structure are not required to replace any deteriorating assets and all losses occurring because of these deteriorations in assets in the pool are borne by the investors.

Dual Recourse

The CB holders enjoy a dual recourse. They have a preferential claim over the assets held in the cover pool. This pool is ring-fenced and segregated from other assets. The assets held in the cover pool remain unaffected in post-bankruptcy situation. Other creditors of the bank do not have access to these assets. However, CB holders have an unsecured claim on bankruptcy estate of issuers if the collateral held against the issued CBs does not generate enough cash or its value drops down. CB holders in such a condition are treated *pari passu* with unsecured creditors of the credit institution and in some cases they also get a preferential treatment over unsecured creditors. Hence, a CB holder enjoys a dual recourse to the cover pool and the issuer as well. Nonetheless, this dual recourse depends on the enforcement strength of the local legislations (in case of LCB) or on the legal structure of the transactions (in case of SCB). The status of claims has been summarized in Table 2.3.

2.2.5 Covered Bonds in Europe

CBs have been widely used refinancing instruments in European countries for the last 250 years. The roots of CBs can be traced back to the 17th Century when Frederick the Great

[32]Most protective legislation related to over-collateralisation are in Spain where investors are required to maintain a minimum 25% over-collateralisation in case of CBs backed by the residential mortgages and 43% in case of CBs backed by public loans.

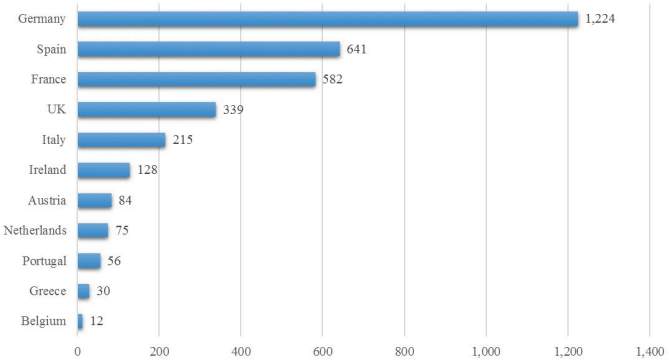
Table 2.3: Recourse of Investors for Funding Sources

		Claim Against Collateral Pool	
		No	Yes
Claim Against Financial Institution	No	Unsecured Debt and Depositors	ABS or MBS
	Yes		Covered Bonds

Source: (ECB, 2008)

issued the first CBs after seven years of war. These bonds were similar to the bonds issued these days with respect to their over-collateralisation requirements (Larsson, 2013). As Germany is considered the birthplace of CBs, it has been leading the CB market in Europe. Figure 2.7 provides the level of issuance of CBs across different countries in Europe from 2004-2015. Other significant contributors to this market are France, Spain and UK.

Figure 2.7: CB Issuance in European Countries (2004-2014)

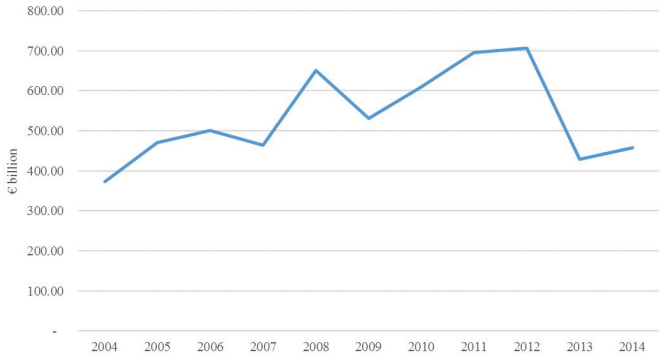


Source: ECBC (2015)

A sizeable growth of the CBs market has been experienced since 2003 (ECB, 2008). A trend of growth of CBs in Europe has been shown in Figure 2.8. This figure shows that the CB market did not follow a concise a trend but it has been fluctuating during the last decade. The market faced a growth after 2003 but this was not a steady growth. The effects of GFC and European sovereign debt crisis are also visible in this market but in comparison with securitisation this market was relatively less affected by the GFC and European sovereign debt crisis. Moreover, the market faced an immediate revival in 2010 after its decline in 2009. This shows that CBs market in Europe served as a stable source of funding for European banks. However, this revival of the securitisation market is ascribed to the Covered Bond

Purchase Programme (CBPP) introduced by ECB in 2009.[33] Therefore, the claim about the resilience of the CB market during the crisis become questionable.

Figure 2.8: Trend of CB Issuance in Europe (2004-2014)



Source: ECBC (2015)

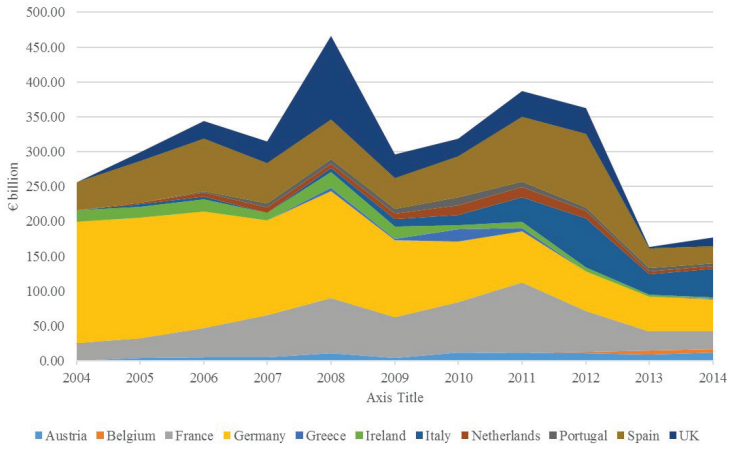
Figure 2.9 shows the year wise issuance of CBs in different countries across Europe. This figure reveals that Germany had the biggest share in this market but this share has been declining with the passage of time. The issuance of CBs was affected in the primary market. This is largely ascribed to sovereign debt crisis. A large portion of German CBs, *Pfandbriefe*, was covered by public sector loans. The sovereign risk affected these CBs especially and a large number of banks stopped public sector lending. As a result, *Pfandbriefe* issuance against public sector loans was seized.

2.2.6 Covered Bond — A Safe Investment

CBs are considered a safe investment for the investor as compared to the senior unsecured bonds and other close counterparts like ABS. The multiple layers of protection attract many investors to this market, especially, after the GFC when investors are more inclined towards safer products as compared to high yielding products. The benefits provided by CBs to issuers, investors and economy are being discussed further.

[33]The government intervention in the markets in form of various programmes like CBPP are considered impeding the natural price discovery mechanism. These programmes might contribute o financial instability by creating assets bubbles, contingent liabilities and accumulation of excess credit in the economy.

Figure 2.9: Year Wise CB Issuance in European Countries (2004-2014)



Source: ECBC (2015)

Covered Bonds and Issuers

The issuers of CBs have several motives for the CB issuance. These motives and (perceived) benefits and limitations are given below.

Funding Source CBs serve as a cost effective source of funding for the issuers. They can diversify their funding mix by issuing CBs. CBs served as a stable source of funding when other sources of long-term funding were dried-up during the GFC. This was mainly because of the maintained investors' confidence in CBs and preferential treatment of CBs in regulations. These bonds are issued for a fixed funding duration that improve the asset-liability management by providing a funding certainty. The multiple layers of protection provided against these bonds lead to a higher rating. The voluntary over-collateralisation also plays an important role in getting higher rating for these bonds. Therefore, banks can obtain funding at a cheaper cost because of the high rating of these bonds. However, the large-scale issuance of CBs may result in a lower rating for the unsecured bonds because rating agencies account for the asset encumbrance resulting from the issuance of CBs while rating these unsecured bonds.

Accounting Treatment Banks retain the assets used in the cover pool on their balance sheet. If an accounting sale occurs like a securitisation transaction, then banks may have to realise

losses in the depressed market conditions. However, the on-balance sheet nature of CBs also creates accounting complexities for the issuers, especially in the case of SCBs where an SPV is involved in the transaction. Moreover, the banks are required to make compliance with additional operational requirements including monitoring and actively managing the cover pool (because of the dynamic cover pool), and reporting to the supervisor. Banks are also required to hold capital against these assets and deleveraging can be a great challenge for the banks issuing CBs.

Liquidity Benefits CBs receive a favourable treatment in regulations.[34] They are viewed positively in the market by investors and regulators. The haircut on these bonds are lower than other unsecured bonds and ABS. Therefore, a bank can obtain more funds while using CBs as collateral in the repo market as compared to ABS.

High Quality Loan Origination CBs are subject to a strict set of regulations and industry standards. The assets used in the cover pool are usually high quality assets and in most of the jurisdictions these asset must be in a compliance with certain LTV requirements. The origination standards are improved because of these requirements thereby helping to maintain a high credit quality.

Covered Bonds and Investors

Investors enjoy multiple layers of protection in case of CBs and they are less concerned about the default unless bankruptcy proceedings are initiated against the issuer. Sovereign bonds are also considered as secured investment but CBs offer attractive yield along with security as compared to sovereign bonds. The investors looking for secured yield-bearing instruments are more inclined towards CBs. Because of these reasons, these bonds also outperformed sovereign bonds during the crisis. The prepayment risk against the assets held in the cover pool is also absorbed by the issuer therefore, investors are not concerned about the prepayment events as well. There is no early redemption in these bonds as they do not amortise along with loan payments.

The favourable treatment of CBs in regulations is also an attractive factor for the investors. These bonds also meet the liquidity requirement of the liquidity coverage framework of the Basel III. The legal limits for the holding of CBs are also higher as compared to other investment options. The lower Risk Weights (RWs) assigned to these bonds also results in

[34] See Chapter 3 for details.

lower capital holdings against them. Therefore, these bonds have been high in demand after the GFC. CBs also offer a high level of transparency and simplicity as compared to securitised products. Hence, evaluation for these bonds for the investor is comparatively easier. Finally, investors are not bothered by moral hazard problems because of the on-balance sheet nature of the assets held in the cover pool unlike securitisation.

Covered Bonds and Economy

It became a great challenge for the European Commission to unlock long-term financing after the impairment of banks' ability to channelize the funds for long-term investment. It is recognised that CBs have the potential to serve this purpose. The long-term nature of the CB transactions is helpful in unlocking the long-term financing. Investors are supposed to take into account the long-term performance and risk for their investment in CBs. Bank with a problem of maturity mismatch can issue CBs to over come this problem. The liquidity crisis arising out of such maturity mismatches can be mitigated in this way.

The Internal Ratings Based (IRB) approach introduced in Basel II and III promotes the issuance of residential mortgage lending as it results in low RWs for residential loans. The countries where larges share of CBs are backed by these residential mortgages can experience a brisk growth in house prices. A liquid covered bond can facilitate this growth. CBs may prove a cheaper mean of financing residential mortgage loans that may also lead to a cheaper lending rate (Nicolaisen, 2017). The low RWs assigned to residential loans will also help in coping with the capital constraints of the banks, as the issuance of other assets with high RWs may quickly deplete the current capital. Hence, the objective of increasing the credit flow in the economy can also be acheived through CB for certain sectors of the economy. For these reasons, banks issuing CBs might curtail their lending to certain sector of the economy where they can enjoy low RWs against the issued assets.

2.3 Securitisation vs Covered Bonds

ABSs and CBs are important funding instruments used by FIs during the last few decades. The two most common motives behind the issuance of these instruments are generating liquidity and controlling funding cost. ABS, in a static theoretical sense, are also meant to transfer the risk but it is practically bit controversial and has further implications. Apart from some of the structural differences, it is argued that these instruments should be regulated in a similar manner because of their underlying similarities with respect to the benefits provided by them

(IOSCO, 2011; Surti, 2010). There are concerns that discriminatory treatment of these two instruments may create imbalances in the funding base of FIs. The revival of securitisation is also hampered due to the absence of a level regulatory playing field.

ABS and CBs work in a similar manner at a very basic level. An FI originates some assets that are placed in a pool afterwards. This pool is ring-fenced in both situations, as other creditors of the FI do not have access to these assets. The characteristics of the pool and nature of ring-fencing may vary across different jurisdictions and types of the issued securities. However, the common feature in both types of securities is that they are backed by a specific pool of collateral. Carbó-valverde, Rosen, and Rodríguez-Fernández (2017) find that the bank issuing ABS were more prone to bail-out during the years close to GFC, while this situation was not observed for the banks issuing CBs. These findings suggest that banks involved in securitisation activity were taking an elevated amount of risk.

CBs are issued against less risky assets, but these assets also have lower rate of return associated with them. On the other hand, usually, securitisation takes places against riskier assets and a bank also relinquish higher return while transferring risk out of its balance sheet. Therefore, the issuance of securitisation may not have positive effects on the profitability of banks. However, this situation may vary in case of CBs (Carbó-valverde et al., 2017; Pinedo & Tanenbaum, 2010).

Boyce (2008) challenges the issuance of CBs to overcome the problems related to securitisation. He emphasises that there can be many other ways of managing problems of securitisation e.g. increase in capital requirements, higher disclosure for investors, insuring mortgages, issuance of warranties to retain investors' confidence and prudential regulations. Despite all these measures being adapted, complexity of securitisation will not be reduced. The increase in capital requirements will offset the benefit of reducing capital requirement provided by original OTD Model. Mortgage insurance will add extra cost and issuance of warranties will cancel out the risk transfer benefit. Some other suggest that CBs will be a good replacement for ABS as suggested changes in the securitisation framework are already present in CBs.

CBs may not be able to replace ABS for several reasons. The most important aspect of CBs is their on-balance sheet nature. The issuers are required to provide full capital coverage to issued CBs and there is no capital arbitrage as provided by ABS. This results into a limited number of CB issuers even in those countries where no licensing requirements are implemented. The issuers of ABS also enjoy a greater flexibility in selection of the assets for placing in the collateral pool but CB issuers have to face a limited range of assets that are eligible to be used for backing the CB issuance. The pass-through nature of ABS also

facilitates the bank to perform a better asset-liability management. The proceeds generated from the assets backing the issued securities are passed to the investors and banks can actively manage their asset portfolio. The CB issuers do not have this benefit because there is no full pass through.

The rating assignment to ABS is based on the type of the collateral pool and bankruptcy remoteness of the SPV. For these reasons, a bank involved in securitisation obtains funds at a cheaper cost given its own credit rating. However, CBs are partly rated on credit strength of the issuing bank, therefore, it might be difficult for banks to get funds at a cost beyond their credit rating using CBs. Practically, both instruments provide a similar risk dispersion with respect to investors types but ABS provide a benefit of greater risk distribution across the various market segments. The securitisation has the potential to control credit, market and liquidity risk but CBs do not provide credit risk management benefit. Therefore, securitising banks enjoy a greater flexibility, better risk management and capital relief benefits, but these benefits come with a price that was largely materialised during the GFC.

The incubation of securitisation market along with CBs will help to reduce the reliance of FIs on a specific funding instruments. This will help the banks to increase the credit supply to commercial and industrial sectors while CBs will continue to enjoy a greater investor confidence and serve as a cheaper source of funding for banks. Alternatively, over-reliance on CBs may adversely affect the capability of taking deposits from the open market that may create disintermediation problem for some of important eligible market segments. This reliance may also make it harder for banking system to show resistance to call for bailout if such a call is considered necessary by the regulators for ensuring functioning of market. However, such problems are being mitigated through strong legislation (IMF, 2011). Table 2.4 provides a comparison of securitisation and CBs.

Table 2.4: Differences between Traditional Securitisation and Covered Bonds

Feature	Securitisation	Covered Bonds
Accounting Treatment	The underlying collateral normally leaves the balance sheet	The underlying collateral mostly remains on the balance sheet with a mentioning of belonging to the cover pool, except in case of SCB
Motives	Financing, risk transfer, regulatory arbitrage, reduction in capital requirements	Financing
Issuer	Special purpose vehicles	Generally issued by the loan originator
Underlying Assets	Any class of assets mainly including residential and commercial mortgage loans, auto loans, credit card receivables, corporate loans and consumer loans	Limited by law (excepted SCBs)
Recourse to Originator	Generally, there is no recourse to the originator until some explicit guarantees are provided by the originator	There is a recourse to the originator
Capital Reduction	Yes	No
Legal Restrictions	Generally, not much regulations	A specific legal framework governs the covered bonds
Transparency of asset pool	Very limited	Generally high
Tranching	Yes	No
Coupon	Floating	Fixed
Prepayment of Assets	Full pass-through in most cases	Assets are replaced and no pass-through (except SCBs issued with CPT)
Risk Retention	Limited	Full risk retention
Cash Flows	Generated solely from the underlying asset and follow a waterfall like structure because of tranching	Issuers are fully liable for all payments of interest and principal without reference to cover pool
Claim of Investors	Claims of investors are only limited to the underlying assets	Claim of underlying assets are not limited to the collateral only.
Credit Enhancement	Mainly provided through tranching but many other methods are also deployed to provide credit enhancement	Over-collateralisation is the principal mean of credit enhancement
Servicer and Originator	Originator and servicer may or may not be same. The originator can be a servicer under a specific contract but can be a different entity as well.	Originator is not isolated from the underlying assets therefore banks are the originators and servicers at the same time.
Maturity	Linked with maturity of underlying assets. Some structures may offer maturities shorter than underlying assets. ABCP is one example	Fixed maturity independent of the maturity of underlying assets. The maturity of covered bonds can be shorter than the underlying assets
Bankruptcy of Originator	Mortgage present in the pool of securities are remote from their originator. This pool remains unaffected in case of bankruptcy of the originator	Collateral against covered bonds is remote from bankruptcy but bond holders may have further recourse to other assets if this collateral is insufficient to meet the par value of the bonds
Rating	Rating is assigned on the basis of the mortgage pool and credit enhancement provided to the transactions	Rating is assigned on the basis of assets in the cover pool and the issuer

Sources: (Carbó-Valverde et al., 2012; Dinca, 2014; Murphy, 2013; Packer et al., 2007; Segoviano et al., 2013)

Chapter 3

Regulations for Securitisation and Covered Bonds: Premises, Context and Asymmetry

> Wilbur Ross said in a Question and Answer Session, *"There is no evidence that more regulation makes things better. The most highly regulated industry in America is commercial banking, and that did not save those institutions from making terrible decisions."*
>
> Benner (2011)

3.1 Introduction

Securitisation, the process generating Asset-Backed Securities (ABS), has always been a hot potato for regulators and policy makers because of its complex nature. Many attempts to regulate this market have been made after the Global Financial Crisis (GFC), but regulatory authorities in USA and Europe are still struggling to devise an efficient and effective regulatory framework for it. However, Covered Bonds (CBs) are governed by a set of well-defined regulations in most of the European countries with some differences in the legal framework of each country. Despite some structural differences between ABS and CBs, it is argued that they can be regulated in a similar way, as they are expected to provide similar economic benefits (IOSCO, 2012).[1]

[1]This argument lacks an empirical support. However, both instruments are used for generating liquidity and controlling the funding cost.

After the collapse of securitisation market, it was generally perceived that CBs might replace ABS. Different market stakeholders including banks, investors and regulators started showing a deeper interest in CBs. Their stable performance during the GFC was the main cause of this interest. Many countries devised new regulations for CBs and others updated their existing ones. CBs also made their entry into the US market during this period. Keeping in view the higher interest of market stakeholders and stable performance during the GFC, CBs were given a favourable treatment in the post-crisis regulations that further incited the interest in this asset class. However, CBs might not serve as the actual replacement of securitised products, rather it is another security in the arsenal of the giant financial market (Harrison, 2008).

According to Keys et al. (2009), seeds of bad regulations are sown during the crisis period and a knee-jerk reaction is usually seen after the crisis. Such a reaction was seen in the regulations immediately devised after the GFC. The resulting criticism on these regulations led to several revisions. Nevertheless, many of these regulations are still stringent and they are hampering the efforts to revive the securitisation market. The efforts are being made to revive securitisation, as it is considered to play a positive role in the economic growth by increasing the funding availability.[2]

This chapter reviews the most recent regulations devised for the ABS and CB markets. It identifies key regulations devised for both markets and performs an economic analysis of these regulations. It develops three perspectives of these regulations. First, the chapter focuses on the premises of these regulations that are found in contradiction with the theoretical underpinnings of securitisation process. Moreover, these premises are highly influenced by the political reactions. Second, the chapter highlights that the current regulatory treatment provided to securitisation is not based on the European realities, rather it is heavily influenced by the situation in the US market. There are some key differences in both market but unfortunately those differences are ignored. Finally, the study performs a comparison between the regulatory treatment of CBs with ABS. This comparison helps understand how CBs are getting a favourable treatment in the regulations and what can be the possible implications of this asymmetric treatment.

Rest of the chapter is structured as follows. Section 3.2 reviews the regulations for securitisation. It provides an overview of pre-crisis regulations before moving to the post-crisis regulations of securitisation. The premises of different regulations have been highlighted and regulations have been analysed in the light of these premises. A critique of regulations

[2]Securitisation increases the lending capacity of banks and a wider population in the economy can access funding through banks.

for securitisation has been provided at the end of this section. This section also highlights that the current regulatory treatment of securitisation is not based on the European realities. Section 3.3 reviews the regulations for CBs. This section provides an overview of the recent developments in the regulations for CBs and a critique of these regulations. Section 3.4 makes a comparison of regulations for securitisation and CBs. This section highlights that how CBs are getting a favourable treatment as compared to ABS. Section 3.5 concludes.

3.2 Regulations for Securitisation

Many economists maligned the regulatory authorities for the lax treatment of securitisation. It was argued that regulators could not provide an effective regulatory framework for securitisation and they let the securitisation market grow without any bounds. The concerns about the rising trend of securitisation were echoed even before the eruption of the financial crisis (Allen & Carletti, 2006; Kiff, Michaud, & Belgique, 2003; Kiff, Michaud, & Mitchell, 2002). Many market analysts were of the view that an increase in the securitisation activity might have serious implications for the stability of banks and the overall financial system as well.[3] The negligent behaviour of regulators ostensibly played a key role in the exponential development of this market and the problems arising afterwards.

The poor regulatory framework allegedly provided banks with vicious incentives for securitisation (Cerasi & Rochet, 2014).[4] The creation of these perverse incentives is largely ascribed to the purportedly feeble regulatory framework. ABS entailed less cost for banks to hold as compared to the assets underpinning them, as the financial regulations provided different standards for such assets.[5] The regulations allowed the securitising banks to hold less capital.[6] Therefore, banks were encouraged to use securitisation to reap the wider economic benefits by spreading out credit exposure. This helped the banking system diffuse their concentration in different risk classes and reduce systemic vulnerabilities arising from

[3]The banking system occupies a core place in the economy and the failure of one bank may lead to the failure of other banks because of the contagion effect. This situation may have adverse effects on the stability of the overall financial system.

[4]The alleged perverse incentives relate to lending practices and pooling of different assets in the securitisation process. The opponents of securitisation argue that banks were issuing loans and quickly packaging them in a pool to issue securities. The investors were not aware of the characteristics of the loans being pooled and a lemon problem was existent in this way.

[5]The differential treatment is continued after the GFC but this time in a reverse manner. Now holding ABS is more expensive than underlying assets because of strict capital regulations introduced after the GFC.

[6]The off-balance sheet nature of securitisation allowed banks to play around the capital requirements. The investors in the securitisation market were also required to hold less capital against them because of the high rating assigned to ABS.

concentrated exposures (Cerbioni et al., 2014).

Along with its various benefits, securitisation created challenges for regulators and policy makers. Conventionally, lending activities of a bank are controlled by the monetary policy of the central bank. However, securitisation deteriorated the ability of monetary authorities to control lending (Loutskina, 2011). Nonetheless, the vulnerability of banks to economic shocks exacerbated when securitisation market was disrupted because of an excessive reliance on it.

In the run-up to the crisis, securitisation transactions became extremely opaque and complex. This high level of opaqueness is also ascribed to lax regulations (Cerbioni et al., 2014). This opaqueness gave rise to wider information asymmetries. Most of the frictions in this market are linked with information asymmetries those are believed to plague the entire securitisation process (Ashcraft & Schuermann, 2008). The regulators were demanded to decrease the opacity of this process as the information asymmetry can be controlled by bringing transparency in the securitisation process, thereby helping control the (alleged) moral hazard and adverse selection problems.

After the GFC, for the reasons such as outlined above, regulators at both sides of the Atlantic were urged to devise stringent regulations for the securitisation. However, regulations devised after the GFC largely affected the incentives of banks to securitise. The reduction in the securitisation activity raised concerns related to an increase in the funding cost and a decrease in the credit supply to the economy (Guha, Braithwaite, Guerrera, & van Duyn, 2009). Therefore, it is argued that new regulations should not decrease the securitisation, as it helps to boost the economic activity by increasing the credit supply in the economy. However, distortions in this market should be controlled to avoid its negative effects on financial markets (Casu, Clare, Sarkisyan, & Thomas, 2013). Given the competing goals outlined above, regulating securitisation becomes a challenging task.

3.2.1 Pre-Crisis Regulations for Securitisation

For the perceived benefits of the risk transfer, an increase in credit supply and reduction in the liquidity pressures, securitisation was initially endorsed by the regulatory bodies (BCBS, 2005; IAIS, 2003). Securitisation, along with other forms of financial innovation, was welcomed by the market and regulators (BIS, 2003). Most of the regulations before the eruption of the GFC were securitisation supportive. The regulators were following an indirect approach

and direct regulations for securitisation market were missing.[7] Most of the transactions were taking place under the contractual arrangements. There were no defined limits regarding securitisation and taking exposures in the securitised instruments.

Basel I defined Risk Weights (RWs) for various classes of assets held by a bank. Corporate loans were given 100% RWs in Basel I and banks issuing these loans were required to hold higher capital against them. This situation adversely affected credit supply to corporate sector. There was widespread criticism by academicians and practitioners on the rigidity of these RWs. It was argued that the credit risk rating of corporate borrowers should also be considered. These guidelines were revised in 1999. The purpose of revisions in the Basel I Accord was to promote safety and soundness of the banking system along with enhancing the competitive quality of banks (Fabozzi, Davis, & Choudhry, 2006). However, these rules were still considered inflexible and Basel II was introduced to overcome the shortcomings of Basel I. Basel II was based on three pillars:

1. New capital requirements for credit and operational risks;
2. Supervisory actions for higher risk as compared to the capital;
3. Greater disclosure requirements for banks to promote the market discipline.

Basel II followed a model based and a rating based approach. For the calculation of capital requirements, two approaches were introduced in the Basel II i.e. Standardised Approach (SA) and Internal Ratings Based (IRB) approach. By following the SA, banks can split assets as per their credit ratings. There are two sub-approaches in IRB i.e. foundation approach and advanced approach. The categorization of the assets is based on internal assessment of the bank. However, relevant supervisory body should identify internal systems to use this approach. The banks in EU were provided with the freedom to choose any of these approaches. This approach based mechanism provided banks with a justification for their thinner capitalisation. Banks in Basel II were not allowed to follow their internal risk assessment mechanism for evaluating the risk related to their securitisation exposures. This increased their reliance on the Credit Rating Agencies (CRAs) that are widely maligned for playing a significant role in the debacle of securitisation market.

Basel I provided a flat treatment to various asset classes to many of the bank assets. Consequently, regulatory capital for many of the (high-quality) assets was higher than the

[7]The regulators were focusing on lending standards, risk classification of various assets (loans) classes and investment exposures. These regulations indirectly played a supportive role in the exponential growth of securitisation market. As a set of regulations directly targeting the securitisation market was not existent, therefore, banks allegedly used the loopholes present in indirect regulations and securitised their assets enormously.

required capital to cover the economic risk. Hence, Basel I provided banks with an incentive to remove those assets from their balance sheet through securitisation to reduce regulatory capital requirements.[8] However, it is pertinent to note here that banks were reducing the regulatory capital requirement but not the economic risk because of the retention of first loss position in the lower tranches in securitisation deals (Gorton & Pennacchi, 1995). Basel II was meant to reduce this incentive or regulatory capital arbitrage. However, stringent capital requirements were applied to the lower securitisation tranches those were mainly retained by the banks. This incited banks not to retain these tranches (Fabozzi et al., 2006) or reduce the size of these tranches.[9]

Under the Basel II Framework, similar RWs were assigned to corporate bonds and ABS of similar rating. The similar RWs to these assets classes incited the interest of investors in the latter class as it was perceived safe being backed by specific assets and generating higher yield at the same time. However, non-investment grade ABS attracted higher RWs. The issuers of ABS started working closely with CRAs to increase the proportion of investment grade ABS in the economy. This resulted in an economy flooded with ABS and many of them were too complex to understand for investors and regulators [e.g. Collateralised Debt Obligations (CDOs) and Collateralised Mortgage Obligations (CMOs)] (C. W. Calomiris, 2009; DeMarzo & Duffie, 1999; Griffin et al., 2013; Schwarcz, 2013c).

The differences in the capital charges against the senior and junior tranches of securitisation were significant in the Basel II framework. This framework created a scope for engineering specific tranches to maximise the leverage. The banks decreased the size of lower tranches because of significantly high capital charges on these lower tranches.[10] The protection offered through subordination was adversely affected because of this situation. Moreover, Basel II framework led to the generation of 'cliff effects'.[11] The changes in the capital charges because of downgrades in the rating of any single type of security or tranche were not smooth, rather such downgrades resulted in disproportionate cascading effects on other tranches and securities. This has been identified in the recent securitisation framework in Basel III. The above discussion explicates that banks have been continuously involved in countervailing financial engineering in response to the changes in regulatory framework.

[8]Banks were able to reduce the regulatory capital requirements by removing some assets from their balance.

[9]The new securitisation framework of Basel III focuses on the thickness of tranches while assigning RWs to overcome this issue.

[10]This has been identified in the recent securitisation framework in Basel III and size of the tranches have also been taken into consideration while allocating RWs (BCBS, 2016).

[11]'Cliff effect' can be referred to a positive feedback loop. Small changes in ratings of the securitised instrument led to significant changes in the capital. Banks had to substantially increase their capital when many ratings were downgraded during the GFC.

3.2.2 Post-Crisis Regulations for Securitisation

In response to the criticism on securitisation and role of regulations, regulators on both sides of the Atlantic developed stringent regulations for securitisation. The reaction to the criticism on securitisation is visible in the new regulations, mainly Dodd-Frank Act in the USA, and Capital Requirement Directive (CRD) IV, Capital Requirement Regulations (CRR), Solvency II and Basel III in Europe. These regulations became a subject of widespread criticism from the market analysts, academicians, and other market stakeholders. The regulations devised after the GFC have been repeatedly revised in response to this criticism. These changes and revisions in the different regulations after the financial crisis show the intensity of the challenge faced by the regulators in regulating this market.The key regulations introduced after the GFC are given below.

- Basel III
  - An initial draft of the Basel III was issued by the Basel Committee on Banking Supervision (BCBS) in 2012. This draft was later on revised in 2013, 2014 and finally in 2016 (BCBS, 2016).

- Regulation (EU) No. 575/2013 (Capital Requirement Regulations (CRR)):[12] CRR directive provides the provisions for the capital treatment of securitisation and other relevant exposures. Many of the legal provisions provided in CRR are considered very strict by the securitisation industry.
  - A proposal for the revision of Regulation (EU) No. 575/2013 has been issued by the European Commission (EC) (European Commission, 2015b).[13,14]
  - Delegated Regulation (EU)2015/61 was issued by the European Union to supplement Regulation (EU) No. 575/2013 with regard to the liquidity coverage requirements for credit institutions.[15]

[12]REGULATION (EU) No 575/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No. 648/2012, *Official Journal of the European Union* (June 2013) http://eur-lex.europa.eu/oj/direct-access.html

[13]Proposal for a "REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL Amending Regulation (EU) No. 575/2013 on Prudential Requirements for Credit Institutions and Investment Firms". Brussels: European Commission, No. COM(2015) 473, 30.09.2015.

[14]This proposal is placed by the EC to supplement the Simple, Transparent and Standardised (STS) proposal. The capital regulations of the original CRR Directive have been relaxed in this proposal for the securitisation meeting the criteria given in the STS proposal.

[15]COMMISSION DELEGATED REGULATION (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for

- Directive 2013/36/EU (Capital Requirement Directive (CRD-IV)):[16] This directive supplements the CRR and reflects the capital standards and rules of Basel III.

- Directive 2009/138/EC (Solvency II):[17] This directive provides the provisions for the treatment of securitisation exposure by the insurance industry, [18]
  - A delegated Act Supporting the Solvency II directive was also issued in 2014 (European Commission, 2014).[19]

- STS Proposal:[20] European Commission (EC) issued a proposal on September 30, 2015 for Simple, Transparent and Standardised (STS) securitisation (hereinafter referred as 'STS proposal') to promote STS securitisation (European Commission, 2015c). This proposal is currently under review in the European Parliament (EP) and the Council.[21] This proposal is analogous to the BCBS Proposal for Simple, Transparent and Com-

Credit Institutions. *Official Journal of the European Union*, 11. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015R0061{&}from=EN

[16]DIRECTIVE 2013/36/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Dir. *Official Journal of the European Union*, L(176).

[17]DIRECTIVE 2009/138/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2009 on the taking-up and pursuit of the business of insurance and reinsurance (Solvency II). *Official Journal of the European Union*, L335/1-129.

[18]Solvency II deals with insurance companies. However, this act occupies a core importance in the securitisation market as insurance industry has been significantly investing in this market and the current provisions in the Solvency II are likely to reduce the interest of insurance industry in this market, thereby reducing the investor base of the securitisation market.

[19]COMMISSION DELEGATED REGULATION (EU) 2015/35 of 10 October 2014 supplementing Directive 2009/138/EC of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II), *Official Journal of the European Union*, 12. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015R0035{&}from=EN

[20]Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL laying down common rules on securitisation and creating a European framework for simple, transparent and standardised securitisation and amending Directives 2009/65/EC, 2009/138/EC, 2011/61/EU and Regulations (EC) No 1060/2009 and (EU) No 648/2012. Brussels: European Commission

[21]According to the Article 294 of Treaty on the Functioning of European Union (TFEU), EC submits its proposal to the European Parliament and the Council. The Parliament has to approve or amend this proposal and forward the same to the Council. The Council can approve or amend this proposal. The proposal is sent back to the EP if amendments are made by the Council. The proposal is adopted or rejected depending on the approval of the EP. In case of any further amendments by the EP, the EC is asked to give its opinion and the proposal is sent to the Council for the second reading. Decision is made on the basis of majority voting if opinion of the EC is positive or on the basis of unanimity if EC's opinion is negative. If proposal is rejected by the Council, a Conciliation Committee is formulated and negotiations start. See https://www.eumonitor.eu/9353000/1/j9vvik7m1c3gyxp/vga3bya9max9 for details about the ordinary legislative procedure. The STS Proposal is also following the same procedure to take the form of a directive or act.

parable (STC) Securitisation in July 2015,[22] but the former is proposed as the EU law.

- A draft report has been issued by the Committee on Economic and Monetary Affairs (ECON) of the European Parliament in response to the STS proposal (hereinafter referred as the 'ECON report') (Tang, 2016). The ECON report has proposed various amendments in the original STS proposal.[23]

The post-crisis regulations for securitisation are focused on four key areas: (i) addressing conflicts of interest by aligning incentives; (ii) transparency of securitisation by removing the information asymmetry; (iii) dealing with inappropriate incentives and (iv) reduction in the reliance on rating agencies. In line with these targeted objectives, the post-crisis regulations for the securitisation in Europe can be classified into six categories i.e. risk retention requirements, high disclosure requirements, due diligence requirements, capital requirements and liquidity requirements. These regulations are discussed below.

Risk Retention

The Risk Retention Regulations (RRR) have been introduced because of the alleged moral hazard associated with the so-called Originate-to-Distribute (OTD) model. A general perception about securitisation is that securitising banks do not have a 'skin in the game' after the loan transfer from their balance sheet. This results in a misalignment of incentives between investors and originators leading to deterioration in the quality of the originated assets. The RRR is also based on this perception. It is believed that these requirements will help ensure incentive alignment and quality of the underlying assets will improve as originators will have a 'skin in the game'.

US regulatory authorities introduced the risk retention requirement in Dodd-Frank Act. The European regulations have also focused on the risk retention (so-called 'skin in the game'). According to RRR, originators are required to retain an unhedged portion of credit risk while securitising their assets. The minimum requirement is 5% of the securitisation transaction.[24] The originators are not allowed to use any hedging technique for this retained portion of the risk, as hedging will trounce the (desired) objective of the RRR.

[22] A complete version was issued in November 2015.

[23] The amendments proposed by ECON are not binding and the Council will review them in light of the ordinary legislative procedure. A press release has been issued by the European Commission on 30 May 2017. According to this press release, the European Parliament, the Council and the Commission agreed to set out the criteria for the STS securitisation. This agreement is being followed by further discussion for the finalization of the text (European Commision, 2017).

[24] Article 405, Regulation (EU) No. 575/2013

The RRR has been directly placed on originators, sponsors or original lenders. If there are different entities involved in a transaction, then the originator is deemed responsible for the risk retention and the net economic interest in the transaction should not be split among various retaining parties.[25] The STS framework — to overcome the loopholes in the definition of an originator — specifies that "an entity shall not be considered to be an originator where the entity has been established or operates for the sole purpose of securitising exposures". Hence, the Special Purpose Entity (SPE) does not qualify as an originator for the risk retention.

The premise for the RRR is the general perception about securitisation that banks do not maintain a 'skin in the game' while securitising. However, this premise is questionable as it may not be the reason behind the astronomical losses emanating during the GFC. The risk retention was mandated by the market before the debacle of securitisation during the GFC. Originators and sponsors of securitisation transactions were already having a strong 'skin in the game' as the securitisation might be difficult unless the lower tranches are not retained by the originator.[26] According to Chiesa (2008, 2015) and Schwarcz (2009), securitisation should not matter with respect to the risk creation. An investor, being the new owner of the assets, should undertake the risk assessment before making the investment decisions and taking positions in securitisation. However, the assessment for the investors was difficult because of the complexity of the securitisation transactions. Hence, they were excessively relying on the rating agencies (Barth, Ormazabal, & Taylor, 2012; Rösch & Scheule, 2011; White, 2010). Therefore, the complexity of securitisation transactions might support the propagation of STS securitisation but it does not support the risk retention.

Schwarcz (2016) is of the view that risk retention regulation may lead to 'mutual misinformation' problem. The originator may exhibit a fake confidence in the issued securities by retaining a portion of the risk in the securitisation transactions. The investors may get misinformed and reliance may also shift on the signal generated by the originator. This may become in conflict with the due diligence requirements. The securitisation carried out by many originators with retention of the lower tranches also contributed to the financial crisis, as it buttressed the false confidence of investors in these securities.

Guo and Wu (2014) argue that RRR may not prove to be effective as one size may not fit all. It may not be sufficient for the banks having a high securitisation intensity and vice versa. The different classes of securitised instruments performed differently before, during and after the GFC.[27] Therefore, the treatment of securitisation as a homogeneous class in RRR may not

[25] Article 4 § 1 of STS Framework
[26] See Gorton and Pennacchi (1995)
[27] See Moody's (2015)

be justifiable. Moreover, the risk profile and motives of securitisation also vary from bank to bank. The RRR should be defined by keeping in view the market conditions, the risk profile of Financial Institutions (FIs) and type of assets being securitised. The later aspect occupies a core importance in this context.

Disclosure Requirement

Transparency in the securitisation transactions has been the central concern of regulators after the GFC. The securitisation transactions were considered highly complicated and opaque and several market frictions are attributed to this perceived opacity of the securitisation transactions. Most of the problems related to securitisation are attributed to the information asymmetries. Therefore, regulatory authorities largely focused on promoting transparency of these transactions through higher disclosure requirements. The disclosure is believed to control the information asymmetry and improve transparency. The disclosure requirements are a key element of the new STS framework in Europe.

Chapter 3 of the STS framework provides disclosure requirements. This chapter outlines all the standards that should be followed to qualify as STS.[28] This chapter defines the transfer mechanism that should be considered as a true sale. The underlying assets must be homogeneous in their classification. The STS framework discourages re-securitisation as most of the complexity lies in these transactions.[29] An originator is required to maintain all the underwriting standards while originating the exposures being securitised like the exposures that have not been securitised. If there are some significant changes in these underwriting standards, the originator must disclose them to the investors.

Article 9 of the said proposal provides standards for standardised securitisation transactions. The interest rate and currency risk against these securitisation transactions must be mitigated and the originator must disclose the measures used for the mitigation of these risks.[30] The payments against these securitisation transactions must be based on the market interest rate and there should be no involvement of any complicated formulae for calculation of these payments. The relevant documents governing the securitisation transactions should explicitly specify the obligations, duties, rights and responsibilities of the servicer and the

[28] Article 8 of the STS framework

[29] Article 8(5) of STS framework

[30] Interest rate and currency risk are mitigated by FIs through various means e.g. future contracts, SWAPS and options. Securitisation transactions are subject to fluctuations in interest rates and exchange rate if issued in other currencies. The value of the ABS may fluctuate as per movements in interest and exchange rates. Therefore, interest rate and currency exchange risk must be controlled and measures taken for controlling these risks should be disclosed.

trustee. The possible remedies and actions in case of default should be well-defined in the relevant documents. Different triggers should be considered while structuring the securitisation transactions and they should be mentioned in the documentation. The documentation should also provide with a mechanism used for conflict resolution.

The STS framework also provides the requirements for transparency. The originator is responsible for providing the historical data related to the default and delinquencies of the underlying exposure. The minimum period covered in this data should be 7 years. A sample of the underlying exposures should be subject to the verification by an external party.[31] The investors should be provided with a liability cash flow model by the originator before the investment decision has been taken. The compliance with all these requirements is the joint responsibility of originator, sponsor and Securitisation Special Purpose Entity (SSPE). The securitisation transaction showing compliance with chapter 3 of the STS framework will be regarded as STS Securitisation.

The disclosure requirements may not prove to be effective as the risks associated with complex securitisation and especially subprime mortgage loans were fully disclosed before the GFC, but such disclosure could not prevent the cataclysmic collapse of the securitisation market. Moreover, the information required to be disclosed by an originator is substantial and it is an arduous task to evaluate the long documents with complex legal and technical terminologies. The investor will require a fair amount of financial modelling to understand STS securitisation transactions as well. Therefore, even the most sophisticated institutional investors may continue to rely on the rating agencies while taking the investment decisions. The granular disclosure requirements are likely to place a burden on the securitising institutions without providing a proportionate benefit to the investors (Slaughter and May, 2015). Hence, these requirements may serve as a disincentive to securitisers.

Due Diligence

It is believed that the massive losses faced by investors in the securitisation market can be ascribed to the heavy reliance on the rating agencies. The ratings assigned to the issued ABS were dictating the investment decisions. The investors were not showing the due diligence while taking the investment decisions. The decline in the mechanistic reliance on the rating agencies (BCBS, 2014b) and thereby promoting due diligence has been high on the regulatory agenda after the crisis (The European Commission, 2015).

[31]This requirement seems akin to the cover pool monitoring in case of CBs. However, the regulations do not clarify that who will appoint this external agency and who will bear the cost. The eligibility criteria for the designated external party is also not given in this proposal.

The due diligence requirements are provided in Article 406 of CRR and Chapter 2 (Article 3) of the STS framework. According to these requirements, an investor must show due diligence while making the investment decision. This due diligence entails several requirements. An investor must evaluate before taking positions in the securitisation if the transaction follows the relevant requirements outlined in various recent regulations (e.g. Article 4 of Regulation (EU) No. 575/2013, STS framework etc.). The institutional investors must undertake a risk assessment associated with all the structural features of the target securitisation. The payment priorities and different triggers affecting the payment structure should be evaluated. As part of this due diligence framework, the investors are also required to document the procedures being followed for the risk assessment and regularly perform the stress tests on the cash flows generated from the securitisation exposures. They must be aware of the changes in the risk profile of the underlying exposure of securitisation. Lastly, they must have a mechanism for reporting to concerned authorities about their understanding and management of risk inherent in the securitisation positions.

The due diligence requirements were laid out to avoid feeding-frenzy atmosphere in the financial markets.[32] However, these requirements may be unnecessary and considered too paternalistic in nature. They seem to shout at investors: 'Do a better job!'. Given that investors will suffer the losses in case of poor investment decision, they are already expected to conduct some due diligence before making their investment decisions. Generally, this (expected) due diligence is not confined to the securitisation exposures only, rather investors are expected to show this due diligence in almost all forms of investment decisions, as other market instruments like unsecured bonds, equities and CBs are not inherently less risky than securitised products. It should be investors' decision to decide about the nature of the due diligence. The empirical investigation performed by Fabozzi and Vink (2012), on the data before 2007, shows that European investors were already looking beyond the credit rating. They were already performing some sort of due diligence while making their investment in the ABS market. Hence, these requirements seem unnecessary.

The reliance on the STS notification by the originator may not be sufficient and investors need to evaluate other accompanying information. These due diligence requirements may prove to be burdensome for the investors. They are required to outlay high level of due diligence before investing in securitisation, and evaluating if a securitisation transaction can be regarded as STS. These regulations require investors to evaluate a number of risks

[32]Paul Stevenson, Managing Director of Moody's Investor Service Inc. said, "When everybody wants to securitize, and everyone is willing to buy, and everyone thinks nothing will go wrong, there gets to be a feeding-frenzy atmosphere, and you have to remain cautious" (Woolley, 1996).

involved in the securitisation transactions that clearly lie in originators' ambit (Mullin, 2015). The compliance with the granular and detailed due diligence requirements envisaged by the EC may cause a decline in investors' interest in the securitised instruments. The investors breaching the due diligence requirements will be subject to higher RWs (as a penalty) on their securitisation exposures in compliance with other sectoral regulations (Basel III and Article 407 of CRR).[33]

Capital Requirements

Capital requirements are meant to protect FIs from economic shocks. The losses are absorbed by the capital maintained by an FI. The capital requirements are higher for ABS holdings in the new Basel III Framework. The investors are required to hold high capital against their ABS exposures as compared to their exposures in other similar types of investment. These regulations have been introduced after the observations related to the thin capitalisation of banks before the GFC and sudden downgrades of the securitised instruments. The losses arising from these downgrades are to be absorbed by the capital, therefore there must be sufficient capital.

The revised securitisation framework of Basel III revised the hierarchy of the approaches used to determine the RWs of securitisation exposures. The new framework consists of three hierarchies: Securitisation Internal Ratings-Based Approach (SEC-IRBA), Securitisation External Ratings-Based Approach (SEC-ERBA), and Securitisation Standardised Approach (SEC-SA). The last approach is meant for less-sophisticated banks. The minimum RW floor given to a securitisation exposure is 15% regardless of the type of approach used by a bank. The regulatory RWs assigned to securitisation exposure in case of following SEC-ERBA approach are higher than the ones under the Basel II framework.[34]

Banks following SEC-SA must know about the delinquency status of the underlying exposures.[35] A bank will follow this approach if the delinquency status of an exposure is not greater than 5%, otherwise, the securitisation exposure will be given a RW of 1,250%. The revised securitisation framework allows for the application of Internal Assessment Approach (IAA) in the case of unrated Asset-Backed Commercial Papers (ABCPs) only, but rest of the unrated securitisation exposures receive RWs of 1,250%. Furthermore, capital requirements

[33]Regulation (EU) No. 575/2013

[34]The purpose of these higher RWs under SEC-ERBA approach is to discourage the reliance on rating agencies.

[35]"Delinquent underlying exposures are underlying exposures that are 90 days or more past due, subject to bankruptcy or insolvency proceedings, in the process of foreclosure, held as real estate owned, or in default, where default is defined within the securitisation deal documents" (BCBS, 2014b)

against the securitisation exposure are not limited to the credit risk but banks must recognise the dilution risk as well (unless a bank can prove to the respective supervisor that dilution risk is immaterial).[36]

The capital requirements against the securitisation exposures have been widely criticised in the industry. Some have dubbed them as a punitive treatment of securitisation (AFME, 2014; Federation Bancaire Francaise, 2014; GFMA, 2013; IOSCO, 2012; Millán, 2014). These requirements are considered following a conservative approach resulting into the tightening of capital requirements for the ABS investors (Perraudin, 2014b). The investors are required to hold higher capital against the ABS than the capital required against the assets backing these ABS. Therefore, the notion of capital neutrality is supported in the industry (Federation Bancaire Francaise, 2014).[37] The notion of capital neutrality sounds reasonable as banks were playing around the capital requirements before the GFC because of different standards for the securities and assets underlying them.

It is also argued that the proposed approaches for calculating RWs should be calibrated with the historical loss statistics of different classes of securitisation (Mayer Brown, 2014). However, such calibration is not provided in the revised securitisation framework. The capital treatment of securitisation exposure in the light of the revised securitisation framework does not consider the legal form of securitisation, rather it is based on the economic substance of the relevant exposure (p. 6, § 1). The RW penalty of 1,250% is too strict. Thus, many participants are likely to make an exit from the securitisation market and such a conservative approach will act as a barrier for the smaller banks to enter this market. The additional RWs as proposed in Article 407 of the CRR reflect a more suitable approach.[38]

The Proposed STS framework of EC and STC Proposal of BCBS have been introduced in response to this criticism. A proposal revising the CRR directive has also been issued by the EC to supplement the STS proposal. The CRR proposal has been issued with a view to facilitate the STS securitisation. European Commission believes that STS securitisation must be dealt differently in order to facilitate the growth of this market. Hence, the securitisation transactions making a compliance with STS frameworks will be subject to 25% reduction in the capital requirements as compared to non-STS securitisation. However, the compliance with these proposals itself is too costly and tedious that this benefit of reduction in the capital

[36]Dilution risk is referred to the probability of reduction in receivables from an obligor because of disputes, credit rebates, warranty claims and offsets. This risk may arise in case of revolving securitisation structures.

[37]The amount of required capital for holding ABS should be decided on the basis of the capital required for the underlying assets.

[38]Article 407 of the CRR does not apply the RW of 1,250%, but this penalty is capped at 1,250%. The RW penalty is progressively increased with the infringement of each due diligence provision.

may not be attractive for the investors.

Liquidity Requirements

BCBS introduced Liquidity Coverage Ratio (LCR) in 2013. The objective of LCR was to promote resilience of banks against the liquidity risk in the short-run. According to LCR, a bank must hold sufficient High-Quality Liquid Assets (HQLA) for covering the differences in cash inflows and outflows over a period of 30 days to avoid the stress scenario. The bank management is expected to take corrective actions during this time. It also provides central banks with additional time to take appropriate measures to deal with the stress scenario (BCBS, 2013).

LCR is considered the most significant regulatory innovation after the GFC. This is the first detailed liquidity regulation introduced at the European level. Similar regulations are introduced in the delegated regulation of the European Union in 2014 a the EU level (European Union, 2014).[39] LCR divides HQLA into 3 distinct levels. LCR will now determine the liquidity level of an FI. The illustrative summary of HQLA as per LCR directive of the European Union is provided in Table 3.1.

Securitised instruments are placed in the last category of high-quality liquid assets i.e. level 2B.[40] However, the treatment of securitisation is a little bit relaxed in the LCR Directive as compared to the recommendations of Basel III. In the prior LCR framework, securitised instruments were not classified as HQLA and later on only RMBS were included in the list of HQLA after the market criticism. The new Delegated Regulation included the ABS backed by commercial loans and auto loans as well. All these ABS must meet a list of requirements outlined in Article 13 (§ 2 to 134) of the above-referred regulations. This article applies high-RWs and haircuts and delineates the assets backing the securities those are eligible for placement in level 2B assets.

RMBS are given a preferential treatment in the LCR framework.[41] Moreover, given the criteria, outlined in the Article 13, many of the securitised instrument will not be able to qualify as HQLA. Perraudin (2014a) provides the empirical evidence that some of the non-residential mortgage-backed securities have remained more liquid than RMBS and these securities have been either excluded from the LCR framework or they are subject to higher

[39]Commission Delegated Regulation (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for Credit Institutions

[40]Article 13 of The Delegated Regulation (EU) 2015/35 of 10 October 2014

[41]Haircuts are lower for RMBS as compared to other classes of ABS included in the LCR framework.

Table 3.1: Illustrative Summary of LCR

Item	Haircut
Level 1 Assets	
Bank notes and coins Marketable securities from central banks, multilateral development banks, sovereigns Central bank or domestic sovereign debt for non-0% risk-weighted sovereigns Central bank reserves	0 %
High-Quality Covered Bonds with RW of 10% for Credit Quality Step (CQS) 1 and minimum size of Euro 500 million	***7 %***
Level 2 Assets	
Level 2A Assets	
Assets of central banks, multilateral development banks, and sovereigns that qualifies for 20% RW Corporate debt securities having a rating of AA- or higher	15 %
Qualifying covered bonds rated AA- or higher meeting with 20% risk weight for CQS 2 and minimum size of Euro 250 million	
Level 2B assets (maximum of 15 % of HQLA)	
Corporate debt securities with a rating between A+ and BBB-	50 %
Common equity shares	50 %
High quality covered bonds with a risk weight not greater than 35% for CQS 3 and minimum size of Euro 250 million	30 %
Qualifying Residential Mortgage-Backed Securities (RMBS)	***25 %***
Qualifying Commercial ABS	***35 %***
Qualifying Auto ABS	***35 %***
All securitised products should meet following requirements: • Minimum size of the tranche should be Euro 100 million • Loan-to-Value (LTV) of the assets in the underlying pool should not be less than 80% • None of the borrowers should be an investment firm • The remaining weight average life of the tranches should not exceed 5 years	

haircuts. Therefore, despite many revision in the new LCR framework, securitisation is still significantly disfavoured in the LCR framework.

3.2.3 Critique of Post-Crisis Regulations for Securitisation

The securitisation market is still crippled by the legacy of the financial crisis. The revival of the securitisation market is a prime agenda of regulators in Europe as now it is considered a panacea for the ailing European economy. However, the regulations devised for securitised instruments are hindering the revival of this market. Many researchers are of the view that regulatory responses to securitisation in the US and Europe are based on political reactions (Chiesa, 2015; Schwarcz, 2016; White, 2010). Therefore, most of the regulatory responses are considered ad hoc in nature. According to German Banking Industry Committee, it is imperative to ensure the legal certainty to revive investors' confidence in the securitisation market. The biennial changes in the legal frameworks are creating challenges for the resumption and stable functioning of the securitisation market.

It is also argued that regulatory treatment of securitisation after the GFC is not based on the European realities, rather it is highly influenced by the situation in the US market. Unlike the USA, the failure of securitisation market is not linked to the credit deterioration in Europe, rather market became illiquid and prices fell down that led to the accumulation of the marked-to-market losses (Blommestein et al., 2011). Mario Draghi, president of European Central Bank (ECB), said in a press conference on March 6, 2014:

> *If we consider just the revitalisation of the ABS market, there are many things that need to change in regulation and in legislation. Today, the capital charges for ABS discriminate them unfavourably with respect to other instruments with similar degrees of riskiness. The current capital regulation of ABS was calibrated on a reality which is not the European one.*
>
> Draghi (2014)

The OTD model and development of complex securities like Collateralised Loan Obligations (CLOs) are two key elements for which securitisation was immensely criticised and strict regulations were demanded. However, it is pertinent to note that both are largely the US phenomena. Many of residential mortgages in the US were issued with a view to securitise them at a later stage. Many non-banking companies and mortgage brokers in the USA also started issuing mortgage loans with the above-referred view. However, in Europe, with an exception of Netherlands and Spain, residential mortgages were never securitised on a large-scale.[42] The OTD culture never flourished in Europe like the US market. Mainly, loan origination was taking place within the banking system and there were no boutique lenders.

[42]Dutch RMBS were mainly issued for the funding purpose and risk transfer was not the main motive behind their issuance (Bronzwaer, 2012).

The development of complex securities was also very limited in Europe. CDOs became the second biggest segment of the ABS market in the USA in 2006. These CDOs were backed by subprime bonds as collaterals. Although some European banks invested in US securitised instruments including CDOs, but the existence of CDOs in Europe was not ubiquitous. Moreover, banks in Europe were issuing more complicated securities like CLOs and Collateralised Bond Obligations (CBOs) as well. Therefore, the securitisation in Europe cannot be alleged for the problems that were pervasive in the US market. Moreover, the European securitisation market operates under the private market forces but Government Sponsored Mortgage Enterprises (GSMEs) have largely influenced the securitisation market in USA. Therefore, evaluating the impact of securitisation on the credit market is more difficult, as it is hard to disentangle its impact in the presence of concurrent impact of the GSMEs (Kara et al., 2015). European regulations have discussed a lot about the above explained re-securitisation. Hence, they are trying to correct the problems that are non-existent in the European market.

Certain parts of the securitisation market have undoubtedly played their role in intensifying the effects of GFC, but it should be kept in view that it is not endemic to all parts of the market. The performance of securitised mortgages in Italy had a lower probability of default than non-securitised mortgages (Albertazzi, Eramo, Gambacorta, & Salleo, 2015). However, when some of the esoteric securitised products faced a decline, a stigma was quickly developed and the entire securitisation market became contaminated. The products exhibiting a solid performance could not remain immune from this stigma.

The new STS framework highlights that the EC has realised the importance of securitisation in the financial market. The proposal for STS Securitisation is considered a good development and it has been welcomed by many of the market participants but it may not help revive the securitisation market. Many of the regulations are still administratively cumbersome for issuers and investors. The complexity and onerous nature of these regulations are still disincentivising for the market participants. It is still not clear to what extent the proposed measures in STS framework will be workable in practice. There is a widespread uncertainty about the securities that will qualify for a more favourable treatment under this framework (Brunsden & Hale, 2015).

A monitoring mechanism is apparently missing to evaluate if the securitisation transactions meet the STS criteria. The originators, sponsors and issuers are jointly required to notify the European Securities and Markets Authority (ESMA) and the competent authority that the securitisation transactions are STS compliant. Although such securitisation will be listed on the website of the ESMA, it does not imply that ESMA or any other authority will certify that the concerned securitisation is compliant with the STS requirements. An STS securitisation

transaction may become a non-STS securitisation at a later stage and the responsibility of notifying about this situation also lies on the originator and ESMA or any other authority is not liable to evaluate this situation. Although the ESMA maintain a register of all the securitisation transactions for which STS notification is provided, it does not mean that the ESMA or any other competent authority approves that the concerned transactions meet the STS criteria. In the absence of this verifications system by the third party, investors might consider this notification as self-certification.

Self-certification is a potential problem that may arise out of the STS proposal. Banks may paint a rosy picture of their securitised instruments unless some deterrence mechanism is in place. Most of the market participants have the consensus that STS status should not be self-awarded but it should be given by an external agency. However, according to the British Bankers Association (BBA), originators are the best candidates to understand the various aspects of the assets in the collateral pool (BBA, 2015). Therefore, self-certification is considered the most suitable process, but the politicians, market and investors may see self-certification as a return of bad habits for which the securitisation industry was stigmatised after the GFC. The self-certification may not help to revive investors' confidence in the securitisation market as investors may be sceptical about the credibility of this self-certification.

Currently no authority is empowered to verify the STS-compliance. The recital 5 of the CRR proposal mentions that a close monitoring of the impact of the new framework of securitisation will be carried by the European Banking Authority (EBA) and competent supervisory authorities. However, it is not clear if monitoring for the compliance with the STS proposal will also be performed by any of the regulatory agencies. The ECON report has addressed the monitoring and supervisory issues in the STS proposal. This report specifies that ESMA along with other competent authorities including Joint Committees of the European Supervisory Authorities (JCESA) for the securities market should supervisor and monitor the compliance with the STS proposal. This will help in addressing the concerns of investors regarding the the self-certification. The issue of various interpretations possibility is also addressed in this report.[43] A template for the disclosure of information about securitisation is proposed in the ECON report. Moreover, the earlier proposal has ambiguous provisions regarding the homogeneity of the securitisation pool. The amendment 70 of the ECON report in the Article 8(a) of the STS proposal clarifies this ambiguity to a larger extent.

CRAs were put under an extensive scrutiny thereby placing a greater pressure on CRAs fostering them to revise their methodology in a stringent manner. They tend to follow a

[43]See Amendment 5 of the ECON report for Recital 9 of the STS proposal and Amendment 12 regarding the deletion of recital 37 of the STS proposal

more conservative approach now while rating the securitisation transactions that has made securitisation costlier and difficult for banks. Many market stakeholders and organisations are in favour of giving labelling to securitisation. The investors should be given the confidence in this market by the certification system. For this purpose, Prime Collateralised Securities (PCS) labelling has been introduced in Europe.[44] The initiative of PCS has been taken to strengthen the ABS market with an aim to fuel the credit supply in the economy. However, I believe that this labelling mechanism may not be very different from ratings and that the similar blames those are placed on CRAs can be placed on PCS in the case of next crisis. This is especially true when CRAs are mainly criticised for the 'issuer-pays' model and the same model is followed in getting the PCS label.[45] The labelling requirements are also placing extra cost for issuers, thus acting as a disincentivising element for them.

The above discussion explicates that most of the premises for the new regulations for securitisation are questionable and so are the regulations. Pacces (2010) highlights that these financial regulations are likely to increase distortions in the banking system instead of correcting them. Most of the regulations concerning ABS are based on controlling moral hazard and maintaining 'skin in the game'. However, a number of studies have documented that these problems did not play a major role in unfolding the financial crisis (Chiesa, 2008, 2015; Hartman-Glaser, Piskorski, & Tchistyi, 2012; Pacces, 2010; Pagès, 2013; Schwarcz, 2013b, 2013c). Therefore, it is unlikely that these regulations can help in rectifying the actual problems in the securitisation market.

The objective of reviving the securitisation market may not be achievable in the presence of a strict treatment given to securitisation. The regulators should make securitisation economically viable for the issuers and investors. Punitive and administratively cumbersome regulations are restricting the flourishing of securitisation market in Europe as incentives of market participants are largely distorted (Nomura, 2015).

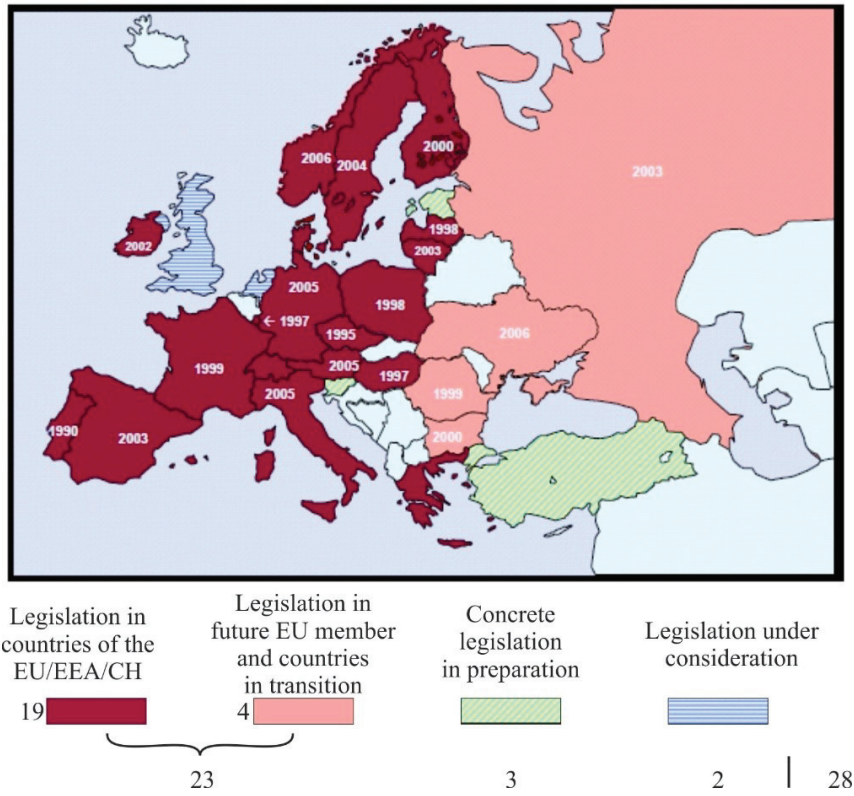
3.3 Regulations for Covered Bonds

A regulatory framework for Covered Bonds (CBs) is currently non-existent in the US market. Therefore, investors in the US market are still hesitant to invest in CBs. On the contrary, The CB market is well-established in Europe and these bonds are issued and traded under a well-defined legal framework. However, regulations pertaining to CBs in Europe vary from country to country. Larsson (2013) is of the view that performance of CBs should be

[44] It is similar to European Covered Bond Council (ECBC) labelling system for CBs.
[45] See http://pcsmarket.org/about-pcs/

evaluated under these different regulatory structures in Europe and possible lessons, not only for regulating CBs in the US but also for regulating securitisation, should be identified.

Figure 3.1: Legislation for Covered Bonds in Europe - Before Crisis

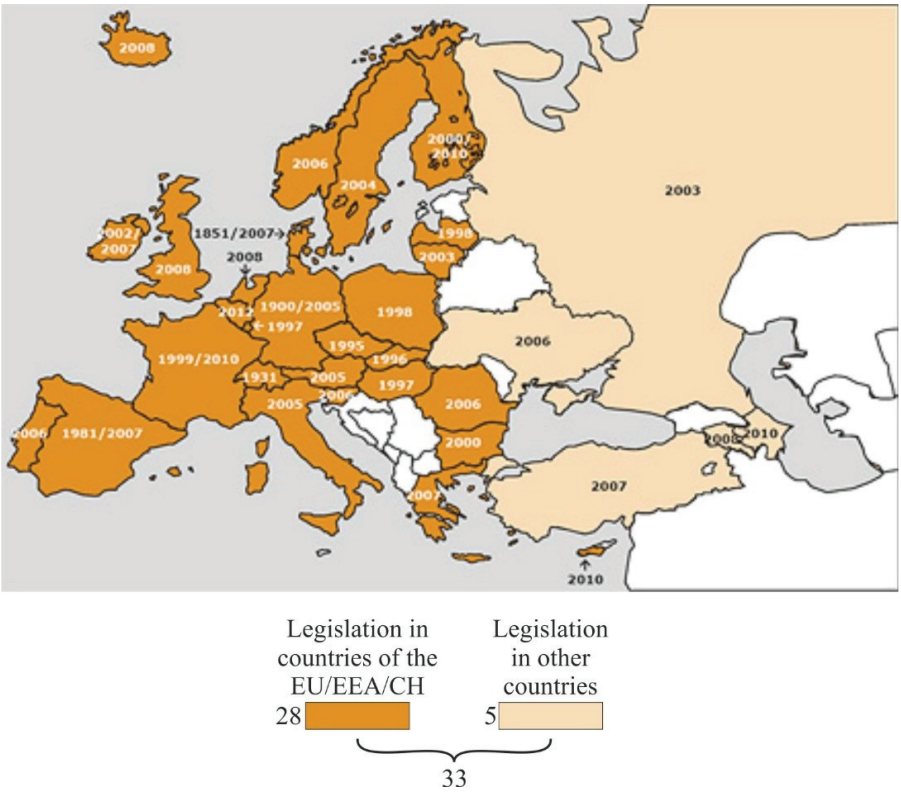


Source: ECBC (2014)

Figure 3.1 shows the status of CB legislation in Europe before the GFC. It is clear from this figure that many countries had defined legal frameworks for CBs and some other countries were in the process of transition or devising the legal framework for CBs. This shows that these bonds are deeply rooted in the European market. Not only many European countries had already well-established markets for CBs, rather interest of other countries was also growing and they were developing legal frameworks to promote this market. The interest in CB market was further incited after the eruption of the GFC.

Figure 3.2 shows the status of the CB legislation in Europe after the crisis. Many countries in Europe established the regulations for the CB market after 2007 or existing regulations

Figure 3.2: Legislation for Covered Bonds in Europe - After Crisis



Source: ECBC (2014)

were updated. This shows an increase in interest of European market towards CBs. There were 19 countries with defined regulations for CBs before the GFC but this figure has reached to 28 now, as shown in Figures 3.1 and 3.2. The financial crisis increased the dependency of banking system across Europe on CBs to access non-depository funding from the market. Therefore, regulatory authorities defined regulations for CB market or countries already having a regulatory framework for CBs updated their regulations to meet the challenges posed by changes in market conditions after the GFC.

The basic regulations for CBs were outlined in Undertakings for Collective Investment in Transferable Securities (UCITS) directive of 1988. The Article 52(4) of this directive provided the minimum requirement that makes a CB programme eligible for the privileged

regulatory treatment.[46] According to this article, a CB programme must meet following requirements:

1. CBs should be issued by a credit institution.
2. A public authority should prudentially supervise the credit institution.
3. A special legal framework should govern the CB programme.
4. A law must define the eligibility of the assets used in the cover pool.
5. The cover pool should be comprised of sufficient assets to meet the claims of CB holders.
6. A priority should be given to the claims of CB holders over the assets held in the cover pool in case the issuer faces a default.

CBs making a compliance with these requirements are considered as a safe investment and get a favourable treatment in regulations. The easier investments limits are justified because of this compliance. An investor can hold the CBs issued by a single issuer up to 25% of its total assets if they are complied with Article 52(4) of UCITS directive. The insurance companies can also hold 40% of UCITS compliance CBs in their asset portfolio in light of the EU Directives governing the Life and Non-Life Insurance companies (Directive 92/96/EEC and 92/49/EEC).

The new CRD IV (2013/36/EU) and CRR (575/2013) provide a cornerstone for the CB regulations in Europe. These directives are based on the proposal of BCBS for the revision of capital adequacy requirements for international banks. These directives came into enforcement on July 17, 2013 replacing the EU Directives 2010/76/EU, 2006/49/EU and 2006/48/EC. The Article 129 of the CRR provides the guidelines to get a favourable treatment in case of CB exposures. This article defines the eligibility criteria of the assets used in the cover pool. The minimum loan-to-value (LTV) ratio for the assets used in the cover pool is 80% for the residential and 60% for the commercial and ship loans.

The Article 129(4) of the CRR provides the RWs applicable to the CBs assessed by an External Credit Assessment Institution (ECAI). However, the CBs for which credit assessment by an ECAI is not available, RW assignment is based on RWs assigned to senior unsecured exposures as per the Article 129(5) of the CRR. These RWs assigned to CBs are lower than

[46]This privileged treatment is given to the qualifying CB in form of lower risk weights for the bondholders and exemption from investment limits.

weights assigned to unsecured exposures. These lower RWs are reflective of a favourable treatment given to CBs even they are not assessed by an ECAI.[47] The § 7 of the same Article provides the transparency requirements.

LCR also has central position in the set of regulations for CBs in Europe. According to the Article 10(f) of the LCR Delegated Regulations, CBs having a compliance with UCITS (Directive 2009/65/EC) Article 52(4) and CRR Article 129 — with issuance size of Euro 500 million or equivalent and having 2% excess coverage over the outstanding claim of bondholders — are placed in level 1 (the highest level of liquid assets).[48] According to the Article 11(c) of this act, CBs having a compliance with UCITS Article 52(4) and CRR Article 129(1c) & (7) — with issuance size of Euro 250 million or equivalent and having 7% excess coverage over the outstanding claim of bondholders — are placed in level 2A. The credit assessment of these CBs should be carried out by an ECAI as per the Article 129(4) or 129(5) of CRR. Per Article 12(e) of this act, CBs having a compliance with UCITS Article 52(4), CRR Article 129(4) or (5) and Article 129(7) — with issuance size of Euro 250 million or equivalent, RWs lower than 35% and having 10% excess coverage over the outstanding claim of bondholders — are placed in level 2B.

CBs can only be issued against high-quality assets meeting a certain criterion of LTV Ratio. According to Capital Requirement Directive (CRD), a bank must calculate the LTV for each loan individually. Therefore, a loan with higher LTV cannot be part of the cover pool because of the fact that other loans in the cover pool have lower LTV. Notwithstanding, there can be loans with higher LTV in a cover pool because of other factors e.g. property devaluation. These loans are replaced by other loans with a lower LTV. This is highly protective for the investors but onerous for the issuers. During the economic downturns, a small increase in the LTV may create several challenges for the issuing institutions when LTV is close to the ceiling. The LTV requirements currently vary from country to country but each CB issuance must have a compliance with a certain LTV threshold (ECB, 2008).[49] Table A.1 in Appendix A provides the details of the legal structure of CBs in major European jurisdictions.

The CB holders have been provided with an exemption in the new bail-in regulations in Europe.[50] The investors and creditors are asked to take the losses and bail-in the bank before

[47]The RWs assigned to ABS are much higher. See section 3.4 for a detailed comparison.

[48]These are Jumbo covered bonds.

[49]See Table A.1 for comparison of LTV requirements across European jurisdictions.

[50]See Article 44(2b) of EU Directive 2014/59/EU. Bail-in regulations require banks to call on bondholders instead of governments to bail them out in a crisis. The bail-in regulations is part of the wider efforts of insulating the financial system from the negative shocks generated by ailing financial institutions (Manning, 2015). The

the taxpayers intervene for the bail-out. The EU Directive provide competence to the member states to exclude CBs holders from the bail-in. This provides CB holders with an extra layer of protection, thereby increasing their confidence in this market. Hence, investors get more inclined towards CBs as compared to other securities issued by the banking industry.

3.3.1 Critique of Regulations for Covered Bonds

The new regulations devised after the GFC, mainly liquidity, capital, funding and investment related regulations, incentivise the CB issuance (in lieu of ABS issuance).[51] The purpose is to strengthen the funding profile of the issuing banks and provide extensive legal protection to investors in the CB market. However, a large-scale CB issuance may result into a high level of asset encumbrance that results into subordination of unsecured creditors and depositors (EBA, 2013).[52] The increase in the issuance of CBs for securing cheaper funding may give rise to a tension between the rights of the CB holders and that of Deposit Guarantee Schemes (DGS). A higher CB issuance implies a downside to the DGS, as it may create an asset shortfall for satisfying the claims of depositors.

Because of the large-scale CB issuance, banks may curtail their lending to the economic sectors who meet the eligibility requirements for the cover pools backing the issuance of CBs.[53] Because of their subordination, unsecured creditor may increase the risk premia. Thus, the unsecured funding via issuance of unsecured bonds may become costlier in this situation. CBs also result into ring-fencing of the underlying assets on the balance sheet of the issuers unlike securitisation. The issuer cannot use these assets at the time of distress to generate liquidity. Moreover, this ring-fencing also results in the subordination of unsecured depositors and general unsecured creditors in the event of bankruptcy.

Most of market participants in the United States and Europe are iffy if CBs could truly replace ABS. These concerns are linked with the balance sheet capacity constraints of the issuers and the size of domestic housing market. Therefore, promoting securitisation is inevitable to boost the economic activity by ensuring the continuous supply of credit in the

regulations are meant to protect taxpayers from rescuing lenders. ABS are implicitly exempted from the bail-in because of their off-balance sheet nature.

[51] CBs are subject to lower haircuts in the LCR and risk weights given to CBs are lower than ABS of similar rating.

[52] According to the definition of asset encumbrance provided by the EBA, "An asset shall be treated as encumbered if it has been pledged or if it is subject to any form of arrangement to secure, collateralise or credit enhance any transaction from which it cannot be freely with-drawn".

[53] CBs can only be issued against certain loans. The large issuance of CBs will not let the bank to issue loan to other sectors and only CBs eligible loans will be issued.

financial system that is dominated by banks.[54] Hence, the regulatory authorities and policy makers must consider the merits of a reformed securitisation market. The issuance of CBs and ABS should be balanced and a tilt towards any single security needs to be discouraged.

The favourable regulatory treatment of covered bonds is based on historical default statistics as explained by EBA (2014). Nonetheless, there is no incident of a CB default and none of the CB holders has been asked to take the losses (not during the GFC and sovereign debt crisis in Europe, not in Greece and not even in Cyprus), there are some CB issuing institutions that faced a bail-out after the GFC,[55] and liquidity in this market was adversely affected. The ECB introduced Covered Bond Purchase Programme (CBPP) at that time to maintain liquidity in this market. Conversely, the fact that an instrument did not default in the past does not make it immune from the risk and the probability of default in future cannot be ruled out completely.

3.4 Asymmetric Regulatory Treatment

The regulations after the GFC provides a discriminative treatment to ABS as compared to CBs that is visible in the CRR, Solvency II, Basel III and LCR Framework. There are many concerns that a less rigorous regulatory scrutiny received by CBs relative to ABS may eventually lead to an under-appreciation of risk in the CB market. The asymmetric regulatory treatment of securitised instruments vis-a-vis other instruments of similar risks such as CBs may result into unintended consequences. CBs provide a dual recourse to investors but this is onerous for CB issuers.[56]

The most important discrimination is visible in the capital regulations as CBs have been given the lowest RW of 10% in CRR,[57] whereas, the RW given to securitisation exposures with Credit Quality Step (CQS) 1 is 20%.[58,59] As a result, banks taking exposures in ABS are required to hold higher capital as compared to the ones taking exposures in CBs. Moreover,

[54]The issuance of ABS will decrease bank reliance on unsecured funding and CBs. This will not help them to control their funding cost but credit supply to economy will also increase.

[55]These banks include Düsseldorfer Hypothekenbank (April 2008), Hypo Real Estate AG (October 2008), Eurohypo AG (May 2009) and Valovis Bank (December 2011).

[56]The investors in the securitisation have only recourse to the underlying pool of collateral. If the pool is not sufficient to meet their claims they do not have a recourse to the originator. However, CB holders do not have the recourse to the underlying cover pool only. Their first claim is against the underlying cover pool but if this cover pool is not sufficient to meet their claims then they have an unsecured claim against other assets of the issuing institution *pari passu* to its other creditors and in some cases, they have a preferential claim against other assets.

[57]Article 129(4) of Regulation (EU) No. 575/2013 (CRR)

[58]Article 251 of Regulation (EU) No. 575/2013 (CRR)

[59]The credit quality of a security informs about its default risk. The securities with CQS 1 are highly rated securities usually having a AAA rating.

the competent authorities have been given the authority to partially or fully exempt CBs[60] against the limits on large exposures.[61] Therefore, a bank may take large exposures in CBs if it is allowed by the local authorities, whereas such exemption is not given in case of ABS and investors can take limited exposures in this market.

Solvency II proposal also provides a highly discriminative treatment to securitisation as compared to CBs.[62] For instance, spread risk factors[63] under Solvency II Directive are 2.1% (Type 1) and 12% (Type 2)[64] for AAA-rated ABS[65] and 0.7% for CBs of same rating.[66] The same factor for re-securitisation transactions range from 33% to 100%.[67] These differences in spread risk factor result into higher capital requirements for securitised instruments as compared to CBs.[68] The potential size of the investor base of securitised instruments may reduce significantly because of these regulations.[69]

LCR framework also provides a favourable treatment to CBs as compared to securitised products of similar rating and maturity profiles. ABS were altogether excluded from the initial proposal of LCR. Although, some classes of ABS are now included in the LCR framework after the market criticism, asymmetric treatment of ABS continues. The qualifying ABS are required to meet several conditions. These conditions are explicitly outlined in the Article 13 of the LCR regulations.[70] Mainly, these conditions include the compliance with CQS

[60] Article 400(2a) of Regulation (EU) No. 575/2013 (CRR)

[61] An institution shall not incur an exposure that is higher than 25% of its eligible capital or €150 million, whichever is higher. However, CBs can be exempted from such limits. See Article 395 of Regulation (EU) No. 575/2013 (CRR).

[62] Spread Risk Sub Module of the EC Delegated Act Supplementing Directive 2009/138/EC (Solvency II)

[63] The value of a bond may decrease because of some financial mistakes made by the issuing institutions. These mistakes may result in downgrade of issuer's rating thereby causing a drop in value of the issued security. The spread risk factor is assigned to various classes of bonds to account for this spread risk. The holding institutions must hold some capital against these exposures. The amount of required capital against the holding of a security is determined on the basis of its assigned spread risk factor.

[64] Securitisation is classified as Type 1 and Type 2 Securitisation. Type I Securitisation refers to high-quality STS Securitisation.

[65] Article 178(1b & 2b) of the EC Delegated Act Supplementing Solvency II Directive

[66] Article 180(1) of the EC Delegated Act Supplementing Solvency II Directive

[67] Article 178(3b) of the EC Delegated Act Supplementing Solvency II Directive

[68] The spread risk factor of an instrument is directly proportional to the risk weight assigned to that instrument.

[69] Before the eruption of GFC, approximately 15% of securitised instruments were placed with insurance companies. Therefore, the strict regulations provided in Solvency II might cause a remarkable decline in the inclination of insurers to buy these securities, as it will be uneconomical for them to hold these securities because of high capital charges associated with them.

[70] Commission Delegated Regulation (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for Credit Institutions. *Official Journal of the European Union*, 11.

requirements[71], class of tranches[72], LTV requirements[73] and full recourse for mortgages.[74] This may not be possible for all ABS transactions to meet these requirements. Despite all these strict requirements, all classes of qualifying ABS are placed in level 2B assets i.e. last category of the LCR framework. The total amount of level 2B assets must not exceed 15% of the total liquidity buffer, whereas this limits is 60% and 30% for level 1 and level 2A assets of the LCR respectively and CBs are placed in these first two categories.[75] Consequently, many of ABS virtually remain excluded from the LCR framework.

The favourable treatment of CBs is also visible in Net Stable Funding Ratio (NSFR) of Basel III.[76] NSFR is meant to ensure that a bank maintains a stable funding profile in relation to the composition of its assets and off-balance sheet activities. Among all the securitised instruments, only RMBS are part of the NSFR.[77] The amount required to fund a specific class of assets is determined on the basis of the Required Stable Funding (RSF) factor assigned to each class of assets. The RSF factor[78] assigned to CBs (with a minimum credit rating of AA-) is merely 15% but for the qualifying RMBS (with a minimum credit rating of AA) the same factor is 50% (BCBS, 2014a). Other types of securitised products receive RSF factor of 100%. A bank taking exposure in securitised instruments will be required to maintain large number of funds against its securitisation exposure because of higher RSF factors.

CBs are also getting favourable treatment in the form of lower haircuts on the discount window. There are five categories of the eligible assets that can be used as collateral.[79] CBs are placed in the Category II (Jumbo CBs) and III (All other CBs). The applicable haircuts to CBs with the CQS 1 and 2 start from 1% and varies with the maturity of CBs. However, ABS

[71]The securitised instruments with a credit assessment of at least CQS 1 are allowed in the LCR.

[72]The securitised instruments must belong to the most senior tranche.

[73]All securitised instruments must be subject to the LTV requirements laid down in the point 1 of the Article 129(1)(d) of the Regulation (EU) No 575/2013 (CRR).

[74]The mortgage owner remains responsible for the shortfall in sale proceeds from the property.

[75]Article 17(1c) of Regulation (EU) 2015/61 (LCR)

[76]Net Stable Funding Ratio (NSFR) is the amount of available stable funding divided by the required stable funding. This ratio should be equal to or greater than 100%. Available Stable Funding (ASF) is the amount of liabilities and capital that is expected to be stable over the period considered by the NSFR, i.e. one year, and the Required Stable Funding (RSF) is a function of liquidity profile and maturities of the assets held by an institution. NSFR will be applicable from January 01, 2018.

[77]The earlier version of LCR also included RMBS only. However, ABS backed by auto loans and Small and Medium Enterprise (SME) loans are also included in the recent LCR framework, but no changes have been made in the NSFR.

[78]RSF factor is assigned to different classes of assets to approximate the amount of funding required for the holding of particular class of assets. The assets are required to be funded either because of their roll-over or because of their monetisation inability. RSF is somewhat akin to the haircut applicable to liquid assets for the purpose of LCR calculations.

[79]Annexure of Guideline (EU) No. 2016/65 of 18 November 2015

Table 3.2: Asymmetric Regulations for Securitisation and Covered Bonds

Regulations	**Securitisation**	**CBs**
LCR (Basel III)	Placed in level 2B category of HQLA (the lowest category) Lowest Haircut is 25% Maximum allowed limit is 15% of HQLA Only RMBS, Commercial ABS and Auto ABS are included in HQLA (with restrictions)	Placed in all categories of HQLA (even in the top category). Lowest Haircut is 7% Maximum allowed limit is 40% of HQLA
NSFR (Basel III)	RSF Factor is 50% Minimum rating AA Only RMBS are included	RSF Factor is 15% Minimum rating AA-
Risk Weights (CRR)	RW floor for rated securitised instruments is 20% for CQS 1	RW floor for rated CBs is 10% for CQS 1
Risk Weights for Unrated Securities (CRR)	1,250% RW for unrated ABS	RW assignment is based on RW assigned to senior unsecured exposures
Spread Risk Factor (Solvency II)	Ranges from 2.1% to 100% for different securitised instrument depending on credit quality and maturity structure	Ranges from 0.7% to 0.9% depending on credit quality and maturity structure
Haircuts (ECB)	Placed in the last category of eligible assets Applicable haircut is flat 10% irrespective of maturity Securities with CQS 1 and CQS 2 are eligible only	Placed in category II and III Applicable haircut starts from 1% and varies with the maturity CBs with CQS 3 are also included

with CQS 1 and 2 are placed in the last category of eligible assets and the applicable haircut is flat 10% irrespective of the maturity. Moreover, CBs with the CQS 3 are still eligible for collateral but ABS with CQS 3 are not. As a result of higher haircuts, CBs overtook ABS as collateral in the repo market (Altomento & Bussoli, 2014). The asymmetric treatment of securitisation and CBs has been summarised in Table 3.2.

3.5 Conclusion

The review of regulations performed in this chapter provides with three perspectives of the regulations for securitisation and CBs. First, the premises for the current regulations are not aligned with the theoretical understanding of securitisation transactions. This raises the questions on the credibility of the regulations. It highlights that regulations may fail to target the actual problems lying in the securitisation market. The regulators need to reconsider these premises and recalibrate the regulations accordingly.

Second, the regulatory treatment of securitisation is not based on the European realities, rather it is highly influenced by the situation in the US market. The European securitisation market had different dynamics and the problems that were pervasive in the US securitisation market were not ubiquitous in the European market. The differences in both markets must be understood and problems on the other side of Atlantic should not be generalised. The treatment of the European securitisation market should be aligned with its own dynamics.

Thirdly, an asymmetric treatment is provided to ABS and CBs in the current regulations. The consequences of this asymmetric treatment need to be evaluated. The favourable treatment given to a specific instrument may generate a system-wide instability, as it might promote over-reliance on it. This may adversely affect the funding diversification of issuers and investment diversification of investors. A financial system flooded with a certain instrument may become fragile to the economic shocks of that specific market. A situation akin to the securitisation crisis may arise in future. Therefore, there is a need to develop a level playing field for the securities with similar risk characteristics and maturity structures.

The economic analysis conducted in the subsequent chapters will provide a basis for reconsidering the regulatory treatment as it will help evaluate the premises of the current regulations and understand the realities of the European market. The comparative approach being followed in this study will be helpful in evaluating the asymmetric treatment given to ABS and CBs.

Chapter 4

Securitisation, Covered Bonds and Credit Risk Taking Behaviour of Banks

The universe of mortgage lending has gotten to the point where there is a place in it for everybody.

Joe Mays

4.1 Introduction

It is a hoary notion in the banking industry that securitisation leads to lax lending standards. Securitisation is chastised for moral hazard, adverse selection, and high risk taking. These problems are often attributed to the lack of so-called 'skin in the game'. This view of securitisation has influenced the policy reforms on both sides of the Atlantic after the Global Financial Crisis (GFC). According to the US regulatory authorities, the above-mentioned problems can be mitigated if the underlying assets are kept on the balance sheet of originator (Pinedo & Tanenbaum, 2010),[1] as this will ameliorate the loan origination practices. Covered Bonds (CBs), a close counterpart of Asset-Backed Securities (ABS), are supposed to serve this purpose because of their on-balance sheet nature. This study is aimed at evaluating the impact of these two instruments on the credit risk taking behaviour of banks.

The policy reforms premised on the view that securitisation leads to moral hazard thereby increasing the riskiness of issued loans are questionable (Gorton, 2009; Pacces, 2010). These regulations emphasise on risk retention. However, these risk retention requirements seem unnecessary as securitising banks already retain the risk in one form or another (Gorton &

[1]Similar views are visible in the European reforms. See risk retention requirements in Capital Requirement Regulations (CRR) Directive.

Souleles, 2007). Nonetheless it is still an unanswered question whether the on-balance sheet risk retention can make a difference. Banks retain all the risk in case of CBs. Therefore, if risk retention can make a difference then, *ceteris paribus*, CB issuing banks should not face problems similar to securitising banks. The 'skin in the game' in case of CBs should refrain banks from the imprudent risk taking. To this end, this study attempts to investigate the impact of securitisation and CBs on credit risk-taking behaviour of banks in Europe.

Previous studies about the effects of securitisation are equivocal. The theory is not conclusive and empirical studies provide contrasting results. Moreover, these studies have certain limitations. First, most of these studies focus on the US market and their results are not generalizable to Europe, especially since sub-prime mortgage market is largely non-existent here. Therefore, this study endeavours to explore the European realities. Second, the methodology of some studies has been recently challenged. For instance, the most prominent empirical work about the impact of securitisation on lending standards is done by Keys et al. (2009, 2010, 2012). For controlling the endogeneity, they ingeniously use FICO score as a rule of thumb to determine securitisation decision.[2] Bubb and Kaufman (2014) show that the evidence of moral hazard has been misinterpreted in this work. The exclusion restriction of the instrumental variable is violated that invalidates their research design.[3] FICO Score can also affect the screening incentives of a lender.[4]

This study follows a different approach. It compares securitising banks with CB issuing banks. This is one of the very few studies comparing ABS and CBs. CBs are close counterparts of ABS,[5] but most of the allegations placed on ABS may not be applicable to CBs. Banks maintain a strong 'skin in the game' in the case of CBs as opposed to ABS. The investigation in this chapter is expected to make a threefold contribution to the literature. First, it focuses on the European securitisation that is still relatively under-investigated. Second, CBs have been ignored in the academic literature and this study attempts to fill this gap. Finally, this study helps understand the role of risk retention (in the form of on-balance sheet retention) in shaping the credit risk taking behaviour of banks.

The most important issue in analysing the impact of securitisation and CBs on credit risk taking behaviour is the endogeneity of the decision to issue ABS or CBs, which leads to the self-selection bias. A natural experiment can be an ideal solution to overcome the problem of endogeneity. However, in the presence of two different instruments, it is extremely unlikely

[2]Loans below the FICO score of 620 are harder to securitise

[3]The instrumental variable should not affect the dependent variable.

[4]The lender may rely on high FICO score and do not screen the borrower properly. Therefore, the change in screening cannot necessarily be linked with securitisation.

[5]The terms 'securitisation' and 'ABS' have been used interchangeably here.

to find an exogenous shock that can be used as a natural experiment. Many previous studies have used the instrumental variable methodology, but choice of the right instrument is a potential problem. Selection of a wrong instrument can invalidate the findings. The selection of appropriate instruments becomes harder while dealing with multiple choices, as this study deals with the choice of issuing ABS or CBs.

The empirical design followed in this study addresses the issue of self-selection bias by using the Propensity Score Methods (PSM). It makes the use of recent developments in the PSM literature i.e. Covariate Balancing Propensity Score (CBPS). To the best of my knowledge, this is the first study using CBPS in a finance study. Thus, this study makes an important methodological contribution as well. The study estimates the impact of ABS and CB issuance on the change in credit risk level of a bank that is measured as difference of pre and post-issuance risk level. This method is known as double differencing or Difference-in-Differences (DID). The first difference controls for the unobserved heterogeneity and second difference provides the estimate of impact.

The study uses data from 253 banks operating in 7 European countries from 2000-2014. The initial results suggest that European banks do not securitise to transfer risk, rather than liquidity generation. The impact of ABS and CB issuance on credit risk-taking is observed in the short and long run. The results show that 'skin in the game' in the form of on-balance sheet risk retention may not be playing an important role in terms of determining the risk level of a bank. Securitisation does not lead to an increase in the existing risk level of a bank. Results do not support that securitising banks under-price their risk. Moreover, CB issuing banks — although they retain a greater risk portion — tend to issue riskier loans in the long run.

The rest of the chapter is organised as follows. Section 4.2 reviews previous research in the field, focusing on securitisation and covered bonds. Section 4.3 provides details about the research methodology. This section explains various methodological issues involved in the analysis under a basic framework and introduces the PSM and CBPS methodology to deal with the identified issues. Section 4.4 provides detailed results and explain the main findings. Section 4.5 concludes.

4.2 Related Literature

The securitisation process has been extensively studied, especially after the eruption of the GFC. Moral hazard, adverse selection and the risk-taking behaviour of banks have been the

key areas of interest for researchers. On the contrary, CBs did not get much attention in the academic literature. However, the market has shown a deeper interest in CBs after the GFC and they are considered an alternative to securitised products. There are mixed views about the above-referred allegations placed on securitisation, but a little is known about CBs.

4.2.1 Securitisation

A number of theoretical and empirical studies have documented that securitisation leads to lax lending standards. According to Pennacchi (1988), loan sale may create moral hazards and adverse selection problems as it affects the bank's incentive to monitor borrowers. These problems mainly stem from the information asymmetry. Most of the information used by a bank during the loan origination process is not transmitted to the market. A bank may have an incentive to securitise its poor quality loans (Gorton & Pennacchi, 1995). It might also lack incentives to properly screen its borrowers at the time of loan origination and continuously monitor them after the loan securitisation (Morrison, 2005).

The originate-to-distribute model has been ferociously criticised in the post-crisis era.[6] Purnanandam (2011) finds that the originate-to-distribute model led to the issuance of inferior quality loans in the years close to the crisis. Banks following this model had a higher default rate. The empirical evidence provided in his study endorses the popular view that securitisation causes the loss of screening incentives. The adverse selection problem in securitisation is also confirmed by the empirical evidence provided by Elul (2015). Nonetheless, these results cannot be generalised to the European market where the originate-to-distribute model never got popularity.[7]

Bord and Santos (2015) conducted their study on Collateralised Loan Obligations (CLOs) i.e. a form of securitised products, and evaluated if loans used in CLO transactions performed differently than non-securitised ones. Their results suggest that banks followed lax underwriting standards while issuing loans used in CLO transactions as compared to non-securitised loans. However, these banks were aware of the risk associated with these loans as they were charging higher interest rates. They also find that the share of the retained securitisation ('skin in the game') also played a significant role in this market. The loans issued by banks with

[6]In the originate-to-distribute model, loans are issued with a view to securitise them at a later stage. Many non-banking institutions also get involved in securitisation through this model. Frankel and Jin (2015) argues that securitisation worsens the screening by allowing the entry of remote lenders. Therefore, banks start competing with non-banks.

[7]The loan origination in Europe remained within the banking industry and remote lenders were not involved in loan business. Hence, the problems pervasive in the US market cannot be prevalent in the European market.

higher retention level performed better than others. These findings endorse the recent policy reforms about the risk retention. Similar results are presented by Carey (1998) who finds that retained loans performed better than the securitised ones. These findings imply, first, that banks retain higher quality loans on their balance sheet and second, monitoring of loans creates some value.

The study of Kara et al. (2015) provides some interesting results. They endorse the signalling[8] and monitoring[9] hypotheses at the same time. They find that loans with a higher default risk have a lower probability to be securitised. However, once these good quality loans are sold to investors, bank's incentive to continuously monitor its borrowers is reduced. This lack of monitoring deteriorates the performance of these loans that are initially considered of good quality. These results endorse the view presented by previous researchers about the monitoring incentives (Bord & Santos, 2015; Carey, 1998).

On the other hand, many studies depart from the views about moral hazard and incentive problems associated with securitisation (Chiesa, 2008, 2015; Hartman-Glaser et al., 2012; Pagès, 2013). Chiesa (2008) states that credit risk transfer (through securitisation) cannot be necessarily linked with the distortion of monitoring incentives instead, the optimal use of securitisation may enhance monitoring incentives. She further argues that default of loans can mainly be linked with the state of the economy and bad luck instead of securitisation. If this is true, the issuance of a specific type of security becomes irrelevant in determining the credit risk taking of a bank rather, economic and market conditions determine its credit risk level.

The study of Bonner, Streitz, and Wedow (2016) negates the positive effect of securitisation on risk taking of banks. They find that securitisation reduces risk-taking because of the risk aversion of banks and investors. Along similar lines, Casu, Clare, Sarkisyan, and Thomas (2011) explain that banks well understand the risk arising out of the securitised pool and become more risk averse. This motivates them to have less risky assets and to allocate capital to a portfolio with assets having lower credit risk. This is supported by the empirical evidence in their study. They ascribe this observation to the recourse hypothesis.[10] The empirical evidence provided by Benmelech et al. (2012) also negates views about adverse

[8]A bank securitises its better-quality loans to generate a positive signal about the loan quality.

[9]Securitised loans perform worse than non-securitised loans because of reduced monitoring incentives.

[10]The originators provide an implicit or explicit recourse to the securitisation structure. Explicit recourse is often provided through credit enhancement and standby letters to securitisation structures, known as Special Purpose Vehicles (SPVs). Implicit recourse can be provided by selling assets to an SPV on discount, purchasing assets from the SPV on a greater amount as compared to the fair value, replacing the non-performing assets with performing ones and providing credit enhancement beyond contractual arrangements. See Gorton and Souleles (2007) for further details.

selection caused by the securitisation in their study on CLOs. They find a weak evidence of under-performance of securitised loans.

The motives behind securitisation are very important to evaluate the securitisation effects. Bank may securitise their assets because of the regulatory capital arbitrage (Ambrose et al., 2005), to reduce the bankruptcy cost (Gorton & Souleles, 2007), transfer risk (Panetta & Pozzolo, 2010), increase liquidity (Cardone-Riportella et al., 2010) and decrease funding cost (Loutskina, 2011). If securitisation is performed for the former two motives, then it cannot be blamed for the risk taking or moral hazard problems. Bank will securitise their less risky assets because of the similar capital charges applicable to a broader set of assets and safer assets are helpful in achieving the bankruptcy remote structures. However, the risk transfer objective may precipitate risk taking. The bank might issue riskier loans with a view to securitise them at a later stage and transfer their risk. This situation can be ascribed to adverse selection. A bank might take advantage of information asymmetries and securitise some of it worst loans (Parlour & Plantin, 2008).[11]

Banks who securitise their assets with a view to transfer credit risk are likely to increase the risk they take. They tend to issue loans with a view to securitise them on a later stage (the so-called originate-to-distribute model). Martín-Oliver and Saurina (2007) empirically evaluate motives behind securitisation in Spanish banks. They find liquidity as the main driver behind securitisation. Capital arbitrage can be another potential driver in some cases.[12] However, they do not find that risk transfer is a motive of securitisation. Similar results are provided by some other studies as well (Ambrose et al., 2005; Cardone-Riportella et al., 2010).

The empirical investigation carried out by Ambrose et al. (2005) confirms that higher risk loans are retained by the banks and lower risk loans are securitised. Therefore, the retention of high-risk loans prevents the distortion of monitoring incentives. It implies that the securitisation decision is not driven by the information asymmetry and that risk transfer may not be a motive behind the securitisation. Ultimately, securitised loans can be expected to be safer. Their results confirm the regulatory capital arbitrage as a motive of securitisation (Ambrose et al., 2005).

[11] An investor might not be aware if a bank securitises because of the outside investment opportunities or some inside information. The trading in the secondary market might face a break down resulting into illiquid loans if the adverse selection problem is too severe. However, market remains liquid if banks are selling their loans for private motives (Akerlof, 1970).

[12] The securities issued against the loans provided to Small and Medium Enterprises (SMEs) were meant to serve the purpose of regulatory arbitrage to some extent.

4.2.2 Covered Bonds

ABS and CBs have similar functioning at a basic level and are expected to provide similar economic benefits (IOSCO, 2012). A bank places its assets into a ring-fenced pool after originating them. The characteristics of the issued securities and ring-fencing practices may vary from country to country and type of the security issued against these assets, but these assets serve as a collateral against the issued securities (ABS or CBs). However, unlike securitisation, collateral against CBs does not leave the balance sheet of the issuer, rather these ring-fenced assets are separated from other assets. The issuing institution explicitly mentions that these assets are held against CBs.[13] The on-balance sheet nature of CBs is supposed to maintain the banks' incentive to monitor and screen their borrowers (Pinedo & Tanenbaum, 2010).

CB is prosaically considered to be a product that may help prevent the next financial crisis. CBs, on the one hand, provide a secure mean of investment to investors because of many layers of protection and, on the other hand, they serve as a stable source of funding for issuers who can sell them to investors or central banks for obtaining funds (Murphy, 2013). Prudent underwriting is perceived as the primary benefit of CBs relative to ABS (Surti, 2010). CBs offer a greater level of transparency as compared to ABS. The information asymmetry problem, largely associated with ABS, is quite controlled in the case of CB issuance. Moreover, the on-balance sheet and dynamic cover pool features abstain the bank from moral hazard and adverse selection. Therefore, the lemon market problem is hard to expect in case of CBs. However, CB may not be the silver bullet as it is flaunted. It should be taken as another financial instrument in the arsenal of financial market having benefits and costs at the same time (Harrison, 2008).

CBs, because of their on-balance sheet nature, do not provide the benefits of regulatory capital arbitrage and credit risk transfer, but are issued to meet liquidity requirements and control funding cost. According to many previous studies, securitisation in the European market is also driven by the same motives and not by credit risk transfer and regulatory capital arbitrage (Cardone-Riportella et al., 2010; Martín-Oliver & Saurina, 2007). Therefore, if both instruments are issued for liquidity and funding cost motives, the issuance of ABS or CBs should not affect the credit risk-taking behaviour of a bank. The analysis performed in this

[13]The assets held against the issuance of CBs are recorded in a cover register, in the case of issuance of famous German bonds, '*Pfandbrief*'. An independent cover pool monitor ensures that the cover pool is well maintained all the time and all the necessary adjustments are made timely and recorded in the cover register. A certificate is also issued by this monitor before the issuance of covered bonds. This monitor plays an important role in maintaining the confidence of investors and ensuring the stability of the covered bonds market.

study sheds light on this issue.

4.3 Research Methodology

This study follows a different path to study the securitisation market in the European context. It compares ABS with CBs. The inclusion of these two instruments in a single study gives rise to various challenges calling for a carefully crafted research design. This section first explains the basic framework and identifies associated methodological issues if the analysis is performed under this basic framework. It then introduces PSM and CBPS to overcome the problems related to the analysis. Finally, it provides details about the empirical approach and the data used in this study.

4.3.1 Basic Framework

This study aims at evaluating the impact of ABS and CBs on credit risk taking behaviour of banks. Let $R_{i,t+1}$ be the credit risk of bank i at time $t+1$ that is encountered by two financing decisions i.e. securitisation (s) and issuance of CBs (b) at time t. The purpose of the analysis in this study is explaining the differences in $R_{i,t+1}$ across banks and periods using:

- $s_{i,t}$, securitised products issued by bank i at date t; $s_{i,t} = 0$ if the bank did not securitise, $s_{i,t} = 1$ otherwise;
- $b_{i,t}$, CBs issues by bank i at date t; $b_{i,t} = 0$ if the bank did not issue covered bonds, $b_{i,t} = 1$ otherwise;
- $Z^R_{i,t}$, a $H_R \times 1$ vector of additional controls

The risk equation is then given by:

$$R_{i,t+1} = Z^R_{i,t}\beta_R + \theta_s s_{i,t} + \theta_b b_{i,t} + u^R_{i,t} \tag{4.1}$$

The positive impact of securitisation on risk taking behaviour is shown if:

$$\theta_s > 0$$

while the impact of on balance sheet retention (in case of CB issuance) in controlling the credit risk-taking behaviour is also shown if:

$$\theta_s > \theta_b$$

This study uses two proxies for measuring the credit risk taking of banks i.e. the ratio of Risk-Weighted Assets to Total Assets (RWATA) and the Loan Loss Provision (LLP). This is in line with many previous studies (Aggarwal & Jacques, 2001; Avery & Berger, 1991; Casu et al., 2011; Dionne & Harchaoui, 2008; Salah & Fedhila, 2012). RWATA captures the bank's allocation of its assets across different risk categories and helps evaluate the quality of the asset portfolio.[14] LLP can be a good proxy to measure the quality of issued loans as per the bank's estimations. LLP shows how much losses have been estimated by a bank on its loan portfolio. A higher LLP ratio shows the issuance of risky assets by the bank. At the same time, this ratio is also indicative of a (conservative) risk averse approach of the bank. A positive relation of securitisation with RWATA and a negative one with LLP implies that banks take more risk and under-price this risk as a result of securitisation, as explained by Kara et al. (2015). However, a negative relationship with RWATA and a positive one with LLP do not support this understanding about securitisation.

The financing decision of bank i at time t is induced by its conditions at time $t-1$. Hence, the issuance of ABS and CBs can be determined by K-dimensional vector of pre-treatment covariates $x^s_{i,t-1}$ and $x^b_{i,t-1}$ respectively. ABS and CBs equations are given by:

$$Pr(s_{i,t} = 1|x^s_{i,t-1}) = f[(x^s_{i,t-1})'\beta_s] \tag{4.2}$$

$$Pr(b_{i,t} = 1|x^b_{i,t-1}) = f[(x^b_{i,t-1})'\beta_b] \tag{4.3}$$

Banks in the population can be classified into four groups.

1. Non-Issuers: Banks who do not issue any of the two securities under consideration in this study.

2. Securitisers: Banks who issue securitised products.

3. CB Issuers: Banks who issue covered bonds.

4. SB Issuers: Banks who issue both securitised products and covered bonds.

[14]The Basel Accord I divides assets and off-balance sheet activities of a bank in four categories as per their credit risk i.e. (i) assets with zero risk weight (government securities and reserves); (ii) assets with a low risk (interbank deposits); (iii) assets with a medium level of risk (e.g. mortgage loans); (iv) assets with high default risk (e.g. consumer, commercial and credit card loans). The assets for which no risk weight is mentioned receive 100% risk weight. The total risk-weighted assets of a bank are calculated as follows:
$RWA = 0 \times AC\ I + 0.2 \times AC\ II + 0.5 \times AC\ III + 1.0 \times AC\ IV$, where AC = Asset Category

Methodological Issues

The basic framework, explained in section 4.3.1, entails various methodological issues. First, the most important issue is endogeneity of the decision of issuing ABS or CBs. The issuance of a particular instrument by the bank i at time t can be prompted by multiple factors at time $t-1$. The fund managers of banks may have some inside information or motives to decide the issuance of a particular type of instrument. For instance, fund managers want to issue more loans in order to gather maximum commission that is often linked with the number of issued loans. However, the capital requirements do not allow them to issue loans those are beyond the limits of existing capital. They might use securitisation for the capital arbitrage. As a result they might issue more loans to meet their objective of higher compensation. Thus, s_{it} and b_{it} are endogenous.

The problem of self-selection bias is most likely to arise in this type of situation.[15] Banks may also select the issuance of ABS and CBs to meet their liquidity needs. When liquid assets are produced beyond their current needs, available funds are used to create new assets. This excess capacity created by the issuance of ABS and CBs might motivate them to issue some riskier loans. Therefore, estimation of equation (4.1) with traditional models of panel data analysis (fixed and random effect models) may not provide unbiased results as they require that sample selection must take place outside the model (Dustmann & Rochina-Barrachina, 2007). The bias in the results will be induced because of the selectivity problem.

Another type of endogeneity stems from the reverse causation. Securitisation may affect credit risk taking behaviour, but credit risk taken previously can also affect the decision to securitise. Therefore, if the bank managers have already issued loans with a higher credit risk, this might motivate them to securitise such loans. Similarly, CBs can be issued to alter the reputation of a bank, as CBs are considered safer securities. Second, factors other than the issuance of one specific type of security can explain the differences in credit risk behaviour of banks (e.g. increasing competition among banks). Third, some banks can be more sensitive to the economic shocks that may affect their lending behaviour. This resilience can be mainly linked with the size of the bank. Bigger banks have the capacity to better absorb the economic shocks. The involvement of all these issues makes it difficult to evaluate the impact of the issuance of a specific financial instrument on credit risk-taking behaviour of banks.

Popular methods to deal with selection bias and endogeneity problems are based on instru-

[15]This is a very common problem in non-experimental studies. In experimental studies, the treatment can be random but in non-experimental context, this is generally not true. The selection problem arises in another form in studies using panel data and focus on units observed at all dates. This may also create self-selection bias. See Heckman (1979)

mental variables (IV), Heckman's two-stage estimation (Inverse-Mill Ratio - IMR Method) and Propensity Score Methodss (PSMs). The researcher employing instrumental variable methodology must have at least one variable to predict the choice. The selected instrumental variable(s) must meet three conditions. First, they should not be correlated with error terms; second, they should have a strong impact on the choice variable and third they should not affect the outcome variable. The major problem in this methodology is to find the right variable(s) meeting the above three conditions. For this reason, this methodology is not used widely.

The Heckman's two-stage estimation method (Heckman, 1979) has also been widely used by researchers. However, this method has been criticised for its lack of robustness and potential sensitivity (Tucker, 2011). Therefore, the use of alternative methods is currently increasing. Some of the previous studies have used IMR and PSM simultaneously. Nonetheless, these two methods work under different assumptions and results may differ significantly thereby creating confusion.

This study employs PSM to analyse the impact of ABS and CBs on the credit risk taking behaviour of banks. PSM has been widely used in the health economics literature to measure the impact of different treatments, but its usage in accounting and finance is also growing.[16] The traditional PSM method of Rosenbaum and Rubin (1983) deals with two groups (i.e. treatment and control). Nonetheless, the use of PSM is extended to the case of multiple groups by Imbens (2000). Further developments in PSM for multiple treatments are made by other researchers (Abadie & Imbens, 2015; Imai & van Dyk, 2004; Lechner, 2001). This study also deals with a situation in which a bank faces multiple choices.

4.3.2 Propensity Score Method (PSM)

In accounting and finance, firms face the dilemma of selecting among different alternatives. These alternatives are considered as treatments here. Firms selecting a specific alternative are placed in the treatment group and the others are placed in the control group. The impact of a specific treatment d ($d \in D$) on the credit risk-taking behaviour of a bank (i.e. the outcome R) can be measured by calculating the difference between the state of the world if d was chosen and the state of the world if it was not. However, the latter situation is counter-factual as the same bank cannot be observed under both situations. This is the fundamental problem of causal inference (Holland, 1986).

PSM deals with the fundamental problem of causal inference by calculating the probability ($\pi^d_{i,t}$) of receiving the treatment (d) for each unit i at time t. PSM works under two

[16] See Tucker (2011) for a review of studies using PSM in accounting and finance.

key assumptions. The first is conditional independence or unconfoundedness assumption. According to Wooldridge (2002), the treatment effect is identified if the information related to observable covariates can be collected and if the treatment is determined by observables only, that is, it is unaffected by unobservables. This assumption is given by:

$$(R^{d}_{i,t+1}) \perp\!\!\!\perp D_{i,t} | X_{i,t-1}, \forall X \tag{4.4}$$

This is a strong assumption as the systemic differences between banks may exist even after conditioning on a set of observable covariates. For instance, such differences may arise because banks operating in different regions face different market conditions thereby affecting their credit policies differently. To overcome this problem, this study focuses on change in the credit risk measured as the difference between the credit risk before and after the issuance of ABS and CBs. The change in the credit risk of a bank is measured as:

$$\Delta R_{i,t+1} = R_{i,t+1} - R_{i,t} \tag{4.5}$$

This is the Difference-in-Differences (DID) or double-differencing approach.[17] The impact of time-invariant unobservables is controlled in this approach. Focus on $\Delta R_{i,t+1}$ instead of $R_{i,t+1}$ helps control the bank fixed effects and removes the bank-level heterogeneity. The second difference provides the estimate of the impact of ABS and CB issuance on the credit risk-taking behaviour. The assumptions to justify DID are weaker than those required to justify conventional matching under unconfoundedness assumption (Smith & Todd, 2005).

The second assumption is overlap or common support assumption. The fulfilment of this assumption rules out the possibility that pre-treatment covariates can perfectly predict D_{it}. This assumption ascertains that units having the same scores can be either in treatment or control group (Caliendo & Kopeinig, 2008). The Propensity Score (PS) in the presence of this assumption cannot be zero or one, as shown by:

$$0 < pr(D_{i,t} = d | X_{i,t-1}) < 1 \tag{4.6}$$

PS is conditioned on K-dimensional pre-treatment covariates. The formula for PS is:

$$\pi^{d}_{i,t} = pr(D_{i,t} = d | X_{i,t-1}) \tag{4.7}$$

Traditionally, the estimated PS are used to match units from the treatment and control group. To estimate the treatment effect, the mean outcome of matched units is compared.

[17] This is non-paramteric version of DID, used in line with Casu et al. (2013).

There are two types of treatment effects (τ) estimated in PSM: Average Treatment Effect (ATE) and Average Treatment Effect on the Treated (ATT). ATE is the estimation of difference in the outcome had the entire population been observed under one treatment d' versus the entire population been observed under another treatment d'' or no treatment (control group), whereas ATT is defined by the difference in the outcome of units getting treatment d' and that of those actually getting d'' had they received the d' (Wooldridge, 2002).

The choice of the treatment effect depends on the research question and target population of the study. ATE is more interesting to calculate if treatment can be offered to all elements of a population. Conversely, if some elements in the population cannot get a particular treatment, ATT becomes the estimand of interest. One of the potential disadvantages of ATT is that it does not provide the information about the relative effect of a treatment program if it is extended beyond its base clientele (McCaffrey et al., 2013). I believe that ATE should be the parameter of interest in this study, as all the banks can issue either ABS or CB but it is matter of personal choice to issue a specific security or not. ATE is given by:

$$\tau_{ate}^{d',d''} = E(\Delta R_{i,t+1}^{d'} | D_{i,t} = d', d'', Z_{i,t}) - E(\Delta R_{i,t+1}^{d''} | D_{i,t} = d', d'', Z_{i,t}) \tag{4.8}$$

Covariate Balancing Propensity Scores (CBPS)

This study uses the CBPS methodology. CBPS is a recent development in PSM introduced by Imai and Ratkovic (2014). CBPS is more robust than the traditional propensity score estimation methods as it improves the resulting covariate balance. PS , at the same time, is a covariate balancing score and the conditional probability of assigning the treatment. CBPS exploits this dual characteristic of PS and a single model here determines the mechanism of treatment assignment and the covariate balancing weights. Incorporation of the covariate balance in the estimations is a more robust way of PS estimation that optimises the covariate balance and controls the bias.

Traditionally, the popular method for the estimation of PS is the logistic model:

$$\pi_\beta(X_i) = \frac{exp(X_i^D \beta)}{1 + exp(X_i^D \beta)} \tag{4.9}$$

where $\beta \in \Theta$ is an L-dimensional vector of unknown parameters and $L = K$. β is estimated by maximizing the log-likelihood function:

$$\hat{\beta}_{MLE} = arg \max_{\beta \in \Theta} \sum_{i=1}^{N} D_i \, log \pi_\beta(X_i) + (1 - D_i) log\{1 - \pi_\beta(X_i)\} \tag{4.10}$$

Assuming:

$$\pi_\beta(.) \in C^2(\beta) \implies \text{first order condition}$$

$$\frac{1}{N}\sum_{i=1}^{N} s_\beta(D_i, X_i) = 0, \qquad s_\beta(D_i, X_i) = \frac{D_i \pi'_\beta(X_i)}{\pi_\beta(X_i)} - \frac{(1-D_i)\pi'_\beta(X_i)}{1-\pi_\beta(X_i)} \tag{4.11}$$

Equation (4.11) shows the condition used to balance the function of covariates. The main problem in this traditional approach is that treatment effects may become largely biased if the treatment model is misspecified (Smith & Todd, 2005). CBPS help overcome this problem by exploiting the above-explained dual characteristics of PS . CBPS operationalises the covariate balancing property by using the inverse propensity score weighting:

$$\mathbb{E} = \left\{ \frac{D_i \tilde{X}_i}{\pi_\beta(X_i)} - \frac{(1-D_i)\tilde{X}_i}{1-\pi_\beta(X_i)} \right\} \tag{4.12}$$

where $\tilde{X}_i = f(X_i)$, an M-dimensional vector-valued measurable function of X_i. Equation (4.12) gives more weights to the covariates with a stronger predictive power of the treatment assignment. Maximum Likelihood (MLE) might not balance the covariates if model is misspecified. Hence, setting $\tilde{X}_i = X_i$ ensures that first moment of each covariate is balanced, even in the presence of model misspecification. Both the first and second moments are balanced when $\tilde{X}_i = (X_i^T X^2 T_i)^T$. The model estimated through CBPS will be just-identified when $L = M$ and over-identified when $M > L$.[18] Imai and Ratkovic (2014) found that just identified models perform better than over-identified ones, because the latter fail to detect model misspecification which leads to a significant bias in the estimates.

CBPS has many advantages over traditional approaches of PS estimations. First, it helps mitigate model misspecification by taking in account parameter values that lead to a robust covariate balance. Second, CBPS incorporates all theoretical properties of the GMM and Empirical Likelihood (EL). Third, matching or weighting can be used without any modifications as it already provides improved estimations of PS. Finally, unlike other conventional methods of PS estimations, CBPS can be extended to non-binary treatments and continuous treatments. Moreover, CBPS simplifies the process of balancing covariates and helps avoiding the iterative process of refitting the logistic PS model (Fong & Imai, 2015; Imai & Ratkovic, 2014, 2015).

Another method dealing with multiple treatment cases is the use of Generalised Boosted Models (GBM) by McCaffrey, Ridgeway, and Morral (2004). However, the high dimension-

[18] Over-identified model is estimated using the Generalised Method of Moments (GMM) approach.

ality of the pre-treatment covariate vector can become a challenge for GBM. Furthermore, an evaluation of various PS methods conducted by Wyss et al. (2014) shows that CBPS provides more robust estimates than GBM in many instances. In their simulation study, they found that CBPS was the best estimation method. The simulation study of Imai and Ratkovic (2014) also shows that CBPS outperforms GBM.

Inverse Probability of Treatment Weights (IPTW)

Estimation of the treatment effect by the Inverse Probability of Treatment Weighting (IPTW) is an extension of the PSM. The IPTW approach tries to mimic a situation akin to random assignment to the treatment. The specification of the treatment model is more important here as compared to the outcome model (Ellis & Brookhart, 2013). The calculation of treatments weights is based on the computed PS. These weights create a pseudo-population in which the treatment assignment is unrelated to the baseline covariates, given that the treatment model is correctly specified.[19] The pseudo-population is formulated in a way that the weight assigned to each element is proportional to the inverse of the element's probability of getting the treatment. The weights for ATE can be estimated as:

$$\omega_{ate} = \frac{D_{i,t} - \pi^d_{i,t}(X_{i,t-1})}{\pi^d_{i,t}(X_{i,t-1})[1 - \pi^d_{i,t}(X_{i,t-1})]} \tag{4.13}$$

As compared to matching, weighting is a more robust approach as exact matching is impossible with estimated propensity scores (Abadie & Imbens, 2011). However, IPTW has a limitation that very large weights can lead to higher variance in the estimated treatment effect. A lower value of π in the treatment group and higher value in the control group result in large weights. A solution to this problem is using stabilised weights. Stabilisation can be achieved by using $\overline{\pi}$ (mean of π) and 1 - $\overline{\pi}$ in the formula used for computing weights. Weights can be trimmed as well if weights after stabilisation are still very large.[20] These weights are used in the estimation of treatment effects either through regression or differences in means (t-test or ANOVA). However, calculated weights are already stabilised when CBPS is used for the PS estimations. There is no need to perform separate weight stabilisation or weight trimming while using CBPS.

[19] CBPS can control the model misspecification.
[20] See Lee, Lessler, and Stuart (2011) for further details

4.3.3 Empirical Design

The principal purport of this study is to evaluate the impact of ABS or CBs issuance on the credit risk-taking behaviour of banks. For this analysis, this study focuses on the change in credit risk instead of absolute level of credit risk as measured in equation 4.5. Here, credit risk taking behaviour is proxied by RWATA or LLP. Hence, the outcome variables are ΔRWATA_{t+1} and ΔLLP_{t+1}. To estimate the impact of the issuance of any particular security, banks are divided in three categories.[21]

1. Non-Issuers: These banks do not issue securitised products or CBs. This group of banks is used as a control group in this study.

2. First Time Securitisers: These are the banks who switched from non-issuer to securitisers by issuing securitised products for the first time during the sample period. This group of banks is treatment group 1 here.

3. First Time Covered Bond Issuers: These are banks who became covered bond issuers after issuing CBs for the first time during the sample period. This group of bank is treatment group 2 here.

Banks are dropped from the sample once they issue ABS or CBs for the first time during the sample period. This is in line with Casu et al. (2013) and Panetta and Pozzolo (2010). Looking at the bank outcomes after the first-time ABS or CB issuance can help disentangle the impact of ABS or CBs issuance. If ABS or CBs are likely to affect, a significant change in the level of credit risk should be visible after the first time issuance of ABS or CBs. Taking into consideration first time securitisers and first time CB issuers is also important as banks may have different frequencies of issuing a security. However, they become comparable when they issue ABS or CBs for the first time.

The selection of the pre-treatment covariates ($X_{i,t-1}$) for the PS model is an important decision in any PSM analysis. According to Wooldridge (2002), the best candidates for the inclusion in $X_{i,t-1}$ are pre-treatment variables and past outcomes. The main motives for the $s_{i,t}$ and $b_{i,t}$ are controlling funding cost, improving liquidity and controlling credit risk (through the risk transfer in case of securitisation and improvement in lending standards in the case of CBs). The issuance of ABS or CBs depends on the types of loans issued by a bank. CBs can

[21] A fourth category, defined in the section 4.3.1, has been dropped here. There were only 9 banks in the full sample who fell under this category and there were only 2 banks who securitised and issued CBs for the first time in the same year.

be issued against a certain type of loans and similar preferences can be observed in the case of securitisation as well. Different loan categories are taken as determinants of any specific choice. Moreover, institutional variables have also been included in X_{it-1} given the fact that propensity scores, mainly, are not meant to predict the treatment but to balance the covariates among the groups. The details of the pre-treatment covariates are provided in Appendix B.

The riskiness embedded in securitisation may not be observable in the short run but it is noticed after some time. Therefore, the analysis is first performed on a 1-year window to measure the impact of ABS and CBs issuance in the short run. The analysis is then extended to a 3-year window to evaluate if there is an impact of ABS or CBs issuance over the long run.

Data

The increase of ABS issuance in the Euro Zone is widespread but heterogeneous across different countries. This study is mainly focused on the major contributors in this market. The countries included in the sample are Austria, France, Germany, Italy, Netherlands, Portugal, and Spain. There are 253 banks in the sample from these 7 countries. 228 banks are active and 25 banks are dissolved during the sample period. However, these dissolved banks are not excluded from the sample to avoid survivourship bias.[22] The complete details of the sample are provided in Appendix C.

The data frequency is yearly covering the time period from 2000 to 2014. Data come from multiple sources. Data for ABS and CBs are collected from AB-Alert, the Bloomberg terminal and European Covered Bond Council (ECBC). Bank level data, comprised of the information from financial statements, are obtained from Bankscope (Bureau van Dijk). All banks with missing information about total assets, equity and net income are excluded. All ratio variables are winsorised at the 1% level to prevent the problem of any potential outliers.[23] Non-performing loans and funding cost for total deposits have been dropped because of several missing values. The variables of return on assets, loans funded by long term funding ratio, equity ratio, loans to banks ratio, other mortgage loans ratio, other loans ratio, loan ratio, other interest ratio, other interest expense, loan income, loan income ratio, other interest ratio, other interest expense ratio, debt to equity ratio and asset growth have been dropped because of collinearity, detected using the Cariance Influence Factor (VIF). The VIF value of all retained

[22] Survivorship bias arise by focusing on the active units only. This bias may lead to positively skewed results. It may result in a rosy picture as failures are ignored.

[23] Winsorisation amounts to limiting extreme values in the data to prevent the possibility that results are driven by outliers. All outliers in the data are set to a specific percentile of data. All the data below the Nth percentile is replaced with the Nth. Winsorisation at 1% level implies that all the data below the 1^{st} percentile is replaced with the 1^{st} percentile data.

variables is lower than 2.[24] The analysis is performed in the free software *R*.

4.4 Results

This section provides results of the econometric analysis performed in the chapter. The analysis starts with some simple statistics and extends to the PSM. Table 1 provides the frequencies of each treatment during the sample period. CBs gained significant attention after the GFC and many new banks made their entry into this market. This is evident from the statistics provided in Table 4.1.

Table 4.1: Year Wise Treatment Frequencies

This table provides the frequencies of first time securitisers and CB issuers in the sample period. It is pertinent to note here that given figures are for first time securitisers and first time CB issuers and not for securitisers or CB Issuers.

Year	Non-Issuers	First Time Securitisers	First Time CB Issuers	Total
2001	126	16	2	144
2002	114	9	4	127
2003	115	7	1	123
2004	114	6	4	124
2005	104	5	8	117
2006	96	3	6	105
2007	93	2	4	99
2008	93	2	2	97
2009	85	2	11	98
2010	83	0	7	90
2011	74	0	12	86
Total	1,097	52	61	1,210

4.4.1 Descriptive Analysis

Table 4.2 provides the descriptive statistics computed for a comparison of banks' situation before and after the GFC. Most of the differences among the variables before and after the GFC are significant, suggesting that banks in Europe are significantly affected by the GFC. Risk taking has declined but LLP has significantly increased after the GFC. Post crisis RWATA is lower as lending usually contracts during and after the crisis. A significant decrease is visible in corporate & commercial loans ratio. The profitability of banks is also significantly reduced after the GFC and growth is adversely effected.

[24] A variable is considered collinear if its VIF value exceeds 4.

Table 4.2: Descriptive Analysis - Before and After GFC

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This table provides the descriptive statistics for all the variables computed before and after the GFC. This tables shows the difference in banks' situation before and after GFC that helps understand the effects of the GFC on banks in Europe.

	Before GFC			After GFC			Difference
	N	Mean	Std. Dev.	Obs	Mean	Std. Dev.	After - Before
Risk Weighted Assets to Total Assets	765	0.5666	0.1974	624	0.5271	0.2138	-0.0394***
Loan Loss Provision	765	0.0316	0.0306	624	0.0489	0.0686	0.0173***
Net Interest Margin	765	0.0168	0.0148	624	0.0150	0.0134	-0.0017**
Return on Assets	765	0.0042	0.0051	624	0.0026	0.0071	-0.0016***
Return on Equity	765	0.0779	0.0752	624	0.0431	0.1478	-0.0348***
Loan Funded by Deposits	765	1.6582	1.7245	624	1.6402	1.4740	-0.0179
Funding Through Deposits	765	0.3957	0.2751	624	0.4273	0.2822	0.0316***
Loans Funded by Short Term Deposits	765	1.1011	1.0736	624	0.9698	0.9033	-0.1312**
Loans Funded by Long Term Deposits	765	0.6130	0.2638	624	0.5953	0.2741	-0.0177
Funding Cost for Total Liabilites	765	0.0343	0.0175	624	0.0276	0.0183	-0.0067***
Liquid Assets Funded by Short Term Funding	765	0.4660	0.5420	624	0.4569	0.5539	-0.0092
Liquid Assets Funded by Long Term Funding	765	0.2588	0.2081	624	0.2643	0.2226	0.0055
Liquidity Ratio	765	0.2480	0.4640	624	0.3050	0.5795	0.0571**
Equity Ratio	765	0.0530	0.0472	624	0.0552	0.0451	0.0022
Capital Adequacy Ratio	765	0.1213	0.2097	624	0.1308	0.1826	0.0095
Loans to Banks Ratio	765	0.2726	0.2458	624	0.2643	0.2693	-0.0083
Residential Mortgage Loans Ratio	765	0.0507	0.1552	624	0.0947	0.1924	0.0441***
Consumer & Retails Loans Ratio	765	0.0069	0.0463	624	0.0080	0.0401	0.0011***
Corporate & Commercial Loans Ratio	765	0.1849	0.3075	624	0.1264	0.2543	-0.0585***
Other Loans Ratio	765	0.4839	0.3691	624	0.4981	0.3702	0.0143
Loans Ratio	765	0.7413	0.1602	624	0.7040	0.1998	-0.0373
Cost / Income	765	0.5545	0.2047	624	0.5703	0.2750	0.0158
Loan Interest Ratio	765	0.5482	0.3973	624	0.5704	0.3692	0.0222
Interest Expense on Deposits Ratio	765	0.2294	0.3638	624	0.2076	0.2976	-0.0218
Debt to Equity Ratio	765	28.8338	24.6881	624	29.4848	31.7425	0.6511
Debt to Assets Ratio	765	0.9470	0.0472	624	0.9448	0.0451	-0.0022
Interest Coverage Ratio	765	1.2521	0.3078	624	1.2146	0.4159	-0.0374
Asset Growth	765	0.1225	0.2286	624	0.0703	0.2115	-0.0522***
Loans Growth	765	0.1183	0.2501	624	0.0592	0.2013	-0.0591***
Dividend Payout	765	0.1491	0.3086	624	0.1417	0.3300	-0.0073
Size	765	9.7737	1.7273	624	10.2835	1.7273	0.5097***
Reputation of Bank	765	0.0430	0.0591	624	0.0455	0.0669	0.0025
Charge-Off Ratio	765	0.0002	0.0015	624	0.0002	0.0033	-0.00008

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

The simple analysis of means across different treatment groups has been performed as after the descriptive analysis for before and after the GFC. The groups of ABS and CB issuers include first-time securitisers and first-time CB issuers respectively. The results are reported in Table 4.3. This table compares the characteristics of banks who issued ABS and CBs at least for once in the sample period with those who never issued any of these two securities.

Table 4.3: Analysis of Means (*Tuckey's HSD*)

This table provides the pairwise comparison of means. The equality of means across various categories of banks, with respect to ABS and CBs issuance, is evaluated by *Tuckey's HSD*. The Null hypothesis tested here is: *Means are equal across various categories of banks*.

	Means			Equality of Means (Tuckey's HSD)		
	None	ABS	CBs	ABS - None	CB - None	CB - ABS
Panel A: Credit Risk						
Risk Weighted Assets to Total Assets	0.5039	0.6127	0.5742	0.1089***	0.0704***	-0.0385**
Loan Loss Provision	0.0398	0.0374	0.0395	-0.0024	-0.0003	0.0021
Panel B: Profitability						
Net Interest Margin	0.0144	0.0217	0.0158	0.0073***	0.0014	-0.0059***
Return on Assets	0.0037	0.007	0.0027	0.0033***	-0.0009***	-0.0043***
Return on Equity	0.0669	0.0906	0.0488	0.0237**	-0.0181***	-0.0418***
Panel C: Funding Structure and Cost						
Loans Funded by Deposits	1.6437	1.7421	1.628	0.0984	-0.0157	-0.1141
Funding Through Deposits	0.3544	0.4949	0.4393	0.1406***	0.0849***	-0.0557**
Loans Funded by Short Term Funding	1.0285	0.9636	1.0801	-0.0649	0.0516	0.1165
Loans Funded by Long Term Funding	0.5587	0.7023	0.6127	0.1436***	0.0540***	-0.0895***
Funding Cost for Total Liabilities	0.0296	0.0338	0.0323	0.0042***	0.0027**	-0.0015
Panel D: Liquidity						
Liquid Assets Funded by Short Term Funding	0.5715	0.306	0.4001	-0.2655***	-0.1714***	0.0941**
Liquid Assets Funded by Long Term Funding	0.3039	0.2281	0.2286	-0.0758***	-0.0753***	0.0006
Liquidity Ratio	0.3251	0.2262	0.2365	-0.0989**	-0.0886***	0.0103
Panel E: Capital						
Equity Ratio	0.0521	0.0752	0.0462	0.0231***	-0.0059	-0.0291
Capital Adequacy Ratio	0.1466	0.1706	0.0905	0.024	-0.0562***	-0.0801***
Panel F: Loan Portfolio						
Loans to Banks	0.3229	0.1957	0.2511	-0.1272	-0.0719	0.0553
Residential Mortgage Loans Ratio	0.0643	0.0787	0.074	0.0144	0.0097	-0.0046
Consumer & Retails Loans Ratio	0.01	0.0109	0.0036	0.0009	-0.0064**	-0.0073**
Corporate & Commercial Loans Ratio	0.1689	0.1267	0.1583	-0.0422	-0.0106	0.0316
Other Loans Ratio	0.4220	0.5813	0.5178	0.1593***	0.0957***	-0.0635**
Loans Ratio	0.7008	0.7525	0.7432	0.0516***	0.0423***	-0.0093
Panel G: Income and Cost Structure						
Cost / Income	0.5266	0.5827	0.5903	0.0562***	0.0637***	0.0076
Loan Interest Ratio	0.4883	0.5702	0.6247	0.0819***	0.1364***	0.0545
Interest Expense on Deposits Ratio	0.2687	0.3584	0.1273	0.0898	-0.1414	-0.2312
Panel H: Solvency						
Debt to Equity Ratio	32.1165	17.0746	29.8131	-15.0419***	-2.3034	12.7384***
Debt to Assets Ratio	0.9473	0.9206	0.9526	-0.0267***	0.0054**	0.0321***
Interest Coverage Ratio	1.2211	1.4146	1.1939	0.1935	-0.0272	-0.2207
Panel I: Other Institutional Characteristics						
Asset Growth	0.1245	0.1598	0.0827	0.0353	-0.0418***	-0.0771***
Loan Growth	0.0898	0.1474	0.0766	0.0577**	-0.0132	-0.0709**
Dividend Payout	0.1953	0.1253	0.1024	-0.0701***	-0.0929***	-0.0229
Size	10.3322	9.3593	9.8711	-0.9729***	-0.4612***	0.5118***
Reputation of Bank	0.044	0.0568	0.0403	0.0129**	-0.0037	-0.0165***
Charge Off Ratio	0.0002	0.0005	0.0001	0.0003	-0.0001	-0.0004

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Panel A of Table 4.3 shows the differences between banks with respect to credit risk variables. The results show significant differences in RWATA. Both ABS and CBs issuers have higher RWATA as compared to non-issuers, suggesting that ABS and CB issuers have a higher inclination towards risk-taking. Although CBs issuers have a lower RWATA as compared to ABS issuers (57.42% versus 61.27% for ABS issuers), the higher value of RWATA for CB issuers in comparison to non-issuers (57.42% versus 50.39% for non-securitisers) does not align with the notion that CBs keep banks from risk taking. These results are in line with previous studies (Bord & Santos, 2015; Carey, 1998). However, absence of significant differences for the second measure of credit risk (i.e. LLP) shows a different situation. These insignificant differences negate the notion that securitising banks issue lower quality loans. These banks may not be considered under-pricing the risk as explained by Kara et al. (2015).

Panel B shows the differences with respect to profitability. Securitising banks are found more profitable among all in terms of net interest margin, return on assets and return on equity. A higher net interest margin shows that securitising banks still earn a higher amount of their income through interest. Moreover, securitising banks also earn through securitisation in the form of service fee by playing the role of originator, thereby increasing their profitability. These results are in line with Jiangli and Pritsker (2008). CBs issuers are found less profitable than all other banks. Unlike securitisation, these banks do not have the benefit of earning extra income as a service fee.

Funding and cost structure is considered in Panel C. ABS and CB issuers are found taking more deposits than non-issuers, and CBs issuers are taking less deposits than ABS issuers. Both ABS and CB issuing banks are funding most of their loans by long term funding, suggesting that European banks may not be facing problems related to a wider maturity mismatch that lead to the liquidity crunch. Moreover, the results also show that ABS and CBs issuers have a higher funding cost on their liabilities, implying that most of the liabilities of these banks are bearing higher cost. It suggests that these banks are perceived riskier by lenders; therefore, they might be charging higher rates for the provided funds.

Differences in liquidity are highlighted in Panel D. Both ABS and CB issuers have lower liquidity compared to the control group, but differences are not significant between CBs and ABS issuers, except for liquid assets funded by short term funding. It suggests that these banks have a better access to external funding and they do not need to maintain a higher on-balance sheet liquidity. However, this high reliance on external funding (through ABS) resulted in a liquidity crunch during the financial crisis when the market for the external funding was frozen (Loutskina, 2011). A similar situation might be observed in the future for banks relying on CBs for their liquidity needs.

Two capital ratios have been considered to evaluate the capitalization of bank: equity ratio and Capital Adequacy Ratio (CAR). A popular view is that securitising banks hold less capital as they use securitisation for capital arbitrage. However, results reported in Panel E negate this understanding. These results suggest that European banks are sufficiently capitalised and they do not use securitisation for the capital arbitrage. These results are in line with Martín-Oliver and Saurina (2007).

Panel F shows the differences in loan portfolios. Both ABS and CB issuers are found issuing higher loans as compared to non-issuers (75.25% and 74.32% respectively versus 70.08% for non-issuers). Despite no significant differences are found between ABS and CB issuers in terms of their loan ratio, ABS issuers tend to hold a greater amount of consumer & retail loans as compared to the CBs issuers. These results are in line with the understanding that CBs issuers curtail their lending to certain sectors, as they cannot use all loans for CB issuance. It is pertinent to note here that, contrary to the US market, residential mortgage loans make a small part of the loan portfolio of European banks. Therefore, European banks might not be facing the shocks from the real estate market experienced in the US.

Panel G provides some important results with respect to the income and cost structure. ABS and CB issuers have higher cost/income ratio and higher loan interest income to total interest income. These results depict that both ABS and CB issuers issued riskier loans with a higher interest rate leading to an increase in their loan interest income ratio. Panel H provides the information about the solvency of banks. ABS issuers have lowest debt to asset ratio among all and CBs issuers have the highest debt to asset ratio. These results again are not in line with the notion that securitising banks are riskier and CB issuers are less risky.

Finally, Panel I provides information about some other important institutional characteristics of the banks. Significant differences are found in loan growth, dividend payout, size and reputation. ABS issuers have the highest loan growth, pointing towards the high issuance of loans because of securitisation.[25] However, this does not confirm that these issued loans are of inferior quality. ABS and CB issuers have the lowest dividend payout and size as well. However, CB issuers have a greater size than ABS issuers. These results are in contradiction with some previous studies (Casu et al., 2011, 2013), and highlight the unique nature of the European market as previous studies are mostly focused on the US market. However, ABS issuers are found more reputed than CB issuers.

[25]This is because of the capital arbitrage explained earlier.

4.4.2 Determinants of Securitisation and Covered Bonds

There are two treatment groups and one control group in this study, as defined below:

$$D_{it} = \begin{cases} 1 & \text{if bank } i \text{ issues ABS at time } t \\ 2 & \text{if bank } i \text{ issues CBs at time } t \\ 0 & \text{otherwise} \end{cases} \tag{4.14}$$

First-time issuers from the first year and last 3 years of the sample period have been dropped because pre and post-issuance information are not observed.[26] For the estimation of propensity scores, I use the multinomial logistic model as this study focuses on multiple treatments. The probabilities of not issuing any of two securities or of issuing one of two securities (ABS or CBs) are given by:

$$Pr(D_{it} = 0|X_{j,it-1}, \beta, \alpha) = \frac{1}{1 + \sum_{d=1}^{2} e^{\alpha_d + \sum_{j=1}^{J} \beta_{dj} X_{j,it-1}}} \tag{4.15}$$

$$Pr(D_{it} = d|X_{j,it-1}, \beta, \alpha) = \frac{e^{\alpha_d + \sum_{j=1}^{J} \beta_{dj} X_{j,it-1}}}{1 + \sum_{d=1}^{2} e^{\alpha_d + \sum_{j=1}^{J} \beta_{dj} X_{j,it-1}}} \tag{4.16}$$

$X_{j,it-1}$ is the j^{th} $[j = 1, ...J]$ indicator used for explaining D_{it} and β_j represents coefficients for the j^{th} covariate. Many previous studies using PSM dichotomised multiple treatments. However, this dichotomisation may result in the loss of information, thereby compromising the insights gained from the analysis. Fong and Imai (2015) show that the original analysis of non-binary treatments provides more insights than dichotomised treatments. They identify two key issues with dichotomisation approach. First, causal quantity of interest is different than the one obtained by taking each treatment value separately. Second, dichotomisation does not provide the balancing of covariates across different values of multiple treatments. The main of advantage of using multinomial model, instead of dichotomizing treatments, is that it allows to simultaneously consider all treatments (Fong & Imai, 2015).

Table 4.4 provides coefficient estimates of the multinomial logit model estimated through just-identified CBPS. To determine the coherence of the coefficients obtained in multinomial

[26] As explained earlier, the analysis has been extended to a 3-year window to estimate the treatment effects in the long run. Therefore, the information about pre-treatment covariates and ABS and CBs issuance has not been included for the last 3 years of the sample period.

model, I estimated marginal effects for the estimated coefficients by using:

$$\frac{\partial p_{ij}}{\partial X_i} = p_{ij}[\beta_{jd} - \sum_{l=1}^{J} \beta_{ld} p_{il}] \tag{4.17}$$

Table 4.4: Multinomial Model - Just Identified CBPS

The estimates are obtained by using the CBPS Package available from *Comprehensive R Archive Network* (CRAN) in the free software *R*.

	ABS	CB
(Intercept)	5.482	3.4871
Risk Weighted Assets to Total Assets$_{(t-1)}$	1.1173	1.1933
Loan Loss Provision$_{(t-1)}$	8.1752	2.6836
Net Interest Margin$_{(t-1)}$	-10.5852	5.8643
Return on Equity$_{(t-1)}$	4.3875**	1.6803
Loans Funded by Deposits$_{(t-1)}$	0.0753	-0.0764
Funding Through Deposits$_{(t-1)}$	-1.1440*	-0.3714
Loans Funded by Short Term Funding$_{(t-1)}$	-0.1745	-0.1425
Funding Cost for Total Liabilities$_{(t-1)}$	-0.14	9.9854
Liquid Assets Funded by Short Term Funding$_{(t-1)}$	-0.023	-0.8505***
Liquid Assets Funded by Long Term Funding$_{(t-1)}$	1.0764	0.6419
Liquidity Ratio$_{(t-1)}$	-0.4560**	-0.4546**
Capital Adequacy Ratio$_{(t-1)}$	1.0287	1.4849*
Residential Mortgage Loans Ratio$_{(t-1)}$	0.0517	0.5411
Consumer & Retails Loans Ratio$_{(t-1)}$	-1.0041	2.4572
Corporate & Commercial Loans Ratio$_{(t-1)}$	0.6175	0.1187
Cost / Income$_{(t-1)}$	1.4661**	1.1704*
Loan Interest Ratio$_{(t-1)}$	-0.3723	-0.5695**
Interest Expense on Deposits Ratio$_{(t-1)}$	0.5685	1.0718***
Debt to Assets Ratio$_{(t-1)}$	-2.2089	-2.3684
Interest Coverage Ratio$_{(t-1)}$	-0.0355	0.0198
Loan Growth$_{(t-1)}$	0.3292	0.5913*
Dividend Payout$_{(t-1)}$	1.1191**	1.1063**
Size$_{(t-1)}$	-0.1704**	-0.2884***
Reputation of Bank$_{(t-1)}$	-5.6020**	-1.3861
Charge Off Ratio$_{(t-1)}$	-114.4044	-114.6406*
Residual Deviance:		824.5
J-Statistic:		24.951
Log-Likelihood:		-412.2308

*p < 0.1; **p < 0.05; ***p < 0.01

Marginal effects were found coherent, in terms of their signs, with all the coefficients reported in Table 4.4, except for Charge-Off Ratio (COR) in case of ABS and Liquid Assets Funded by Short Term Funding (LAFST) in case of CBs. The coefficients of RWATA and

LLP for both ABS and CBs are insignificant, implying that credit risk mitigation may not be a motive of ABS or CB issuance for the European banks. Banks with higher amount of Return on Equity (ROE) have a better chance of issuing ABS. The variables used for liquidity (LAFST and liquidity ratio) show that banks with a lower liquidity at $t-1$ have a higher relative probability of issuing ABS and CBs. Lack of liquidity drives them to issue ABS or CBs. The insignificant coefficient of CAR for ABS shows that banks may not be using securitisation for the capital arbitrage. These results are in line with Cardone-Riportella et al. (2010) and Martín-Oliver and Saurina (2007). However, the coefficient of CAR is significant for CBs, suggesting that banks with higher capital have a higher probability to issue CBs as they need to hold capital against the ring-fenced assets used against CBs.

The Cost/Income ratio is another significant factor having a positive effect on the probability of issuing ABS and CBs. Banks with a higher Cost/Income ratio are more likely to issue these instruments, as they are perceived to control their cost (by reducing the cost of external funding) and increase income.[27] Banks having a higher loan interest ratio are less likely to issue CBs. The loan interest ratio has a significant negative coefficient. A possible interpretation of this can be that a higher interest income is usually earned on loans with higher risk. As CBs are usually issued against loans with lower risk generating a lower interest income, therefore, banks with risky loans are not likely to issue CBs.

Banks with higher interest expense on deposits are more likely to issue CBs as these instruments provide source of alternate funding. Dividend Payout (DPO) also has a significant positive coefficient for both ABS and CBs. DPO results in negative cash flows that can be countered by issuing ABS or CBs. This is in line with the study of Casu et al. (2011) and Ambrose et al. (2005) who found that securitisation is used as a funding tool. Size has a negative impact on ABS and CBs issuance, and reputation has a negative impact on issuing ABS only. These results are in contrast with some previous empirical studies conducted on the US market (Casu et al., 2013). As explained earlier, banks ABS and CBs are mainly issued for liquidity in the European market. Bigger and reputed banks are usually least concerned about liquidity problems, therefore, their tendency to issue ABS and CBs can be lower.

4.4.3 Analysis of Balance

The reliability of any of propensity score method is evaluated by looking at the balance of pre-treatment covariates after propensity score matching/weighting (Caliendo & Kopeinig, 2008;

[27] Apart from the traditional income, securitisation provides another income source to banks in the form of service fee, earned by playing the role of servicer in the securitisation process.

Imai, King, & Stuart, 2008). The balance is usually checked by comparing the distributions of covariates in the control and treatment group through a two-sample t-test (Rosenbaum & Rubin, 1985). However, the two-sample t-test is replaced with *ANOVA* combined with *Tuckey's HSD* when there are more than two groups. To this end, I compare covariates of non-issuers, first-time securitisers and first time CBs issuers before and after weighting. Results of *Tuckey's HSD* are reported in Table 4.5. It is apparent that there are significant differences in many covariates across three groups before weighting, but all the differences become insignificant after weighting. This analysis of balance confirms the balancing of the covariates across three groups, thereby endorsing the quality of weighting.

Table 4.5: Analysis of Balance — Equality of Means ($Tuckey's HSD$)

Note: The results are obtained by using *aov()* function in the free software *R* combined with the post hoc function *Tuckey's HSD(aov)*. The null hypothesis here is: *Means of covariates are equal across the groups*. Null hypothesis is accepted for all covariates after weighting.

	Before Weighting			After Weighting		
	ABS -None	CB-None	CB-ABS	ABS -None	CB -None	CB - ABS
$RWATA_{(t-1)}$	0.0523*	-0.0208	-0.0731*	0.0159	-0.0113	-0.0272
$LLP_{(t-1)}$	0.0046	0.0041	-0.0005	-0.0005	0.0039	0.0044
$NIM_{(t-1)}$	0.0097***	-0.0007	-0.0104***	0.0022	0.0003	-0.002
$ROE_{(t-1)}$	0.0111	-0.0384**	-0.0494**	0.0182	-0.001	-0.0192
$LFD_{(t-1)}$	-0.4333*	-0.1204	0.3129	0.0844	0.1229	0.0386
$FTD_{(t-1)}$	0.1275***	-0.0089	-0.1364***	0.0288	-0.0197	-0.0485
$LFST_{(t-1)}$	-0.1051	0.1955	0.3006	0.0041	0.0969	0.0928
$FCTL_{(t-1)}$	0.0012	-0.0001	-0.0014	0.0023	-0.0022	-0.0045
$LAFST_{(t-1)}$	-0.2134**	0.0372	0.2506*	-0.0657	0.0373	0.1031
$LAFLT_{(t-1)}$	-0.0639**	-0.0147	0.0492	-0.0004	0.0138	0.0142
$LiqR_{(t-1)}$	-0.062	0.0596	0.1215	-0.0278	-0.0454	-0.0176
$CAR_{(t-1)}$	0.0478*	-0.0191	-0.0669*	0.0017	-0.0117	-0.0134
$RMLR_{(t-1)}$	0.0335	0.0302	-0.0034	-0.0048	0.0185	0.0233
$CRLR_{(t-1)}$	0.0073	-0.0011	-0.0084	0.0017	-0.0003	-0.002
$CCLR_{(t-1)}$	-0.0312	-0.0902*	-0.059	-0.0078	-0.0442	-0.0365
$CI_{(t-1)}$	0.0186	-0.0238	-0.0424	0.0084	-0.0178	-0.0262
$LIR_{(t-1)}$	0.015	0.1062	0.0912	0.0198	0.0384	0.0186
$IEDR_{(t-1)}$	0.1720***	-0.0512	-0.2232***	0.0472	-0.0092	-0.0564
$DA_{(t-1)}$	-0.0223***	0.0058	0.0281***	-0.0071	0.003	0.01
$ICR_{(t-1)}$	0.1491***	-0.0398	-0.1889***	0.0629	0.0065	-0.0564
$LG_{(t-1)}$	0.0402*	-0.0549	-0.0951	0.0009	-0.063	-0.064
$DPO_{(t-1)}$	-0.0419	-0.0701*	-0.0282	-0.0287	-0.0411	-0.0124
$SIZE_{(t-1)}$	-0.7056***	0.7026***	1.4082***	0.0005	0.3654	0.3649
$REP_{(t-1)}$	0.0191*	0.0077	-0.0114	0.0051	-0.0013	-0.0062
$COR_{(t-1)}$	0.0005*	0.0005**	0.0001	0.0001	0.0003	0.0003

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

4.4.4 Treatment Effects

The treatment effects have been estimated by Weighted Least Square (WLS), using weights estimated through CBPS Package in *R*.[28] There are two variables used for credit risk taking behaviour of a bank i.e. ΔRWATA and ΔLLP. The treatment effect has been estimated for both the short run $(t+1)$ and the long run $(t+3)$. Results are reported from Tables 4.6 to 4.9.

The results reported in Table 4.6 show that ABS or CBs may not affect the change in risk-weighted assets of a bank in the short run. This suggests that securitisation may not be the driving force behind the increase in risk taking as perceived after the GFC. Similarly, CBs are also not found having a significant impact on risk taking in the short run. I also include RWATA_t in the model. Its coefficient is significant and negative for $\Delta\text{RWATA}_{(t+1)}$. This implies that banks already having a high level of RWATA might have lower tendency to increase their existing level. The negative sign indicates that banks are conscious of their high risk-taking and tend to decrease its level. A similar situation is also shown by the negative and significant coefficients of D/A.

Table 4.6: Weighted Least Square Estimations — Outcome: $\Delta\text{RWATA}_{(t+1)}$

This table provides the results of WLS. Weights are taken from the estimated CBPS model. Estimations include the economic covariates, country dummies, year dummies and interaction terms of the selected economics covariates. These four types of variables have been sequentially added to the model. The outcome variable here is $\Delta\text{RWATA}_{(t+1)}$.

	(1)	**(2)**	**(3)**	**(4)**
Asset-Backed Securities	0.001	−0.0005	−0.002	−0.001
Covered Bonds	−0.001	−0.003	−0.003	−0.005
Risk Weighted Assets to Total Assets	−0.063***	−0.081***	−0.079***	−0.080***
Loan Loss Provision	−0.082	−0.132**	−0.171***	−0.184***
Net Interest Margin	−0.255**	−0.253**	−0.307***	−0.278**
Return on Equity	0.022	0.015	0.004	−0.003
Loans Funded by Deposits	−0.002***	−0.003***	−0.003***	−0.004***
Funding Through Deposits	0.012	0.016	0.014	0.013
Loans Funded by Short Term Funding	−0.002	−0.002	−0.003	−0.004*
Funding Cost for Total Liabilities	−0.412***	−0.333***	−0.413***	−0.367***
Liquid Assets Funded by Short Term Funding	0.006*	0.006	0.004	0.003
Liquid Assets Funded by Long Term Funding	−0.012	−0.021*	−0.021*	−0.018
Liquidity Ratio	0.008**	0.011***	0.011***	0.012***
Capital Adequacy Ratio	−0.049***	−0.045***	−0.046***	−0.046***
Residential Mortgage Loans Ratio	0.024**	0.021*	0.024*	0.027**

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[28]The four models provided here are also tested by simple ordinary least square (OLS). The results of OLS do not provide any significant coefficients for the treatment variables of ABS and CBs. These results are available upon request.

Table 4.6: – continued from previous page

	(1)	(2)	(3)	(4)
Consumer & Retails Loans Ratio	−0.001	−0.036	−0.043	−0.027
Corporate & Commercial Loans Ratio	−0.011*	0.001	0.0001	0.004
Cost / Income	−0.016	−0.016	−0.017	−0.018*
Loan Interest Income Ratio	−0.013**	−0.0002	0.001	−0.004
Interest Expense on Deposits Ratio	0.009	0.007	0.006	0.012
Debt to Assets Ratio	−0.268***	−0.229***	−0.249***	−0.226***
Interest Coverage Ratio	0.011	0.008	0.009	0.011
Loan Growth	−0.003	−0.002	−0.006	−0.007
Dividend Payout	0.005	0.007	0.005	0.003
Size	0.0004	0.002	0.002*	0.002
Reputation	0.053**	0.067**	0.064**	0.060**
Charge-Off Ratio	1.289	0.912	1.006	0.97
Germany		−0.016**	−0.015*	−0.007
Spain		0.007	0.007	0.011
France		−0.029***	−0.030***	−0.028***
Italy		0.001	0.001	0.002
Netherlands		−0.005	−0.004	−0.007
Portugal		−0.016*	−0.014	−0.014
2002			−0.001	−0.001
2003			−0.006	−0.005
2004			0.003	0.006
2005			0.008	0.011
2006			−0.018**	−0.018**
2007			0.002	−0.015
2008			0.0002	−0.019*
2009			0.002	−0.011
2010			−0.007	−0.016
2011			−0.015*	−0.030***
LFD * FC				0.004*
LFST * FC				0.009*
CCLR * FC				−0.013
IEDR * FC				0.0003
LG * FC				0.042**
Constant	0.302***	0.264***	0.288***	0.270***
Observations	1.210	1.210	1.210	1.210
R^2	0.17	0.185	0.197	0.208
Adjusted R^2	0.151	0.162	0.168	0.176
Residual Std. Error	0.003	0.003	0.003	0.003
F Statistic	8.989***	8.079***	6.662***	6.367***

*p < 0.1; **p < 0.05; ***p < 0.01

The liquidity ratio is found to be significant and positively related with $\Delta\text{RWATA}_{(t+1)}$. This suggests that banks with higher liquidity reserves are more inclined towards issuing risky assets. Reputation has a significant and positive relationship with $\Delta\text{RWATA}_{(t+1)}$. This can be ascribed to the competitive pressure, as reputed banks must sustain their reputation in the market. In pursuit of this objective, they might issue more risky assets to get a larger market

share and to keep up with the horde.

Table 4.7: Weighted Least Square Estimations — Outcome: $\Delta\text{RWATA}_{(t+3)}$

This table provides the results of WLS. Weights are taken from the estimated CBPS model. Estimations include the economic covariates, country dummies, year dummies and interaction terms of the selected economics covariates. These four types of variables have been sequentially added to the model. The outcome variable here is $\Delta\text{RWATA}_{(t+3)}$.

	(1)	**(2)**	**(3)**	**(4)**
Asset-Backed Securities	−0.003	−0.004	−0.005	−0.003
Covered Bonds	0.014***	0.013***	0.015***	0.015***
Risk Weighted Asset Ratio	−0.056***	−0.067***	−0.067***	−0.056***
Loan Loss Provision	0.111**	0.038	0.034	0.042
Net Interest Margin	0.838***	0.814***	0.657***	0.624***
Return on Equity	0.044**	0.028	0.02	0.031
Loans Funded by Deposits	0.002**	0.002*	0.002*	0.001
Funding Through Deposits	−0.004	0.005	0.016	0.021**
Loans Funded by Short Term Funding	−0.0002	−0.0002	0.0003	0.0001
Funding Cost for Total Liabilities	0.106	0.250**	0.206	0.316**
Liquid Assets Funded by Short Term Funding	0.003	0.003	0.0003	0.002
Liquid Assets Funded by Long Term Funding	−0.024**	−0.033***	−0.027**	−0.021*
Liquidity Ratio	0.010***	0.011***	0.009**	0.009**
Capital Adequacy Ratio	−0.025	−0.023	−0.018	−0.012
Residential Mortgage Loans Ratio	0.030***	0.029**	0.035***	0.028**
Consumer & Retails Loans Ratio	−0.02	−0.034	−0.029	−0.037
Corporate & Commercial Loans Ratio	−0.006	−0.009	−0.008	−0.012
Cost / Income	−0.034***	−0.035***	−0.042***	−0.039***
Loan Interest Income Ratio	−0.010*	0.006	0.012	0.008
Interest Expense on Deposits Ratio	0.003	−0.013*	−0.017**	0.003
Debt to Assets Ratio	−0.105	−0.056	−0.121*	−0.146**
Interest Coverage Ratio	−0.019**	−0.022***	−0.027***	−0.029***
Loan Growth	−0.006	−0.006	−0.01	−0.007
Dividend Payout	−0.059***	−0.053***	−0.048***	−0.044***
Size	0.001	0.002*	0.003**	0.004***
Reputation	0.118***	0.117***	0.095***	0.070***
Charge-Off Ratio	−4.095***	−3.862***	−4.426***	−4.656***
Germany		−0.027***	−0.035***	−0.031***
Spain		0.004	−0.003	−0.003
France		−0.018**	−0.021***	−0.019**
Italy		0.002	−0.004	−0.0003
Netherlands		−0.008	−0.012	−0.021*
Portugal		0.003	−0.003	−0.013
2002			0.023***	0.022***
2003			0.020***	0.021***
2004			0.007	0.01
2005			0.022***	0.025***
2006			0.006	0.009
2007			−0.008	−0.003

Continued on next page

Table 4.7: – continued from previous page

	(1)	(2)	(3)	(4)
2008			0.002	0.007
2009			−0.009	−0.004
2010			−0.0003	0.01
2011			0.007	0.013
LFD * FC				0.003
LFST * FC				0.002
CCLR * FC				0.007
IEDR * FC				−0.058***
LG * FC				0.011
Constant	0.149**	0.1	0.158**	0.156**
Observations	1.210	1.210	1.210	1.210
R^2	0.255	0.27	0.294	0.314
Adjusted R^2	0.238	0.249	0.268	0.286
Residual Std. Error	0.003	0.003	0.003	0.003
F Statistic	14.984***	13.161***	11.309***	11.090***

*p < 0.1; **p < 0.05; ***p < 0.01

Table 4.7 shows the results of WLS estimations of models accounting for $\Delta\text{RWATA}_{(t+3)}$. The effects of ABS issuance remains unchanged, but interestingly coefficients of CBs are positive and significant for $\Delta\text{RWATA}_{(t+3)}$. A possible explanation is that CBs result in asset encumbrance.[29] These encumbered assets are not usable by banks for any other purpose. Bank cannot respond to a liquidity crunch by acting on asset side of the bank. Therefore, they get more inclined towards the issuance of risky assets (generating higher returns) in the long run, which are not used for CB issuance and whose returns can be used by the bank.

Table 4.8 provides the results for $\Delta\text{LLP}_{(t+1)}$. Banks should cancel the LLP related to securitised loans that should result in a negative relationship between ABS and LLP. However, the coefficient of ABS is positive and significant here, whereas the coefficient of CBs is negative and significant. These results suggest that in the short run securitisers might estimate higher loans losses after securitisation, suggesting that banks might follow a conservative approach after securitisation. These results do not support that securitising banks under-price their risk, especially since securitisation does not lead to an increase in the risk-weighted assets. This shows that banks well understand the riskiness of securitisation and follow a conservative approach after securitisation. The coefficient for CBs is negative and significant, apart from model 1 in Table 4.8. This shows that CB issuing banks estimate fewer losses as they might perceive that the assets they issue are less prone to default. The results also show that bigger banks have higher value of LLP in the short term that points

[29] A higher issuance of covered bonds results into a higher ring-fencing of high-quality assets resulting into high asset encumbrance.

towards the riskiness of bigger banks.

Table 4.8: Weighted Least Square Estimations — Outcome: $\Delta LLP_{(t+1)}$

Note: This table provides the results of WLS. Weights are taken from the estimated CBPS model. Estimations include the economic covariates, country dummies, year dummies and interaction terms of the selected economics covariates. These four types of variables have been sequentially added to the model. The outcome variable here is $\Delta LLP_{(t+1)}$.

	(1)	**(2)**	**(3)**	**(4)**
Asset-Backed Securities	0.022***	0.019***	0.021***	0.020***
Covered Bonds	−0.002	−0.008**	−0.010***	−0.010**
Risk Weighted Asset Ratio	0.024	−0.007	−0.004	−0.015
Loan Loss Provision	−0.217***	−0.314***	−0.275***	−0.262***
Net Interest Margin	−0.133	−0.068	−0.071	−0.026
Return on Equity	0.023	0.003	0.022	0.019
Loans Funded by Deposits	−0.003***	−0.003***	−0.002**	−0.002**
Funding Through Deposits	−0.015	−0.021**	−0.041***	−0.045***
Loans Funded by Short Term Funding	−0.005**	−0.006***	−0.006***	−0.007***
Funding Cost for Total Liabilities	0.184	0.346***	0.129	0.051
Liquid Assets Funded by Short Term Funding	−0.006*	−0.007**	−0.007**	−0.009***
Liquid Assets Funded by Long Term Funding	−0.014	−0.022*	−0.021*	−0.023**
Liquidity Ratio	−0.006	−0.001	−0.004	−0.002
Capital Adequacy Ratio	0.001	0.004	0.009	0.003
Residential Mortgage Loans Ratio	0.01	0.017	−0.003	0.003
Consumer & Retails Loans Ratio	−0.077	−0.146***	−0.103**	−0.093**
Corporate & Commercial Loans Ratio	−0.022***	−0.002	−0.004	−0.007
Cost / Income	0.028***	0.035***	0.032***	0.027***
Loan Interest Income Ratio	0.006	0.035***	0.026***	0.025***
Interest Expense on Deposits Ratio	0.0003	−0.007	0.005	−0.009
Debt to Assets Ratio	−0.149**	−0.052	0.055	0.077
Interest Coverage Ratio	−0.017*	−0.020**	−0.016*	−0.014*
Loan Growth	−0.006	−0.005	0.002	−0.0004
Dividend Payout	−0.006	−0.003	−0.003	−0.006
Size	0.004***	0.005***	0.005***	0.004***
Reputation	−0.056**	−0.058**	−0.045*	−0.028
Charge-Off Ratio	1.985**	0.856	0.178	0.306
Germany		−0.028***	−0.012*	−0.012
Spain		0.043***	0.044***	0.042***
France		−0.043***	−0.037***	−0.036***
Italy		−0.007	−0.004	−0.008
Netherlands		−0.003	−0.004	−0.003
Portugal		−0.014	−0.003	0.004
2002			−0.030***	−0.031***
2003			−0.038***	−0.039***
2004			−0.042***	−0.044***
2005			−0.025***	−0.028***
2006			−0.032***	−0.036***
2007			−0.034***	−0.058***
2008			0.006	−0.013

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Table 4.8: – continued from previous page

	(1)	(2)	(3)	(4)
2009			−0.027***	−0.048***
2010			−0.028***	−0.051***
2011			0.030***	0.012
LFD * FC				−0.0005
LFST * FC				0.009**
CCLR * FC				0.013
IEDR * FC				0.052***
LG * FC				−0.036**
Constant	0.131*	0.039	−0.032	−0.03
Observations	1.210	1.210	1.210	1.210
R^2	0.126	0.187	0.28	0.301
Adjusted R^2	0.106	0.164	0.254	0.272
Residual Std. Error	0.003	0.003	0.002	0.002
F Statistic	6.325***	8.204***	10.552***	10.417***

*p < 0.1; **p < 0.05; ***p < 0.01

The positive effects of ABS on ΔLLP seems to be reversed in the long run as shown in Table 4.9. The coefficient of ABS is significant and negative. This implies that in the long run banks might realise that securitisation does not lead to higher credit losses. As no impact of securitisation on RWATA has been seen (both in the short and long run), therefore, this negative relationship in the long run cannot be taken as under-pricing of risk. This impact might be reversed because of the retention of first loss pieces and implicit recourse provided by securitising banks. This implicit recourse prevents the distortion of monitoring incentive and improves the monitoring and screening mechanism (Chiesa, 2008).

Table 4.9: Weighted Least Square Estimations — Outcome: $\Delta\text{LLP}_{(t+3)}$

Note: This table provides the results of WLS. Weights are taken from the estimated CBPS model. Estimations include the economic covariates, country dummies, year dummies and interaction terms of the selected economics covariates. These four types of variables have been sequentially added to the model. The outcome variable here is $\Delta\text{LLP}_{(t+3)}$.

	(1)	(2)	(3)	(4)
Asset-Backed Securities	−0.028***	−0.029***	−0.021***	−0.021***
Covered Bonds	0.006	0.008	0.004	0.002
Risk Weighted Asset Ratio	0.025	0.03	0.043**	0.041**
Loan Loss Provision	−0.118*	−0.140*	−0.156**	−0.172**
Net Interest Margin	0.008	−0.008	−0.099	−0.116
Return on Equity	0.041	0.041	0.029	0.013
Loans Funded by Deposits	0.009***	0.009***	0.006***	0.006***
Funding Through Deposits	0.014	0.021	0.047***	0.043***
Loans Funded by Short Term Funding	−0.002	−0.002	0.0003	−0.0001

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Table 4.9: – continued from previous page

	(1)	(2)	(3)	(4)
Funding Cost for Total Liabilities	−0.234	−0.185	0.143	0.199
Liquid Assets Funded by Short Term Funding	0.006	0.006	0.008*	0.009**
Liquid Assets Funded by Long Term Funding	0.016	0.013	0.031**	0.026*
Liquidity Ratio	0.003	0.0005	−0.011***	−0.012***
Capital Adequacy Ratio	0.005	0.002	0.024	0.025
Residential Mortgage Loans Ratio	0.024	0.022	0.023	0.025*
Consumer & Retails Loans Ratio	0.116**	0.142**	0.013	0.034
Corporate & Commercial Loans Ratio	0.008	0.0005	0.025**	0.040***
Cost / Income	−0.046***	−0.053***	−0.051***	−0.049***
Loan Interest Income Ratio	−0.007	−0.003	−0.002	−0.001
Interest Expense on Deposits Ratio	0.013*	0.01	0.024***	0.023**
Debt to Assets Ratio	−0.194**	−0.214**	−0.212**	−0.184**
Interest Coverage Ratio	−0.009	−0.013	−0.028***	−0.025**
Loan Growth	−0.021**	−0.021**	−0.027***	−0.028***
Dividend Payout	−0.013**	−0.011**	−0.005	−0.008
Size	−0.002	−0.003**	−0.007***	−0.007***
Reputation	0.078**	0.060*	0.02	0.033
Charge-Off Ratio	−0.701	−0.533	0.549	0.582
Germany		−0.005	0.001	−0.003
Spain		−0.002	0.006	0.008
France		0.018*	0.038***	0.030***
Italy		0.007	0.023**	0.021**
Netherlands		−0.001	0.008	0.008
Portugal		−0.01	−0.014	−0.013
2002			0.055***	0.057***
2003			0.038***	0.039***
2004			0.055***	0.056***
2005			0.103***	0.103***
2006			0.098***	0.100***
2007			0.046***	0.067***
2008			0.054***	0.068***
2009			0.075***	0.096***
2010			0.062***	0.077***
2011			0.072***	0.085***
LFD * FC				−0.004
LFST * FC				−0.001
CCLR * FC				−0.063***
IEDR * FC				0.002
LG * FC				0.015
Constant	0.210**	0.245***	0.199**	0.169*
Observations	1.210	1.210	1.210	1.210
R^2	0.124	0.131	0.275	0.289
Adjusted R^2	0.104	0.106	0.249	0.259
Residual Std. Error	0.003	0.003	0.003	0.003
F-Statistic	6.194***	5.361***	10.305***	9.825***

*p < 0.1; **p < 0.05; ***p < 0.01

Table 4.9 also shows that coefficients of CBs also change in the long run. It becomes

positive but insignificant here. Table 4.7 shows that CB issuing banks issue more risky assets in the long run. However, corresponding changes in LLP do not take place (LLP should increase after the increase in RWATA). These results imply that although CBs issuing banks tend to issue more risky assets in the long run, they might continue to believe that their assets are less riskier. This belief might lead to the under-estimation of the risk in the long run.

4.4.5 Robustness Check

A number of robustness checks have been performed to confirm the previous findings. Results are reported in Appendix D. First, the analysis is performed by using the weighted *ANOVA* and *Tuckey's HSD*. Weights are obtained from the CBPS estimations and plugged into *ANOVA*. The grouping variable in this analysis is the treatment variable, as defined in the main analysis. The mean differences are computed across various categories with respect to the given treatment. These results support the results obtained with WLS. There are no significant differences in ΔRWATA. Significant differences are found in ΔLLP in the short run but these differences disappear in the long run. Results are reported in Tables D.1 and D.2.

Second, treatment effects are estimated using the GBM proposed by McCaffrey et al. (2004).[30] GBM is a non-parametric method used to estimate the PS. The resulting weights have been used to estimate the outcome model. Results are reported from Tables D.3 to D.6.[31] These results also suggest that securitisation might not affect the credit risk taking behaviour but CBs issuance might have a positive impact on the credit risk taking behaviour in the long run.

Finally, the analysis is performed by dichotomising the treatments, following some of the previous studies (Kam & Palmer, 2008; Wood, Gooch, & Donnell, 2015). Results remain qualitatively similar as obtained in the CBPS analysis with the multinomial model. Results are also not found sensitive to estimates of ATE or ATT. Moreover, treatment effects remain qualitatively similar after changing the setting of CBPS from just-identified to over-identified.

4.5 Discussion and Conclusion

This study investigates the impact of securitisation and CBs on the credit risk taking behaviour of European banks in the short and the long run. The comparison of securitising banks with CBs issuing banks and the use of the CBPS methodology are distinguishing features of this

[30]The analysis was performed using 'twang' package in *R*.
[31]Results are reported for the outcome model only.

study. Some studies suggest that CBs issuing banks might have a lower inclination towards credit risk taking because of the so-called 'skin in the game', whereas securitising banks tend to issue greater amount of risky assets because of the opposite reasons. Even though securitising banks maintain enough 'skin in the game' in one form or the other, regulators emphasise upon on-balance sheet risk retention. The results reported in this study suggest that the absence of 'skin in the game' in the form of on-balance sheet retention may not be the driving factor for the banks to take the elevated risk. The results of multinomial model did not confirm that securitisation is used for the credit risk transfer by European banks. These results are in line with Cardone-Riportella et al. (2010) and Martín-Oliver and Saurina (2007). However, this study evaluates the ex post effects of securitisation on credit risk taking behaviour of banks, particularly focusing on the role of on-balance sheet risk retention. The use of CBs for comparison with ABS serve this purpose, as CBs are on balance sheet instruments.

The results, although, suggest a positive relationship of securitisation with LLP in the short run but this relationship becomes negative in the long run. The negative relation of securitisation with LLP in the long run cannot be translated as risk under-pricing when securitisation does not lead to an increase in risk taking. These empirical findings are attributed to the retention of the first loss position in the securitisation transaction to generate a signal about the quality of securitised products, as explained by Gorton and Pennacchi (1995), and implicit/explicit recourse provided to investors (Casu et al., 2011; W. Chen, Liu, & Ryan, 2008; Cheng, Dhaliwal, & Neamtiu, 2011).

There can be many other plausible explanations for the decline in underwriting standards in the loan origination process during the pre-crisis years. The optimism of lenders and investors because of the housing prices boom is a potential reason for the underestimation of the risk (Hellwig, 2008). According to Ruckes (2004), the changes in lending standards are linked with the economic cycle. At the time of an economic boom, banks screen their borrowers superficially. Banks tend to lend aggressively because of the intensifying competition and they want to save the resources spent on screening (Cerasi & Rochet, 2014). A bad shock in the economy may cause the failure of many projects. The widespread losses during the GFC are consistent with the belief about an unusual bad shock as explained by Chiesa (2008)

The deterioration of lending standards and lax screening can also be linked with compensation practices. The compensation in the banking system is often linked to the volume of loan origination and sale of high fee products (Segoviano et al., 2015). As a result, the suitability of products sold to borrowers is often ignored. This results in predatory lending that may deteriorate the performance of banks' loan portfolios (Surti, 2010). Therefore, lax

lending standards cannot necessarily be linked with the issuance of a specific security, but can be caused by increased competition during the economic boom and compensation practices.

Summarising, this study suggests that European banks use securitisation and CBs as funding tools and not as a risk management tool. The changes in the risk level of banks can be attributed to the increase in liquidity but securitisation is not the only tool used to generate liquidity. CBs and many other similar instruments also serve the purpose of increasing bank liquidity. When banks are flushed with liquidity, they might get the motivation to take higher risk because of excess capacity. However, admonishing securitisation solely may not be the right approach.

The regulations enacted after the GFC which emphasise on risk retention seem unnecessary. Risk retention may not help reduce the risk level as shown by the positive impact of CBs in the long run. Hence, CB is not the silver bullet it is flaunted. Regulators should identify the loopholes and distortions in the process of securitisation. These distortions should be controlled, instead of penalising the entire process and the securitisation market.

Chapter 5

Effects of Securitisation and Covered Bonds on Bank Stability

Banking is a very treacherous business because you don't realize it is risky until it is too late. It is like calm waters that deliver huge storms.

Nassim Nicholas Taleb

5.1 Introduction

Funding sources of banks were put under extensive scrutiny after the Global Financial Crisis (GFC). Banks were not able to use securitisation to raise funds, as investors lost confidence in this market. Banks heavily involved in securitisation faced liquidity and funding pressures during the GFC that turned into a full blown systemic crisis (Blommestein et al., 2011). Amid this situation, a shift from the preference for returns to the preference for safety was observed among investors. Covered Bond (CB) — a close counterpart of Asset-Backed Securities (ABS) and a *dual recourse* instrument[1] — emerged as an important alternative to ABS to meet investors' preference for safety and to provide funding to banks.[2] Regulators also provided

[1]Covered bonds holders enjoy a dual recourse. First, they have a preferential claim over the assets held in the cover pool backing the issuance of these bonds. This pool remains unaffected in post-bankruptcy situation. Second, CB holders have an unsecured claim on bankruptcy state of issuers if the cover pool does not generate enough cash or its value drops. In such a condition CB holders are treated *pari passu* with unsecured creditors of the credit institution and in some cases they also get a preferential treatment over unsecured creditors.

[2]The market for covered bonds remained resilient to the shocks of GFC in 2007/8 when ABS market faced a decline of 51%. However, the CB market grew by 5% in 2009. CBs outperformed government bonds as well during the sovereign debt crisis in Europe in 2009.

a favourable treatment to CBs that incited the interest in this class of instruments.[3] On the contrary, securitisation faces stringent regulations after the GFC. Many market participants are concerned about this discriminatory treatment of ABS vs CBs, as they think it may result in a distortion of the funding base diversification of Financial Institutions (FIs). It may have severe implications for the individual bank stability and the financial stability.[4] This study contributes to the literature by examining how the focus on a particular instrument affects the bank stability.

The proponents of CBs do not support the concerns about the increasing use of CBs, mainly for two reasons. First, issuance of CBs can never go beyond a certain limit because of their on-balance sheet nature and strict requirements for the cover pool. The on-balance sheet nature of CBs requires banks to hold capital against these bonds. The issuance of new capital can be difficult, hence CB issuance beyond the limits of current capital can be challenging for a FI. The strict requirements for the cover pool make it harder for the banks to have enough assets to be used against CB issuance. Second, the strict requirements for the cover pool and its continuous monitoring by the regulatory authorities make it harder for risks to materialize to the extent of threatening the bank stability (ECBC, 2013).

Most of previous studies have been evaluating ABS and CBs (hereinafter collectively referred as Securities and Bonds (SB)) from the investors' perspective — especially CBs (e.g. Buchholst, Gyntelberg, & Sangill, 2010; Prokopczuk, Siewert, & Vonhoff, 2013). The regulations devised after the GFC are also meant to provide greater protection to investors. However, the effects of CBs on issuing institutions are not yet explored. This study evaluates the issuance of ABS and CBs from issuers' perspective. Despite having important differences and being affected differently during the GFC, both instruments share many similarities.

This study helps in developing an understanding of the effects of ABS and CB issuance on bank stability that is assessed in terms of systemic risk, and is measured with the SRISK and the Long-Run Marginal Expected Shortfall (LRMES) of Brownlees and Engle (2015). The literature is widely divided between the "securitisation-fragility" and the "securitisation-stability" views. This study presents a different view, denoted "securitisation-scalability". CBs are also analysed along similar lines. The study argues that the relationship of ABS or

[3]See Regulation (EU) No. 575/2013 (Capital Requirement Regulations (CRR)) Articles 129(5), 395, 400(1a), 416(2a), 509(3a), Credit Rating Agency (CRA) Regulation (EU) No. 462/2013 Article 8c (1), Liquidity Coverage Ratio (LCR) and the securitisation frameworks of Basel III and the haircut regulations of European Central Bank (ECB).

[4]CBs may generate greater amount of risk for issuers as they must actively manage the underlying pool of collaterals. Therefore, from a financial stability perspective, CBs might not prove to be risk-free and an over-reliance on them may result in risk concentration in the banking system.

CBs with bank stability is not totally distinct; rather, it varies with the issuance level of these instruments. Their respective volumes determine their implications on bank stability. The potential benefits of these funding sources might not be accessible either beyond or below a certain level. For these reasons, it is often argued that limits should be imposed on the issuance of these instruments. Such regulations have been imposed on CBs in some countries like Australia and Belgium.[5] The empirical analysis performed here is likely to provide a foundation to evaluate these regulations.

The data is taken from 46 ABS and CB issuing banks from Europe for the time period between 2000-2014. The study performs an extended analysis of both instruments, aiming at evaluating the link between the scale of the issuance of these two instruments and the systemic risk of banks. The analysis focuses on the variation in the relationship of ABS and CBs with bank stability with respect to changes in the issuance scale of these two instruments. The study also tests the impact of size on the relationship between SB issuance and the systemic risk of banks. The analysis in the study starts with a quadratic model and extends to a partially linear setting that uses Generalised Additive Model (GAM).

The empirical results show the presence of a U-Shaped relationship between ABS and systemic risk. The issuance of ABS initially helps banks in controlling their systemic risk, but the impact is reversed when a bank keeps on issuing ABS. This is what is dubbed by some as 'securitisation beyond limits', and by this study as "securitisation-scalability". For covered bonds, initial estimations showed that this relationship is of the opposite nature. Small issuance of CBs leads to an increase in systemic risk, but large scale issuance of CBs decreases systemic risk. I attribute this relationship to bank size and jumbo CBs. Further investigation revealed that smaller banks face a higher systemic risk when they issue CBs but larger banks remain unaffected. These findings do not support the proposal of putting a uniform limit on CB issuance. Such a proposal should be linked with the bank's size. Moreover, the regulators should think about devising a framework that can control the limitless issuance of ABS.

The remainder of the chapter is organized as follows. Section 5.2 provides some insights from the previous literature. There are very few studies on CBs, but ABS have been studied widely. Section 5.3 explains the research methodology. This section provides economic intuitions and then an empirical model to test the suggested relationship and explains the characteristics of the data including the sample details and descriptive statistics. Section 5.4 provides the empirical results of the model tested herein. This section provides the results of estimations of a quadratic model and generalized additive specification of a partially linear

[5]The issuance of CBs should not exceed the limit of 8% of total assets of a bank.

model. Section 5.5 discusses the results and draws conclusions.

5.2 Related Literature

ABS and CBs function similarly at a basic level and are expected to provide analogous economic benefits. A bank originates some assets and then places them in a ring-fenced pool. The characteristics of the issued securities and ring-fencing practices may vary from country to country and among security types, but underlying assets serve as collateral for the issued securities (ABS or CBs). Banks can use ABS and CBs to finance their asset originations or to obtain loans from the ECB (in the case of Europe) or from the Federal Reserve Bank's discount window (in the case of USA) by pledging them as a security (Pinedo & Tanenbaum, 2010).

Like securitisation, issuers use a specific collateral pool to make payments to CB holders.[6] However, this pool differs from the one used against ABS in three respects. First, this pool is maintained on the issuer's balance sheet. Unlike securitisation, the collateral does not leave the balance sheet of the issuer. Therefore, issuers are perceived to have a strong 'skin in the game' and monitoring incentives are hard to get distorted as alleged in securitisation. However, these ring-fenced assets are separated from other assets.[7] The issuing institution explicitly indicates that the assets in question are held against CBs.[8] This segregation of assets provides protection to CB holders against the event of issuer's bankruptcy. Second, the assets in this cover pool comply with strict requirements provided by concerned regulators and this pool is continuously monitored by the authorities. The third difference is the dynamic nature of the collateral. If the value of cover pool declines at some point, the issuer must replace non-performing assets with performing ones. In this way, the cover pool is dynamically replenished.

ABS are blamed for passing the 'hot potato' of bad loans to investors, but CBs are considered highly secured instruments for investors.[9] However, the rising trend of CB issuance

[6]These collaterals are ring-fenced on the bank's balance sheet. Banks cannot use these assets in case of any liquidity needs. Therefore, some economists argue that CB issuance may result in the encumbrance of high-quality assets. See Avesani et al. (2007), Rosen (2008) and ECB (2008) for more details about ring-fencing and asset encumbrance.

[7]See Schwarcz (2013a) for further details of ring-fencing.

[8]The assets held against the issuance of covered bonds are recorded in a cover register, in the case of issuance of famous German covered bonds, *Pfandbrief*. An independent monitor of the cover pool ensures that it is well maintained all the time and that the necessary adjustments are made timely and recorded in the cover register. A certificate is also issued by this monitor before the issuance of covered bonds. This monitor plays an important role in maintaining the confidence of the investors and the stability of the CB market.

[9]CBs are considered safe and secure as compared to ABS because of the on-balance sheet nature of underlying

gave rise to many concerns among various market participants, mainly regulators and issuers. It is believed that CBs might prove laborious to issuers — mainly because of their *on-balance sheet* nature,[10] *over-collateralisation* requirements,[11] *dynamic* nature of cover pool[12] and *dual recourse* of investors. All these provisions provide a high level of protection to investors who can be less concerned till the issuer remains *solvent*.[13] The issuer maintains all risks, including the prepayment risk, as the underlying assets stay on the balance sheet. Therefore, a higher focus on CBs may shift risk from investors to the banking system (Anand et al., 2012; Surti, 2010)

Regulators also provide a favourable treatment to CBs that further incited the interest in this class of instruments.[14] On the contrary, securitisation faces stringent regulations after the GFC. The stringent regulations for ABS are based on their collapse during the GFC and favourable treatment of CBs is based on their consistent performance.[15] Many market participants are concerned about this discriminatory treatment of ABS vs CBs, as they think it may result in a distortion of the funding base diversification of FIs. It may have severe implications for the individual bank stability and the financial stability. CBs may generate greater amount of risk for the issuers, as they must actively manage the underlying pool of collaterals. Therefore, from a financial stability perspective, CBs might not prove to be

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assets.

[10]CBs are the direct obligation of the issuing credit institution. These CBs are recorded on the liability side of the institution.

[11]The value of underlying cover pool must exceed the amount of outstanding covered bonds. This is called over-collateralisation. This requirement is meant to protect investors against any moribund collaterals.

[12]The issuers are required to replace deteriorating assets in the cover pool with other high-quality performing assets to meet the notional value of the cover pool and fulfil the over-collateralisation requirements.

[13]CBs can only be issued against high-quality assets meeting a certain criterion of Loan-to-Value (LTV) Ratio. According to the Capital Requirement Directive (CRD), a bank must calculate the LTV for each loan individually. Therefore, a loan with higher LTV cannot be part of the cover pool because of the fact that other loans in the cover pool have lower LTV. Notwithstanding, there can be loans with higher LTV in a cover pool because of other factors, e.g. property devaluation. These loans are replaced by other loans with lower LTV. This is highly protective for investors but onerous for issuers. During economic downturns, a small increase in the LTV may create several challenges for the issuing institutions when LTV is close to the ceiling. The LTV requirements currently vary from country to country but each CB issuance must comply with a certain LTV threshold (ECB, 2008).

[14]See Regulation (EU) No. 575/2013 (CRR) Articles 129(5), 395, 400(1a), 416(2a), 509(3a), CRA Regulation (EU) No. 462/2013 Article 8c (1), LCR and the securitisation frameworks of Basel III and the haircut regulations of ECB.

[15]The favourable regulatory treatment to covered bonds is provided on the basis of historical default statistics as explained by EBA (2014). Despite the fact that there is no incident of CB default and none of CBs holders has been asked to take the losses (not during the GFC and sovereign debt crisis in Europe, not in Greece and not even in Cyprus), there are some CB issuing institutions that faced a bail-out after the GFC. Conversely, the fact that an instrument did not default in the past does not make it immune from risk and the probability of default in future cannot be ruled out completely.

risk-free and an over-reliance on them may result in risk concentration in the banking system. Hence, the problems in CBs may not be very different from securitisation for issuers. For these reasons, CBs may not deserve a favourable regulatory treatment, as such treatment is likely to create an over-reliance on CBs.

5.2.1 Securitisation and Bank Stability

Banks acting as financial intermediaries used to reduce their risk by diversifying their portfolio and taking funds from depositors. Securitisation provided another way to reduce their risk by shedding the credit risk from the balance sheets and obtaining funds from alternative funding sources. Securitisation was considered a blessing for banks and the economy for its benefits provided through various channels. It was considered helping banks reduce the liquidity pressure (Loutskina, 2011; Martín-Oliver & Saurina, 2007), increasing the credit supply to the economy by reducing the effect of financial conditions of the lender (Loutskina & Strahan, 2009), creating new profit opportunities for banks (Cebenoyan & Strahan, 2004; Jiangli & Pritsker, 2008), and transferring risk from banks to a wider investor base (Wagner, 2007). However, along with these benefits the risk was also lurking in all these channels.

The positive view about securitisation was largely tarnished during the GFC, as ABS were blamed for passing the 'hot potato' of bad loans to investors (Dell'Ariccia, Igan, & Laeven, 2012; Parlour & Plantin, 2008).[16] However, this 'hot potato' hypothesis is not convincing for many reasons. Originating banks were actively involved in the securitisation process even after the transfer of assets. They were playing the role of the servicer till the maturity of the ABS sponsored by them and providing credit enhancement in various forms. Moreover, securitisation vehicles were not able to finance themselves at the time of the crisis and sponsoring banks were forced to provide credit lines to these vehicles. In some instances, the assets were also moved back to the balance sheets of banks.[17] Hence, the risk that was initially considered transferred, started flowing back because of the excessive reliance on securitisation and the market disruption.

According to agency theory implications, banks can sell loans of better quality to generate a positive signal to investors and to get a better rating for the issued securities (Diamond, 1984; Greenbaum & Thakor, 1987; Instefjord, 2005). This situation results in retention of riskier loans on the bank's balance sheet. According to Gorton and Pennacchi (1995), loan

[16]This problem has been widely discussed in literature and referred as the 'moral hazard' problem.

[17]See Gorton and Souleles (2007) for a detailed description of Special Purpose Vehicles (SPVs) and their role in securitisation.

sale is only possible when banks retain the riskier loans on their balance sheets. This situation makes the loan portfolio of a bank more vulnerable. The lower tranches were also retained by the originators for getting a higher rating. Empirical evidence has been provided by Krahnen and Wilde (2008) that retention of riskier loans in securitisation resulted in the increase of systemic risk.

Close to the crisis period, banks were issuing ABS with implicit or explicit guarantees. These guarantees were issued to enhance the confidence of investors in the ABS market. However, the issuance of these guarantees implied that the risk was not being transferred. This type of securitisation was being performed by banks to get benefits of liquidity and regulatory capital arbitrage.[18] Banks were obliged to honour these guarantees when underlying collaterals were not able to pay back to investors. This resulted in an erosion of bank capital when the risk associated with these guarantees materialized on a large-scale during the GFC. Therefore, the risk transfer objective was not being achieved by this form of securitisation.[19]

An important implication of securitisation for bank stability can be derived from the linkage between leverage and liquidity.[20] Generally, banks tend to maintain a high level of leverage to increase their return on equity, but this leverage is pro-cyclical in nature. It grows during the economic boom and declines when the economy is in a bust. Securitisation provided banks with an extra source of liquidity and they were flushed with liquidity because of it (Acharya & Naqvi, 2012; Wagner, 2007). Banks started facing growth on the assets side of their balance sheet that led to an increase in the leverage. On the liability side, they were taking more short-term loans[21] and on the asset side they were looking for more borrowers (Adrian & Shin, 2010).[22] Banks started issuing loans to subprime borrowers in the absence of prime borrowers, resulting in lax screening and lower lending standards, as supported by empirical evidence provided by many previous studies (Demiroglu & James, 2012; Kara et al., 2015, 2016; Keys et al., 2009, 2010, 2012). This situation threatened the stability of the

[18]Regulatory capital arbitrage is a purposeful attempt of a bank to avoid the constraints of capital requirements. Banks are required to hold capital against their risky assets. The capital of a bank is freed up as a result of loan transfers from the balance sheet as banks are not supposed to hold loans against transferred loans. This is known as regulatory capital arbitrage and it has been a major driver of securitisation for banks. However, banks were creating other assets against this capital so it did not remain free. The issuance of CBs does not provide this benefit. Therefore, this type of securitisation is different from CBs in this respect.

[19]Asset-Backed Commercial Paper (ABCP) is one form of this type of securitisation. See Acharya et al. (2013) for further information about ABCP.

[20]The leverage of a bank measures how many assets are financed by debt. The leverage shows the debt loan of the company. The higher leverage ratio shows a high level of debt in the balance sheet.

[21]Securities issued against the loans were largely used by the banks as collaterals in the repo market.

[22]Banks were having excess lending capacity because of the large liquidity gluts created by securitisation. They were looking for the extra borrowers to use this surplus capacity.

banking system by creating imbalances in the credit markets, thereby increasing the fragility of the financial system (Altunbas, Gambacorta, & Marques-Ibanez, 2009).

Nijskens and Wagner (2011) find that some banks may become less risky because of the securitisation but they make a significant contribution to the systematic risk in the financial system through risk transfer. Banks may shed their individual idiosyncratic risk related to their lending activities but the increase in risk takes place in a systemic manner for two main reasons.[23] First, banks also take exposures in securities issued by other banks. Second, banks also buy Credit Default Swap (CDS)[24] to protect themselves against undiversified positions and simultaneously sell CDS in the market to other banks.[25] This ends up in a greater correlation between them. Hence, the risk is amplified in the financial system because of this high correlation resulting from the race for risk transfer (Acharya & Yorulmazer, 2007).

The question about the impact of securitisation on the risk profile of the bank is extremely important as securitisation affects risk sharing between banks and the market. Securitisation may motivate banks to take more risks — thereby putting the stability on stake (Gibson, Habib, & Ziegler, 2014). The effect of securitisation on financial stability is an important question for regulators, who have introduced strict regulations for securitisation focusing on a higher level of transparency in this process and eliminating the opaqueness as mentioned by Buchanan (2014). However, the risk should not be viewed in an isolated manner for each institution. Regulators are required to keep in consideration the contagion effect. They should pay more attention to the contribution of a bank to the overall risk in the market and not to the individual bank risk only (Battaglia & Gallo, 2013).

5.2.2 Covered Bonds and Bank Stability

Covered bonds are highly secured bonds for investors. Investors only face credit risk in the event of bankruptcy of the issuer — otherwise bondholders enjoy multiple layers of protection including over-collateralisation and dynamic cover pool.[26] However, the issuance of covered bonds may result in a higher risk retention on the issuer's balance sheet. The dual recourse of

[23]This issue has also been raised by Adrian and Shin (2009). Banks were purchasing each other's securities with borrowed money. Hence, the risk was not dispersed evenly in the economy but concentrated in the banking system.

[24]A CDS is a form of financial derivative that is designed to transfer credit risk between two parties. The buyer of the swap makes the payments to sellers until the maturity of contract and the seller agrees to compensate for the loss of interest and principal payments in case of default.

[25]This is known as the synthetic form of securitisation.

[26]Investors become prone to credit risk if the issuer faces a bankruptcy and the cover pool is not sufficient to meet the claims of CB holders. Their claims are shifted to other assets of the bank and it may not be satisfied completely in this situation.

bondholders can amplify the risk for the issuing institutions and for other creditors of the bank as well. A higher issuance of covered bonds may lead to higher ring-fencing of high-quality assets, resulting into high asset encumbrance.[27] According to Arif and Anees (2012), a bank should respond to a liquidity crisis by acting on the asset side of the balance sheet in the first place, but a bank with a large ring-fenced pool, because of the CB issuance, may not be able to respond as the assets in the cover pool are not touchable.

The securities issued under the process of traditional securitisation have a pass-through nature. The proceeds generated from the underlying assets are transferred to the holders of securities. However, CBs do not have this pass-through nature. Investors do not incur any losses in case of a prepayment event against the assets held in the cover pool, as such assets are replaced by the issuer and the value of the cover pool remains intact. There is always a risk of prepayment in mortgage loans and this risk is borne by CB issuers. CB issuers are accordingly exposed to thinner margins as losses may not be covered by prepayment penalties (Poulain, 2003). These prepayment penalties vary from country to country and losses for the lenders may rise significantly in the countries like France where these penalties are capped by the regulations.[28]

Angelos (2015) has expressed his concern that covered bonds may increase market instability in times of stress because of the factors explained below:

1. Banks play the role of market-makers that may generate risk concentration during the downturn. If many investors decide to sell their CBs, banks (in their role of market-makers) must be able to respond and be ready to buy them. This situation results in a higher risk retention on the balance sheet of banks, forcing them to sell on. However, if other banks in the economy face a similar situation and the economy is in a downturn, this scenario might have severe implications for financial stability.

2. CBs may have a higher funding liquidity because of the lower haircuts so banks can obtain more funds from the repo market by using CBs as collateral as compared to ABS. However, the CB market is relatively less liquid because of their long-term maturity. Therefore, under strained market conditions, a large part of the liquidity buffer available in the form of CBs may become unusable.

[27] According to definition of asset encumbrance provided by European Banking Authority (EBA), "An asset shall be treated as encumbered if it has been pledged or if it is subject to any form of arrangement to secure, collateralise or credit enhance any transaction from which it cannot be freely with-drawn".

[28] The maximum prepayment penalty charged by a French bank should be 6-month interest on prepaid amount that should not exceed 3% of outstanding balance.

3. The asset encumbrance does not allow the banks to deleverage when required by a financial crisis. This may result in restricting a banks' activities and raising concerns among the investors about its financial health.

The over-collateralisation feature of CBs requires issuers to maintain the notional value of the cover pool under all circumstances. This requirement makes the cover pool dynamic instead of static. A large-scale issuance of CBs is likely to result in a higher risk retention on the issuer's balance sheet, as it must continuously replace the deteriorating assets with other high-quality assets. The over-collateralisation and dynamic cover pool features of the covered bonds surely provide a safeguard to the bondholders against moribund collateral. However, this over-collateralisation has, at least, two important implications for the issuing institutions.

First, large-scale issuance of CBs results in bigger cover pools, thereby leaving fewer assets for the unsecured creditors of a bank. The unsecured creditors are left with lower-quality assets only. This situation gives rise to fear among the unsecured creditors that they must face losses if the bank goes bust. As a result, the unsecured creditors will demand higher risk premia as a compensation for the elevated risk being taken by them (Haldane, 2012). Hence, unsecured financing will become more expensive for the banks and it may freeze as well during the market downturns. Thus, the over-reliance on CBs may result in funding problems and escalation in funding cost if the CB issuance ability is hampered by the market or bank conditions.

Second, a larger pool of ring-fenced assets might result in more jittery creditors. The unsecured creditors may receive a noisy signal about the returns generated by the assets other than those ring-fenced and they may either decide to run or roll over on the basis of this signal (Gai, 2013). A panic may arise if many unsecured creditors decide to run. A financial crisis is triggered in a situation when there is a bank run by unsecured creditors. The case of Northern Rock stands as a testament to this proposition.[29] Hence, the large issuance of CBs may result in creation of systemic risk for the issuing institutions. This situation stipulates that CB issuance should remain within the limits that such a signal is not generated in the market.

The ring-fencing of high quality assets also increases the risk for taxpayers as they ulti-

[29]Northern Rock was a UK mortgage bank that failed in 2007. It was the fifth biggest mortgage lender and the first bank run since 1866 in the UK. The panic about the bank was created among the depositors by an announcement made by the Bank of England about providing liquidity support to the stricken Northern Rock. Long queues of depositors were seen outside the bank demanding their money after this very announcement and the bank was not able to sustain this situation. Although Northern Rock was following a risky business model, the reaction of depositors was based on the noisy signal generated by the Bank of England. See Shin (2009b) for further details.

mately provide a guarantee to deposits (Nomura, 2015) through Deposit Guarantee Schemes (DGS).[30] DGS were introduced to provide a sense of safety to unsecured depositors of banks. The ring-fencing of high-quality assets because of a CB issuance leaves fewer and low quality assets for unsecured creditors including depositors. Therefore, the risk increases for taxpayers who ultimately sponsor these DGS. However, not all depositors are eligible for DGS.[31] Therefore, some of the depositors may remain jittery even in the presence of DGS.

A proposed way to deal with the problems explained above is to impose limits on the level of asset encumbrance. However, ECBC (2013) opposes imposing such limits and emphasises the importance of increasing the transparency in CB issuance. Anand et al. (2012) argue about imposing variable limits on asset encumbrance depending on the economic conditions. However, this proposal is difficult to implement in practice for two main reasons. First, economic downturns are hard to predict. Second, CBs are issued with defined maturity and assets already encumbered cannot be reversed during an economic downturn.

5.2.3 Systemic Risk

The financial innovation has intensified the challenge of measuring systemic risk as traditional measures may not provide much insight in this world of financial derivatives (Brunnermeier, Gorton, & Krishnamurthy, 2012). IMF (2009) has defined systemic risk as a "disruption to the flow of financial services that is (i) caused by an impairment of all or parts of the financial system, and (ii) has the potential to have serious negative consequences for the real economy". Schwarcz (2008) has provided a working definition of systemic risk. According to him, systemic risk is "the risk that (i) an economic shock such as a market or institutional failure triggers (through a panic or otherwise) either (X) the failure of a chain of markets or institutions or (Y) a chain of significant losses to financial institutions, (ii) resulting in increases in the cost of capital or decreases in its availability, often evidenced by substantial financial-market price volatility". Brunnermeier et al. (2012) define systemic risk as "the risk that shocks affect the financial sector and trigger an endogenous adverse feedback significantly amplifying these shocks, causing further deterioration in the financial sector, and leading to significant output losses".

According to these definitions, the risk lurking in a financial system may create system-wide problems and affect the flow of funds as a result of a shock. The failure of one institution

[30]The failure of a bank may put pressure on taxpayers as they have to sponsor these Deposit Insurance Schemes.

[31]See Article 5 of EU Directive 2014/49/EU for eligibility of deposits under DGS.

may trigger systemic risk in other institutions that can lead to a full blown systemic crisis because of the contagion effect. The complex interconnectedness of FIs has amplified this problem. These webs of connections were identified more than two decades ago by Minsky (1977). Banks have been widely using Value at Risk (VaR) to measure their risk before the GFC. However, this measure does not account for the tail risk and the contribution of a financial institution to systemic risk. Therefore, this measure was widely criticised.

Many of the previous studies are focusing on the firm's stock Beta, by following Capital Asset Pricing Model (CAPM), as a measure of systemic risk (Battaglia et al., 2014; Nijskens & Wagner, 2011; Uhde & Michalak, 2010; Wu, Yang, & Hong, 2011). However, Beta has several limitations as a measure of systemic risk and it is often criticised for its lack of informativeness. This criticism stems from two main reasons. First, the value of Beta depends on the time period of data used in its calculation. There are different opinions about this time period used for the Beta calculation. Second, Beta is based on historical co-variance of a stock with the market. Therefore, it does not have a forward-looking capability. There are several other measures proposed after the GFC. Many of the studies argued about using Conditional Value at Risk (CoVaR) as a measure of systemic risk, as it provides a better insight about the tail risk (Drakos & Kouretas, 2015; López-Espinosa, Moreno, Rubia, & Valderrama, 2012). Other important measures of systemic risk include the Expected Shortfall (ES) and the Marginal Expected Shortfall (MES) of Acharya, Pedersen, Philippon, and Richardson (2010), as well as SRISK of Brownlees and Engle (2012).

Beta and MES are based on market information. These market-based measures have been criticised for the lack of expediency and informativeness (Zhang, Vallascas, Keasey, & Cai, 2015). The regulatory surcharge should not be based on these measures, as it may create wrong incentives for the banks (Löffler & Raupach, 2013). Brunnermeier et al. (2012) recommend that a risk measure should integrate the market and firm-specific information along with the macroeconomic state of the economy. Most of the previous measures of systemic risk do not follow such an integrated approach. The market measure does not account for the firm-specific information. Moreover, a good measure of systemic risk should not measure the stand-alone risk, rather it should reflect the market conditions as well.

Another important issue that obtained attention in the literature after the GFC was the identification of Systemically Important Financial Institutions (SIFIs) and their contribution to the systemic risk of the financial system (Banulescu & Dumitrescu, 2015; Bongini, Nieri, & Pelagatti, 2015; Fiordelisi, Galloppo, & Ricci, 2014). SIFIs are usually large financial institutions that are highly leveraged and have a larger market share. These institutions provide a major contribution to the aggregate risk of the financial system. The risk measures

focusing on a single type of information (e.g. the Beta) do not account for SIFIs. These measures are only useful in evaluating the stand-alone risk as they do not account for the contribution of an institution in the aggregate risk. Hence, a good risk measure should account for the contribution of an FI to the aggregate risk, along with the stand-alone risk.

In light of the definitions of systemic risk provided by Schwarcz (2008), IMF (2009) and Brunnermeier et al. (2012) along with criticism on previous risk measures given above, a good measure of the systemic risk should account for market shocks and feedback of these shocks, potential losses to the FIs, changes in cost of capital or its availability, SIFIs, and the contribution of financial institutions to the aggregate risk. Keeping in view these considerations, this study uses LRMES and SRISK as measures of systemic risk.

Long Run Marginal Expected Shortfall (LRMES)

MES has been very popular among many researchers as a measure of systemic risk after the GFC (see e.g. Battaglia & Gallo, 2013; Derbali & Hallara, 2016; Weiß, Neumann, & Bostandzic, 2014; Yun & Moon, 2014). Acharya et al. (2010) believe that MES is a better measure of systemic risk as it provides information about the contribution of each FI to the systemic risk of the financial system. They argue that MES should also be used as a basis for the regulatory surcharge to penalise FIs for their contribution to systemic risk. However, Acharya, Engle, and Richardson (2012) express the concern that MES is a short-run indicator. They propose the use of LRMES to overcome this problem. LRMES is a more forward looking measure of systemic risk as compared to MES. LRMES is measured as:

$$LRMES_{i,t} = E_t(R_{i,t+1:t+h} | R_{m,t+1:t+h} < C) \tag{5.1}$$

where $R_{i,t+1:t+h}$ is the multi-period return of bank i between period $t+1$ and $t+h$ and $R_{m,t+1:t+h} < C$ is the systemic event. The systemic event is defined as a decline in market return below a threshold C (that depicts a crisis situation) over a time horizon h. The crisis is referred to the most pessimistic situation in the market. Following Acharya et al. (2012), a crisis scenario is considered when the index falls by 40% over the next six months. More specifically, C = 40% and h = 180 days.

According to Acharya et al. (2012), a crisis is a situation of under-capitalisation of the financial system. A second definition of crisis, apart from the 40% criterion mentioned above, is given by:

$$E < \frac{k}{1-k} D \tag{5.2}$$

where E is the sum of all equities in the financial system, D is the cumulative book value of debt and and k is the prudential capital fraction that is taken as 8%. $LRMES$ would be evaluated on the basis of scenarios satisfying equation (5.2). The $GARCH - DCC$ method has been recommended by Brownlees and Engle (2015) to measure LRMES.[32]

SRISK

SRISK gained significant attention in the recent literature (Beccalli, Anolli, & Borello, 2015; Iqbal, Strobl, & Vähämaa, 2015; Laeven, Ratnovski, & Tong, 2015). *SRISK* follows a hybrid approach, as it combines the market-based (sophisticated) and accounting-based (simple) measures. SRISK, as shown in equation (5.3), can be defined as a function of bank size, its leverage and the expected devaluation in equity conditional on the market decline.

Zhang et al. (2015) proved empirically that *SRISK* has a better ability to generate an early warning about the vulnerability of a FI to a systemic shock. They argue that ex-ante regulatory interventions should be devised for FIs to forestall the erosion of their capital adequacy. Pankoke (2014) in his study on comparing different risk measures also found that *SRISK* is the most suitable measure among all modern alternatives to signal the possible contribution of a financial institution to systemic risk.

The *SRISK* calculation is akin to stress testing in banking but it is done with the simple publicly available information.[33] It is defined as:

$$SRISK_{i,t} = W_{i,t}[kLVG_{it} - (1-k)LRMES_{i,t} - 1] \tag{5.3}$$

where $W_{i,t}$ is the market value of equity, k is the prudential capital fraction, $LVG_{i,t}$ is quasi-leverage (that shows the level of capitalisation)[34] and $LRMES_{i,t}$ is the Long-Run Marginal Expected Shortfall (that shows the expected loss in capital conditional on the market decline).[35] LVG is measured as:

$$LVG_{i,t} = \frac{D_{i,t} + W_{i,t}}{W_{i,t}} \tag{5.4}$$

[32]See Brownlees and Engle (2015) for measurement of LRMES

[33]Stress testing is an analysis performed by banks to evaluate if the FI has enough capital to withstand the impact of adverse market conditions during an economic downturn. These tests are either performed by banks as part of their risk management framework or by regulatory authorities. The purpose of these tests is to identify weak spots so that remedial measures are taken by banks or regulators at an early stage.

[34]A high value of LVG shows that a bank is thinly capitalised. A bank may face adverse consequences when it has a high leverage because there is not enough capital to absorb the shocks.

[35]$LRMES$ shows the volatility of the bank capital with respect to the market. A high value of $LRMES$ shows that the bank capital is highly sensitive to market shocks.

where $D_{i,t}$ is the book value of debt and $W_{i,t}$ is the market value of equity. The financial distress of the system with N banks operating in it can be measured as:

$$SRISK_t = \sum_{i=1}^{N} (SRISK_{i,t}) + \tag{5.5}$$

The plus sign in equation (5.5) shows that only positive values are taken to calculate the aggregate risk of the system that shows the amount of the capital required to bail-out the financial system conditional on the systemic shock. Brownlees and Engle (2015) recommend using a percentage version of *SRISK* to get a greater insight, as it shows how much contribution is made by each bank to the aggregate risk. Acharya et al. (2012) have also argued that systemic risk should not be described in terms of an institution's failure, but of its overall contribution to system-wide risk. The percentage version of *SRISK* captures this contribution, measured as:

$$SRISK\%_{i,t} = \frac{SRISK_{i,t}}{SRISK_t} \; if \; SRISK_{i,t} > 0 \tag{5.6}$$

SRISK shows the EURO amount of the capital that a bank needs if the market index falls by 40% over a period of six months. This measure captures the sensitivity of a bank to a decline in the market index. In what follows, I divide the *SRISK* by total assets of the bank. This normalization ensures that the results are not driven by the size of the bank, as large banks usually have a higher *SRISK*. Following Langfield and Pagano (2015), I label this variable as Systemic Risk Intensity (SRI).

5.3 Research Methodology

This section explains the economic intuitions behind the relationship of ABS and CBs with bank stability. These economic intuitions provide the foundation for the empirical model being tested. This section also provides the details of empirical methods being followed.

5.3.1 Economic Intuitions

Many researchers have previously argued that securitising banks follow an aggressive business strategy that stems from their response to the benefits received from securitisation.[36] The stability implications are derived from the response of the bank that is visible in the form of an

[36]See Battaglia et al. (2014); Brunnermeier and Sannikov (2014); Carbó-Valverde et al. (2012); Wagner (2007)

increase in lending, a reduction in monitoring and screening efforts, and a higher leverage.[37] Therefore, the relationship of securitisation with the risk transfer is not linear as it depends on how much risk a bank has taken because of the securitisation. The risk level of newly created assets determines the overall risk profile of the bank. The higher liquidity injections through the securitisation process is a potential factor for the creation of new assets that might be riskier.

Banks use ABS and CBs to mitigate their funding and liquidity risks. These two risks are always systemic in nature. ABS and CBs might help banks meet these objectives, resulting in a reduction in the systemic risk at an initial stage. When banks increase their reliance on one instrument, that is where the rubber hits the road. In the case of ABS, it results in three main effects. First, banks reliance on traditional liquid assets is decreased and securitisation becomes a mean of liquidity generation for the banks. A concentration risk is created here.[38] Second, a liquidity glut is created, or in the words of Acharya and Naqvi (2012), banks are flushed with liquidity. The surplus liquidity must be used somewhere. Hence, the growth in the assets side directs the banks to look for some new borrowers.[39] When all prime borrowers in the market already have loans, further lending is made to the subprime borrowers. The issuance of large-scale leveraged loans may also take place. The third problem is linked with the second one. Banks heavily involved in the ABS issuance are not able to cut back the size of their balance sheets during a crisis. This is because of the generation of long-term assets that are financed by short-term liabilities. Hence, the systemic risk of FIs increases as a result of new risks taken by them.[40] Hence, the problem might not be securitisation per se, but the out of bounds securitisation gives rise to the problems for banks.

In the case of CB issuance, the over-reliance also results in at least three problems. The first problem is analogous to securitisation. A bank issuing CBs may face difficulties in deleveraging when it is needed, because of the high asset encumbrance. The assets that are already ring-fenced cannot be liquidated when a bank needs to deleverage. Second, a higher asset encumbrance resulting from CB issuance makes the balance sheet of a bank vulnerable to the market and economic shocks — mainly for two reasons: (i) high-quality assets are used for CB issuance and the remaining assets are riskier ones, (ii) the dynamic nature of

[37] See Acharya and Naqvi (2012); Adrian and Shin (2010); Cebenoyan and Strahan (2004); Jiangli and Pritsker (2008); Keys et al. (2012); Morrison (2005); Wagner (2007)

[38] Traditional liquidity is replaced by the loan liquidity. Banks decrease their reliance on traditional sources of liquidity. Holdings of liquid assets on the balance sheets are significantly reduced, as banks are able to generate liquidity when required through securitisation. These banks face liquidity problems when their securitisation ability is hampered, due to the collapse of the securitisation market. See Loutskina (2011) for further details.

[39] See Schwarcz (2013c); Shin (2009b)

[40] See Shin (2009a)

the cover pool requires banks to replenish it in case of any deterioration. The susceptibility of unencumbered assets is increased at the time of economic shock. This situation leads to two potential effects, i.e. (i) the price of unsecured funding might increase because of the susceptibility of unencumbered assets, and (ii) unsecured creditors might receive a signal at the time of an economic downturn that unencumbered assets will also be encumbered. They might decide to roll-over or run on the basis of this signal. Third, CBs serve as a source of cheap funding for banks, but the issuance of large covered bonds ties up a larger share of capital that may increase the funding cost.[41] Hence, it is possible to argue that the potential costs of CB issuance may outweigh its benefits for the issuer after a certain stage. However, the European Covered Bond Council (ECBC) calls it a myth that an increase in CB issuance might lead to a higher asset encumbrance that may destabilise the system (ECBC, 2013).

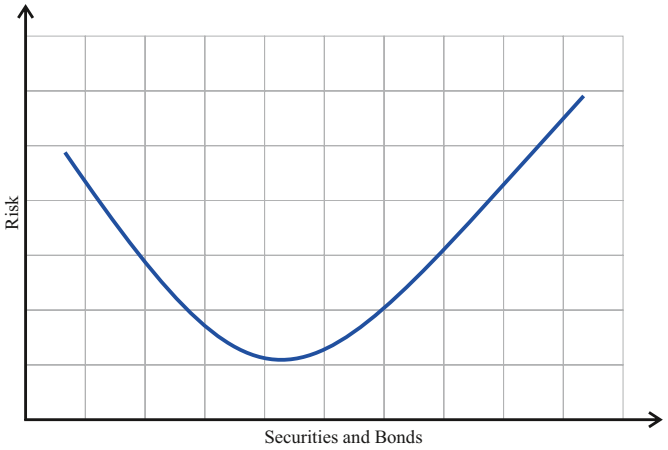
The above discussion explicates that the problem starts when a bank increases its focus on one particular funding source. Pacces (2010) is also of the view that the problem in securitisation is that it went beyond what financial markets could stand. I call it "scalability" aspect. The relationship of SB with bank stability may not be a distinct one rather determined by their respective volumes. The problem does not lie in the securitisation or CBs per se but in the way these instruments are used (Chiesa, 2008, 2015). The complexity and multiple forms of securitisation also added to the problem. However, this study does not focus on multiple forms of securitisation. I assume that a large amount of securitisation represents multiple forms of securitisation as well.

Based on the above discussion, it is argued here that the issuance of SB might initially help the banks reduce their systemic risk by providing multiple benefits related to liquidity, funding cost and risk transfer. However, the nature of the relationship may change when the bank increases its focus on one particular instrument. An increase in systemic risk beyond this level can be observable because of the problems explained above (aggressive business strategy, problems in deleveraging, high asset encumbrance etc.). A hypothetical graph of the relationship between SB and systemic risk is provided in Figure 5.1.

The above discussion implies that the function expressing the relationship between SB and systemic risk is a non-linear one. The slope of the function varies with the volume of the SB issuance. This study empirically investigates this relationship. The analysis will help evaluate the proposals for limits on the issuance of SB.

[41]The assets backing the issuance of CBs are retained on the balance sheet of the issuing bank. Therefore, banks are required to hold capital against them.

Figure 5.1: Hypothetical Relationship of Risk and SB



5.3.2 Data and Sample

Most of the previous studies related to securitisation have focused on the US market, whereas Europe is still under-investigated. Moreover, the CBs market is well-established in most European countries, whereas it is in its nascent stages in the US.[42] The CBs market has deep roots in Europe, especially in Germany, France and Spain, and operates under well-defined regulations.[43] For these reasons, this study targets the European market. The focus is on the largest players in both markets i.e. Austria, France, Germany, Ireland, Italy, Netherlands, Portugal, and Spain.

The data come from multiple sources. A total of 1,041 securitisation transactions from the ABS-Alert and 2,588 transactions of CBs are identified from the Bloomberg terminal and ECBC Label. Data for SB are available with respect to the date of the transaction, and have been transformed into yearly data. Bank level data, comprising of the information from the financial statements, are obtained from Bankscope (Bureau van Dijk). Data regarding *SRISK*, LRMES and market volatility is collected from V-lab maintained by the NY Stern Business School.[44] The data frequency is yearly, covering the time period from 2000 to 2014. Non-

[42]The first covered bond issuance in US took place in 2007. Although many banks started issuing CBs afterwards, the market is still not well-established. Investors in the US market are still hesitant to invest in CBs because of the lack of a well-defined regulatory framework for CBs and the little knowledge about this market.

[43]CBs are mainly subject to prudential treatment by two sets of European directives i.e. Undertakings for Collective Investment in Transferable Securities (UCITS) and CRD.

[44]The values of ABS and *SRISK* were in US $ and converted to Euro by using the currency converter available at Statistical Data Warehouse of the ECB. http://sdw.ecb.europa.eu/curConverter.do

listed banks and banks who never issued ABS or CBs during the sample period are excluded. Banks with missing information about total assets, loans, and net income are also excluded. These adjustment provide with a final sample of 46 banks.

Table 5.1: Description of Variables

Variable	Description	Sources
SRISK%	This is the percentage version fo *SRISK*. The calculation is provided above.	V-Lab
SRI	Systemic Risk Intensity: *SRISK* normalized by the total assets of the bank.	V-Lab
LRMES	Long Run Marginal Expected Short Fall	V-Lab
Z-Score	Modified Version of Altman Z-Score	Bankscope, Author's Calculation
ABSTA	Asset Backed Securities issued during the time t divided by Total Assets at the beginning of time t	AB-Alert, Bankscope, Author's Calculation
SABSTA	Square of ABSTA	Author's Calculation
CBTA	Covered Bonds issued during the time t divided by Total Assets at the beginning of time t	Blooberg, ECBC, Bankscope, Author's Calculation
SCBTA	Square of CBTA	Author's Calculation
Vol	Volatility of the Bank	V-Lab
T1Cap	Tier 1 Capital Ratio	Bankscope
DTA	Deposits to Total Assets	Bankscope
LTA	Loans to Total Assets	Bankscope
NIM	Net Interest Margin	Bankscope
Size	Natural Log of Total Assets	Bankscope, Author's Calculation
GFC	Global Financial Crisis Dummy, equal to 1 if year is between 2007-2009, 0 otherwise	-
SDC	Sovereign Debt Crisis Dummy, equal to 1 if year is after 2009, 0 otherwise	-

The study uses three measures of systemic risk, i.e. *SRISK*%, SRI (*SRISK* divided by total assets), and LRMES. To add robustness to the obtained results, the study also uses an accounting measure of bank soundness, i.e. the Z-Score as defined in section 5.4.4. The securitisation and CB issuance are captured by ratios of ABS (ABS Ratio) or CBs (CB Ratio) issued during time t to total assets at the beginning of time t. A set of control variables is being considered to reduce the omitted-variable bias, consisting of bank-specific attributes. The most important bank-specific variable affecting systemic risk is size of the bank. A number of previous studies have found that larger banks make a greater contribution to systemic risk (Battaglia & Gallo, 2013; Wu et al., 2011). Moreover, these banks are also likely to issue more SB. Therefore, taking size as a control variable helps disentangle the size effect from the SB effect. Other bank-specific control variables include Volatility (Vol) of a bank's stock, Tier 1 Capital Ratio (T1Cap) to account for the available capital buffer, Deposit to Total Assets (DTA), Loans to Total Assets (LTA), the ratio of Liquid Assets to Total Assets (LIQ), the Net

Interest Margin (NIM) to capture profitability of the bank, and the Cost to Income (C/I) ratio. Details on these variables are provided in Table 5.1. All ratio variables are winsorised at the 1% level to prevent the problem of any potential outliers.[45]

Table 5.2 reports descriptive statistics. The table shows the different trends of ABS and CBs issuance and different risk levels in European countries. The maximum values of *SRISK%* show that most of the contribution in the overall systemic risk is made by certain big banks. The variance of ABS issuance is quite large but CB issuance does not exceed a certain level (9% in most cases). This is in line with arguments stated earlier that the inherent limitations of CBs do not let banks issue CBs beyond a certain threshold. The table also shows that Italy, Netherlands and Spain are market leaders in the European securitisation market. Despite a high issuance of ABS, their banks are not found riskier than banks operating in other jurisdictions. Austrian banks have minimal presence in the securitisation market, but these banks are not found less risky than others. Banks in Portugal, Italy, Spain and Germany have a high presence in the CBs market.[46] The correlation matrix is reported in Table 5.3.

5.3.3 Empirical Model

This study is aimed at identifying the relationship between SB issuance and bank stability. Unlike previous studies, it focuses on two instruments i.e. ABS and CBs, and investigates the possible non-linearity in the target relationship between SB. The idea is that the relationship may vary with the level of involvement of a bank in the issuance of these instruments. I start the analysis with the estimation of a simple polynomial (quadratic) model, given by:

$$y_{i,t+1} = \alpha + \beta_1 z_{i,t} + \beta_2 z_{i,t}^2 + \sum \gamma X_{i,t} + \varepsilon_{i,t} \tag{5.7}$$

where $y_{i,t}$ denotes the measure of systemic risk for bank i at time $t+1$, z_{it} is the ratio of ABS (ABS Ratio) or CBs (CB Ratio) during time t to total assets at the beginning of time t, z_{it}^2 is the square of this ratio and $X_{i,t}$ represents a $K \times 1$ vector of additional controls. ε_{it} is the error term and α, β_1, β_2, and γ are the parameters to be estimated.

[45] Winsorisation amounts to limiting extreme values in the data to prevent the possibility that results are driven by outliers. All outliers in the data are set to a specific percentile of data. All the data below the Nth percentile are replaced with it. Winsorisation at 1% level implies that all the data below the 1^{st} percentile are replaced with the 1^{st} percentile.

[46] Germany has been the market leader in CB market of Europe. However, during the last few years, the issuance of CBs has significantly decreased in Germany. Many other banks who were not issuing CBs previously, started issuing these bonds after the GFC e.g. banks in Italy.

Table 5.2: Descriptive Statistics

Note: This table reports the results of country-wise descriptive statistics. The table reports mean, standard deviation, minimum and maximum values for all variables.

Country	Stats	SRISK%	SRI	LRMES	Z-Score	ABSTA	CBTA	Vol.	T1.Cap	DTA	LTA	Liq.	NIM	C/I	Size
Austria	Mean	32.924	3.588	34.391	35.738	0.182	0.694	37.781	9.031	46.629	58.619	18.506	2.137	66.257	10.158
	SD	36.150	2.838	21.684	35.229	.	0.773	33.017	2.190	16.329	10.518	8.623	0.754	38.256	1.384
	Min.	0.090	-5.549	5.150	-0.924	0.182	0.030	10.800	5.840	6.595	24.621	4.986	0.691	43.939	8.124
	Max.	100.000	7.478	68.280	137.503	0.182	2.982	173.700	14.080	65.135	73.765	37.070	4.306	346.189	12.273
Germany	Mean	12.701	9.406	40.970	20.266	0.398	1.762	38.888	8.819	31.888	51.463	17.799	0.855	68.737	11.479
	SD	16.877	8.533	15.743	22.589	0.573	2.603	27.799	3.334	19.171	16.087	10.285	0.331	24.190	1.564
	Min.	0.480	2.837	9.170	-2.070	0.017	0.002	13.300	4.400	2.777	11.620	2.960	0.176	29.318	9.141
	Max.	56.960	41.073	67.480	102.562	2.654	9.014	225.200	18.500	76.743	80.473	83.118	1.666	161.326	14.625
Spain	Mean	17.661	1.352	38.717	18.565	4.828	1.890	42.368	9.139	48.739	67.635	11.062	2.110	52.009	11.352
	SD	22.523	4.521	13.223	12.513	4.067	1.784	41.451	1.740	11.750	13.197	8.095	0.730	15.823	1.540
	Min.	0.230	-10.895	1.960	-4.245	0.008	0.166	14.900	6.320	25.181	12.150	0.292	0.962	27.238	4.450
	Max.	89.870	8.531	62.380	55.007	17.443	9.067	447.400	13.000	93.538	93.721	70.794	4.199	173.485	14.054
France	Mean	17.212	9.173	46.054	14.836	0.145	0.696	41.364	10.222	34.607	27.901	49.240	0.626	73.635	12.891
	SD	11.140	5.488	18.716	10.758	0.091	1.084	19.935	1.895	32.429	10.023	25.339	0.437	59.497	1.344
	Min.	1.310	-0.440	-32.610	-1.486	0.033	0.087	17.200	7.600	0.098	13.030	0.195	-0.492	12.267	10.533
	Max.	34.280	24.337	70.380	43.560	0.351	4.698	106.700	13.700	127.102	47.370	110.371	1.485	392.857	14.547
Italy	Mean	10.099	3.914	41.728	18.865	10.139	2.490	34.457	14.176	36.539	57.460	21.013	1.830	64.571	10.438
	SD	15.109	7.296	15.305	19.044	17.851	1.810	16.169	11.502	17.804	18.436	14.289	1.196	24.203	1.593
	Min.	0.080	-23.753	-2.740	-0.220	0.047	0.106	10.200	5.390	0.087	3.993	0.141	-4.297	12.537	7.036
	Max.	70.480	30.196	74.640	95.930	82.552	6.629	98.300	67.640	73.357	92.327	57.341	5.065	223.864	13.860
Netherlands	Mean	32.242	69.816	45.765	10.741	6.678	1.231	29.890	12.300	47.726	54.072	15.813	1.801	72.470	10.624
	SD	33.548	122.192	14.515	7.146	8.797	0.971	14.741	5.272	26.425	25.727	12.206	1.124	23.235	1.396
	Min.	0.190	-229.032	16.600	0.451	0.032	0.087	16.100	6.800	5.891	-12.896	1.206	0.305	40.632	8.545
	Max.	98.010	370.197	70.510	31.636	37.301	3.391	84.100	32.490	95.327	87.366	52.473	6.261	156.964	13.235
Portugal	Mean	32.500	2.652	29.451	10.569	3.111	2.745	33.050	8.417	47.409	66.625	13.181	1.840	64.163	10.424
	SD	20.827	3.595	14.052	5.899	2.643	2.000	23.073	2.403	7.188	8.072	5.218	0.437	12.561	0.943
	Min.	4.170	-6.724	8.940	-0.319	0.511	0.566	12.100	5.450	29.966	48.264	6.009	0.872	27.435	8.325
	Max.	100.000	7.513	65.930	21.383	10.150	6.338	142.400	16.200	65.778	83.344	31.870	2.765	117.593	11.498
Total	Mean	18.710	10.306	39.889	18.885	5.453	1.768	37.194	11.201	41.050	56.437	19.592	1.659	64.389	10.944
	SD	23.480	40.968	16.307	20.028	10.542	1.925	27.814	7.752	20.068	19.160	15.908	1.003	28.947	1.646
	Min.	0.080	-229.032	-32.610	-4.245	0.008	0.002	10.200	4.400	0.087	-12.896	0.141	-4.297	12.267	4.450
	Max.	100.000	370.197	74.640	137.503	82.552	9.067	447.400	67.640	127.102	93.721	110.371	6.261	392.857	14.625

Table 5.3: Correlation Matrix

Note: This table present the pairwise correlations among the systemic risk measures, ABS, CBs and control variables.

	SRISK%	SRI	LRMES	Z-Score	ABS/TA	Sq.ABS	CB/TA	Sq.CB	Vol.	T1. Cap	DTA	LTA	Liq	NIM	
SRISK%	1														
SRI	0.0426	1													
LRMES	0.261***	0.189***	1												
Z-Score	-0.0808*	-0.0522	-0.185***	1											
ABS/TA	-0.112***	0.230***	-0.0561	-0.0573	1										
Sq.ABS	-0.0746*	0.296***	0.0121	-0.0509	0.917***	1									
CB/TA	-0.103**	-0.0314	0.176***	-0.0278	-0.0898**	-0.0739*	1								
Sq.CB	-0.107**	-0.0232	0.101**	-0.0239	-0.0633	-0.0501	0.924***	1							
Vol.	0.0115	0.0428	0.231***	-0.198***	-0.0694	-0.0508	0.0155	-0.00492	1						
T1. Cap	-0.0775*	0.259***	0.203***	0.0383	0.0218	0.0494	0.261***	0.228***	-0.0306	1					
DTA	0.0285	0.224***	-0.0538	0.143***	0.181***	0.186***	-0.0928**	-0.0807*	-0.0769*	-0.0648	1				
LTA	-0.190***	-0.0960**	-0.290***	0.112**	0.149***	0.0641	0.0550	0.0410	-0.0420	-0.174***	0.475***	1			
Liq	0.0442	-0.0527	0.0319	-0.113***	-0.0937**	-0.0573	-0.0947**	-0.0587	-0.00323	0.101**	-0.378***	-0.728***	1		
NIM	0.0944**	-0.199***	-0.175***	0.0422	0.0498	0.0158	-0.165***	-0.150***	-0.140***	-0.117***	0.462***	0.466***	-0.297***	1	
C/I	0.124***	0.114***	0.101**	-0.0136	-0.0522	-0.0262	-0.0904**	-0.0891**	0.103**	-0.0482	0.145***	-0.0969**	-0.0813*	-0.0825*	
SIZE	0.496***	-0.194***	0.526***	-0.160***	-0.265***	-0.235***	0.0519	-0.0106	0.0824*	-0.138***	-0.289***	-0.492***	0.243***	-0.171***	0.(

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$,

The systemic risk of the bank varies with the issuance of ABS and CBs if $\beta_1 \neq \beta_2$. The model given in the Equation (5.7) is fitted to the data using the Fixed Effect (FE) estimator. Heteroskedasticity is addressed by clustering the standard errors at the bank level. The Modified Wald test for the group-wise heteroskedasticity rejects the null hypothesis of homoskedasticity ($p < 0.01$). Driscoll-Kraay standard errors method is also applied and the associated results remain consistent with earlier estimations. Moreover, the multiway clustering method of Cameron, Gelbach, and Miller (2011) is also used and standard errors are clustered at the bank and time level. However, results are found consistent with earlier estimations when standards errors were clustered at bank level only. The Sargan-Hansen test is used to check whether FEs should be preferred to the Random Effects (REs) as the standard Hausman test is not suitable for models with clustered standard errors. This test is also known as generalized Hausman test (Arellano, 1993). The null hypothesis that the regressors are uncorrelated with individual specific errors is rejected here ($p < 0.01$),[47] thereby supporting the use of FEs.

After estimating the quadratic model, I extend the analysis to a non-parametric approach Non-parametric methods are consistent under less restrictive assumptions than parametric estimators. However, a fully non-parametric approach has limited applicability because of the curse of dimensionality. A possible way to deal with this problem is the partially linear model, given by:

$$y_{i,t+1} = \Theta(z_{i,t}) + \gamma X_{i,t} + \varepsilon_{i,t} \tag{5.8}$$

The vector of controls $X_{i,t}$ appears in a linear specification, but $z_{i,t}$ enters through an unknown smooth function $\Theta(.)$. The partially linear model is being estimated here using the GAM. GAM provides a framework to extends the standard linear model through the non-linear functions of each of the variables, but it maintains the additivity. A linear model can be extended as follows:

$$y_i = \beta_0 + \beta_1 z_{i1} + \beta_2 z_{i2} ..... + + \beta_q z_{iq} + \varepsilon_i \tag{5.9}$$

Each linear function $\beta_j z_{ij}$ in the equation (5.9) with a smooth non-linear function $f_j(z_{ij})$ to allow for the non-linear relationship between each feature and response. The model is

[47] $E(X_{it} * u_i \neq 0)$

rewritten as:

$$y_i = \beta_0 + \sum_{j=1}^{q} f_j(z_{ij}) + \varepsilon_i \tag{5.10}$$

It is called an additive model because a separate f_j is calculated for each of Z_j and then added together. The estimation of Θ, given in equation (5.8), through GAM is done by choosing a basis function that is treated as a known function. If $b_i(x)$ is the i^{th} basis function, then Θ can be represented as:

$$\Theta(z_{i,t}) = \sum_{i=1}^{q} b_i(z_{i,t})\beta \tag{5.11}$$

where β is a vector of unknown parameters. Equation (5.11) can be changed to equation (5.8) as:

$$y_{i,t+1} = \sum_{i=1}^{q} b_i(z_{i,t})\beta + \gamma X_{i,t} + \varepsilon_{i,t} \tag{5.12}$$

5.4 Results

The section presents the empirical results of several tests including the findings of the robustness checks.

5.4.1 Estimation of the Quadratic Model

The quadratic model is fitted separately for ABS and CBs. Results are reported for ABS and CBs in Tables 5.4 and 5.5 respectively. Table 5.4 reports the results of FE with robust standard errors for ABS. The coefficients of the ABS ratio in models 1 and 2 are negative and significant, showing a negative relationship of ABS Ratio with LRMES. The square term of ABS ratio is positive and significant in both models 1 and 2. These results suggest that issuance of ABS initially helps bank control their systemic risk, but this relationship is reversed when the bank increases its ABS issuance. These coefficients have similar signs for SRI and SRISK% but they are not significant here. These results may suggest that the relationship of ABS with systemic risk of the bank does not follow a linear trend but changes with the scale of ABS issuance.

Among the control variables, size has a significant and positive relationship with SRI and LRMES, highlighting that larger banks have a greater exposure to the risk. Another important

Table 5.4: Asset-Backed Securities and Systemic Risk - Fixed Effect Estimations

Note: This table provides the results of the quadratic model estimation for ABS and Systemic Risk Measures through Fixed Effects. All standard errors are heteroskedasticity consistent and are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them. All standard errors are clustered with respect to the bank.

	(1)	(2)	(3)	(4)	(5)	(6)
	$LRMES_{it+1}$	$LRMES_{it+1}$	SRI_{it+1}	SRI_{it+1}	$SRISK\%_{it+1}$	$SRISK\%_{it+1}$
ABS Ratio	-1.273***	-0.902**	-0.432	-0.178	-0.562	-0.861*
	(0.441)	(0.375)	(0.323)	(0.272)	(0.513)	(0.507)
Sqaure of ABS Ratio	0.0618***	0.0498**	0.00414	-0.00341	0.0295	0.0383
	(0.0221)	(0.0183)	(0.0189)	(0.0158)	(0.0274)	(0.0276)
Volatility	0.131***	0.105***	0.0518***	0.0207**	0.0236	0.0618*
	(0.0365)	(0.0328)	(0.0139)	(0.00972)	(0.0370)	(0.0328)
Tier 1 Capital Ratio	0.382**	0.144	0.00275	-0.133**	-0.424*	-0.266
	(0.179)	(0.166)	(0.0545)	(0.0605)	(0.217)	(0.179)
Deposit to Total Assets	0.0810	0.0316	-0.0156	-0.0311	0.0162	0.0324
	(0.0804)	(0.0647)	(0.0230)	(0.0195)	(0.0833)	(0.0866)
Loans to Total Assets	-0.159	-0.118	-0.0671	-0.0495	0.158	0.138
	(0.125)	(0.114)	(0.0525)	(0.0460)	(0.195)	(0.177)
Liquid Assets to Total Assets	-0.230*	-0.212**	-0.0514	-0.0451*	0.166*	0.160*
	(0.123)	(0.0870)	(0.0366)	(0.0249)	(0.0919)	(0.0816)
Net Interest Margin	-1.487	-1.403	-1.666**	-1.750***	-4.603	-4.488
	(2.195)	(2.036)	(0.657)	(0.628)	(3.491)	(3.348)
Cost/Income	-0.0238	-0.0365	-0.0110	-0.0168	0.0301	0.0366
	(0.0236)	(0.0247)	(0.0117)	(0.0101)	(0.0254)	(0.0267)
Size	12.56***	7.680**	3.998***	0.278	-0.328	4.100
	(2.317)	(3.152)	(0.760)	(0.688)	(4.475)	(4.954)
Global Financial Crisis		3.498		4.543***		-5.596*
		(2.135)		(0.726)		(3.178)
Sovereign Debt Crisis		8.494***		5.419***		-6.345
		(2.874)		(0.805)		(4.051)
Constant	-94.14***	-39.57	-28.42***	13.10*	15.82	-33.59
	(30.19)	(35.04)	(8.433)	(7.385)	(53.64)	(58.04)
Standard Errors	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
No. of Observations	381	381	381	381	381	381
No. of Groups	39	39	39	39	39	39
R-squared	0.477	0.520	0.461	0.578	0.058	0.082

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$,

variable is volatility which has a positive relationship with systemic risk in 3 models out of 6. Liquidity has a negative coefficient for LRMES and SRI which is significant in three models. These findings may suggest that liquid banks are less likely to face a greater amount of systemic risk. A bank can control its systemic risk exposure by not compromising on liquidity. A similar situation is visible here for DTA and NIM, showing that banks with a good depositor base and higher profitability can better control their systemic risk.

The estimation of models 2, 4 and 6 allows to investigate if the results differ when the GFC and the SDC are taken into account. The inclusion of these two important events enables us to evaluate whether a crisis situation decreases the systemic risk. This possible decrease can be ascribed to the increase in the awareness about the risk implied in various funding instruments. However, the risk might also increase as it might become harder to manage during the the turbulent times. Table 5.4 provides some interesting results. The GFC and the SDC have positive and significant coefficients for LRMES and SRI. These positive coefficients point towards the increase in the systemic risk during the crisis situation. However, the signs of coefficients of the ABS Ratio and Square of the ABS Ratio do not change in these models. This shows that the potential effects of the securitisation activity on systemic risk are still present in the crisis situation. However, the coefficient of both crises become negative in the case of the *SRISK*%. As explained earlier, the *SRISK*% shows the contribution of each bank to the overall systemic risk and the descriptive statistics reported in Table 5.2 show that most of the contribution to the overall systemic risk is made by a few large banks. These results suggest that on the one hand awareness among big banks about the risk involved in various funding instruments increases, and on the other, the risk is more evenly distributed on the market as other banks are also hit by the crisis situation that leads to an increase in their systemic risk. Models 2 and 4 in Table 5.4 also show a greater impact of the SDC on the systemic risk of banks as compared to the GFC.

Table 5.5 reports the FE estimation of the quadratic model for CBs. The CB Ratio has a significant positive coefficient only in model 1 that becomes insignificant when effects of the GFC and the SDC are taken into account in model 2. The square of the CB Ratio has a negative coefficient in models 1 to 4, but it is insignificant. These results, on the one hand, negate the presence of a non linear relationship and, on the other hand, do not support the idea that CBs help banks control their risk. The coefficients of most other control variables are similar to earlier estimations for ABS. Volatility has a significant and positive relationship with SRI and LRMES. This is in line with earlier results that banks having a high stock volatility face a higher systemic risk. The size variable has a consistently positive relationship with systemic risk. LTA, LIQ and NIM are found to have a negative relationship with systemic risk. The GFC and the SDC also have a significant impact on systemic risk of banks in models 2 and 4.

In addition to the FE estimation, Tobit model for panel data is applied, following Brownlees and Engle (2015). Bank fixed effects are included separately in these estimations. The Tobit model is relevant in this case as *SRISK* is not always positive and since non-positive values of *SRISK* do not contribute to the systemic risk, I truncate *SRISK*% and SRI at 0. Tobit is useful in this condition as it allows to explain the capital shortfall resulting from *SRISK* when

Table 5.5: Covered Bonds and Systemic Risk - Fixed Effect Estimations

Note: This table provides the results of the quadratic model estimation for CBs and Systemic Risk Measures through Fixed Effects. All standard errors are heteroskedasticity consistent and are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them. All standard errors are clustered with respect to the bank.

	(1)	(2)	(3)	(4)	(5)	(6)
	$LRMES_{it+1}$	$LRMES_{it+1}$	SRI_{it+1}	SRI_{it+1}	$SRISK\%_{it+1}$	$SRISK\%_{it+1}$
CB Ratio	2.605**	1.713	0.488	0.259	-2.314	-1.999
	(1.199)	(1.051)	(0.333)	(0.298)	(1.690)	(1.505)
Sqaure of CB Ratio	-0.256	-0.155	-0.0585	-0.0395	0.334	0.308
	(0.163)	(0.157)	(0.046)	(0.042)	(0.255)	(0.240)
Volatility	0.116***	0.0884**	0.0411***	0.0144*	0.0108	0.0477
	(0.039)	(0.039)	(0.010)	(0.007)	(0.035)	(0.032)
Tier 1 Capital Ratio	0.404**	0.194	0.0209	-0.0928	-0.365	-0.209
	(0.195)	(0.176)	(0.060)	(0.057)	(0.231)	(0.210)
Deposit to Total Assets	0.118	0.0787	-0.0116	-0.0184	0.00336	0.0127
	(0.085)	(0.070)	(0.023)	(0.019)	(0.105)	(0.108)
Loans to Total Assets	-0.233*	-0.139	-0.121**	-0.0826**	0.0431	-0.00979
	(0.126)	(0.131)	(0.048)	(0.038)	(0.221)	(0.195)
Liquid Assets to Total Assets	-0.313**	-0.239*	-0.0772**	-0.0392	0.0882	0.0357
	(0.142)	(0.123)	(0.031)	(0.026)	(0.161)	(0.157)
Net Interest Margin	-1.065	-1.482	-1.501**	-1.768***	-4.127	-3.760
	(2.009)	(1.890)	(0.598)	(0.554)	(3.527)	(3.284)
Cost/Income	-0.00645	-0.00159	-0.0214**	-0.0137	0.0609	0.0503
	(0.043)	(0.039)	(0.011)	(0.009)	(0.039)	(0.036)
Size	11.49***	5.856*	4.327***	0.728	1.384	6.341
	(1.892)	(2.986)	(0.761)	(0.684)	(4.874)	(5.637)
Global Financial Crisis		4.980**		4.327***		-5.961*
		(1.965)		(0.575)		(3.046)
Sovereign Debt Crisis		8.240**		4.705***		-6.480
		(3.149)		(0.649)		(3.988)
Constant	-83.03***	-24.12	-34.11***	3.872	2.722	-49.60
	(26.955)	(33.043)	(7.463)	(7.182)	(58.909)	(64.112)
Standard Errors	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
No. of Observations	389	389	389	389	389	389
No. of Groups	38	38	38	38	38	38
R-squared	0.471	0.505	0.496	0.626	0.051	0.074

$*p < 0.1$, $**p < 0.05$, $***p < 0.01$,

it is above 0. The results of Tobit estimation for ABS are reported in Table 5.6. A similar relationship between ABS and systemic risk is observed for SRI and *SRISK*% as observed for LRMES in Table 5.4. The ABS Ratio has a negative and significant coefficient for both risk measures, while the Square of the ABS Ratio has a positive and significant coefficient in all models (except model 2). These results suggest the existence of a U-shaped relationship between ABS and the systemic risk of banks as shown in Figure 5.1. The coefficients of the

Table 5.6: Asset-Backed Securities and Systemic Risk - Tobit

Note: This table provides the results of the quadratic model estimation for ABS and Systemic Risk Measures through Tobit. Bank effects are included in the estimations. Standard errors are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them.

	(1)	(2)	(3)	(4)
	SRI_{it+1}	SRI_{it+1}	$SRISK\%_{it+1}$	$SRISK\%_{it+1}$
ABS Ratio	-1.048***	-0.407*	-1.500**	-1.652**
	(0.258)	(0.228)	(0.655)	(0.659)
Square of ABS Ratio	0.0532***	0.0178	0.0852*	0.0897**
	(0.0174)	(0.0144)	(0.0446)	(0.0444)
Volatility	0.404***	0.153**	0.0494	0.0657
	(0.0707)	(0.0602)	(0.0429)	(0.0451)
Tier 1 Capital Ratio	-0.139	-0.322***	-0.632***	-0.535***
	(0.103)	(0.119)	(0.178)	(0.191)
Deposit to Total Assets	-0.0199	-0.0789	0.00921	0.0207
	(0.0424)	(0.0550)	(0.0819)	(0.0828)
Loans to Total Assets	-0.199***	0.132	0.0565	0.0472
	(0.0716)	(0.109)	(0.120)	(0.120)
Liquid Assets to Total Assets	-0.0888	0.111	0.129	0.126
	(0.0698)	(0.112)	(0.109)	(0.108)
Net Interest Margin	-2.452***	-1.245	-7.605***	-7.499***
	(0.929)	(0.819)	(1.835)	(1.825)
Cost/Income	-0.0572	-0.0735*	0.0174	0.0216
	(0.0448)	(0.0433)	(0.0345)	(0.0345)
Size	4.844***	-1.662	3.242	5.521**
	(1.273)	(1.478)	(2.229)	(2.763)
Global Financial Crisis		11.34***		-2.532
		(2.222)		(2.310)
Sovereign Debt Crisis		24.24		-3.498
		(426.0)		(2.506)
Constant	2.879***	2.291***	11.84***	11.76***
	(0.268)	(0.210)	(0.477)	(0.476)
Observations	381	381	381	381
AIC	465.2	419.6	2638.6	2640.6
Log likelihood	-186.6	-161.8	-1272.3	-1271.3

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$,

control variables are not different from the earlier estimations through FEs.

Table 5.7 reports the results of Tobit estimations for CBs. The coefficient of the CB ratio is positive for SRI but insignificant. The same coefficient is significant and negative in model 3 for SRISK%, but becomes insignificant in model 4. A situation similar to the one reported for ABS in Table 5.6 is only visible for SRISK% in model 3 of Table 5.7. These results suggest that CBs might help large banks to reduce their systemic risk through the perceived

Table 5.7: Covered Bonds and Systemic Risk - Tobit

Note: This table provides the results of the quadratic model estimation for CBs and Systemic Risk Measures through Tobit. Bank effects are included in the estimations. Standard errors are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them.

	(1)	(2)	(3)	(4)
	SRI	SRI	SRISK%	SRISK%
CB Ratio	0.351	0.117	-2.847*	-2.553
	-0.252	-0.222	-1.558	-1.625
CB Sqaure Ratio	-0.0452	-0.0242	0.455*	0.425
	-0.0437	-0.0378	-0.269	-0.276
Volatility	0.0328***	0.0104*	0.0338	0.054
	-0.00705	-0.00622	-0.0433	-0.0455
Tier 1 Capital Ratio	0.0761**	-0.0194	-0.540***	-0.434**
	-0.0325	-0.0287	-0.2	-0.21
Deposit to Total Assets	-0.0126	-0.0175	-0.0411	-0.0328
	-0.0153	-0.0131	-0.0944	-0.096
Loans to Total Assets	-0.0739***	-0.0399**	-0.0705	-0.102
	-0.0199	-0.0174	-0.124	-0.127
Liquid Assets to Total Assets	-0.0563***	-0.0244	0.0409	0.00986
	-0.0187	-0.0159	-0.115	-0.116
Net Interest Margin	-0.898***	-1.124***	-6.370***	-6.065***
	-0.3	-0.253	-1.858	-1.849
Cost/Income	-0.0181***	-0.0112**	0.0441	0.0386
	-0.00677	-0.0057	-0.0416	-0.0417
Size	3.700***	0.445	5.648**	8.680***
	-0.387	-0.411	-2.376	-2.993
Financial Crisis		3.662***		-3.493
		-0.315		-2.296
Sovereign Debt Crisis		4.108***		-4.148
		-0.363		-2.651
Constant	-23.97***	-0.2	-26.52	-48.99*
	-3.611	-3.541	-22.1	-25.8
Observations	389	389	389	389
AIC	1583.4	1454.8	2790.5	2791.8
Log likelihood	-742.7	-676.4	-1346.3	-1344.9

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$,

benefits of increasing liquidity and reducing funding cost. Large banks have enough assets on their balance sheet, so are less affected by the asset encumbrance resulting from the issuance of CBs. Small banks may not enjoy the benefits of CBs because of their small balance sheets. The coefficient of Square of the CB Ratio has a positive coefficient for SRISK%. Here the situation becomes similar to the case of ABS. The differences in the results for SRISK% and other measures point towards the presence of a potential bank size effect.

Although the coefficients of the CB Ratio and the Square of the CB Ratio are insignificant for SRI, their signs suggest that small issuances of CBs may cause an increase in the risk, whereas larger issuances may help these banks control their systemic risk. This may highlight another perspective of CBs that can again be linked with the larger banks. Investors might be more interested in jumbo covered bonds that are issued in a larger size.[48] Non-jumbo CBs may not have the same market liquidity. Therefore, the issuance of non-jumbo bonds may not provide the intended benefits to banks.

5.4.2 The Partially Linear Model

The partially linear model specified in Equation (5.8) is estimated using the GAM approach. The main advantage of GAM is that it allows to fit non-linear functions to different variables and multiple transformations on these variables are not required. This non-linear fit obtained through GAM can provide accurate predictions for y, that are impossible for a linear model. Because of the additive nature of this method, it is possible to evaluate the impact of each variable individually on y while holding all the other variables fixed (James, Witten, Hastie, & Tibshirani, 2013).

Since this study investigates if the risk level of a bank varies with the level of ABS and CB issuance, the variables of ABS Ratio and CB ratio enter the model with a non-linear settings, while control variables enter in a linear fashion. Table 5.8 reports results of the GAM estimation for ABS and systemic risk. Most of the R-Square values reported here are higher than the ones reported in Table 5.4. This shows that the partially linear model provides a better fit compared to FE estimations. This table reports the coefficients of the parametric part of the model. The coefficients of the control variables reported in the Table 5.8 are not very different from the ones reported in Table 5.4. Volatility, DTA, LTA, LIQ, NIM and size are found to significantly affect the systemic risk of the bank. Most of the coefficients are consistent across different models.

The graphical representation of the relationship between ABS and the systemic risk measures is presented in Figure 5.2. The solid line shows the pattern of the relationship between ABS and the relevant risk measure. The dotted lines here represent confidence intervals. The significance of the relationship can be determined on the basis of the distance

[48] A German syndicate of banks introduced Jumbo CBs in 1995. These CBs are issued with a minimum size of 1 billion Euros. These bonds are intended to increase market liquidity, and have attracted foreign investors along with domestic ones. Apart from the size of the issuance there are some other requirements for jumbo bonds. These bonds must be plain vanilla bonds, officially listed on an organised market and there should be at least 3 market makers quoting bid/ask prices to maintain liquidity in the market.

Table 5.8: Asset Backed Securities and Systemic Risk — Generalized Additive Model

Note: This table provides the results of GAM estimations for ABS and Systemic Risk Measures. Individual bank effects are included in the estimations. Standard errors are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them.

	(1)	(2)	(3)	(4)	(5)	(6)
	$LRMES_{it+1}$	$LRMES_{it+1}$	SRI_{it+1}	SRI_{it+1}	$SRISK\%_{it+1}$	$SRISK\%_{it+1}$
Volatility	0.121***	0.062**	0.04	-0.034	-0.058	0.0004
	(0.030)	(0.030)	(0.079)	(0.083)	(0.052)	(0.055)
Tier 1 Capital Ratio	0.471***	0.249***	1.072***	0.937***	0.068	0.258*
	(0.080)	(0.080)	(0.210)	(0.225)	(0.139)	(0.147)
Deposit to Total Assets	0.042	0.009	0.782***	0.764***	0.154**	0.183***
	(0.036)	(0.034)	(0.094)	(0.094)	(0.061)	(0.060)
Loans to Total Assets	-0.037	-0.082	-1.082***	-1.153***	-0.138	-0.1
	(0.057)	(0.054)	(0.150)	(0.151)	(0.097)	(0.097)
Liquid Assets to Total Assets	-0.174***	-0.110*	-1.019***	-1.012***	-0.143	-0.194*
	(0.063)	(0.060)	(0.167)	(0.167)	(0.109)	(0.109)
Net Interest Margin	-4.091***	-2.380***	-7.543***	-6.151***	4.547***	3.041**
	(0.854)	(0.835)	(2.237)	(2.326)	(1.469)	(1.515)
Cost/Income	-0.008	-0.015	0.061	0.058	0.047	0.055
	(0.025)	(0.024)	(0.067)	(0.067)	(0.044)	(0.044)
Size	4.458***	3.450***	-5.342***	-6.059***	7.305***	8.275***
	(0.471)	(0.461)	(1.239)	(1.287)	(0.789)	(0.830)
Financial Crisis		6.411***		11.917***		-6.327**
		(1.515)		(4.231)		(2.739)
Sovereign Debt Crisis		11.314***		5.393		-9.244***
		(1.511)		(4.213)		(2.697)
Constant	-6.371	4.225	* 115.543**	125.220**	-71.838**	* -82.422**
	(8.236)	(7.860)	(21.681)	(21.938)	(13.981)	(14.174)
edf s(ABS Ratio)	2.967***	2.65***	2.027***	2.06***	0.000	0.05
Observations	381	381	381	381	381	381
No. of Groups	39.00	39.00	39.00	39.00	39.00	39.00
R-Square (Adj.)	0.452	0.52	0.403	0.413	0.258	0.277

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$,

of dotted lines from the solid line showing the relationship. Figures 5.2a and 5.2b show that the issuance of ABS first helps banks reducing their systemic risk. However, this relationship is reversed at one point and further issuance of ABS leads to an increase in bank's systemic risk. Models 3 and 4 in figures 5.2c and 5.2d show that the slope of the relationship between SRI and ABS swiftly changes after a certain level and keeps on increasing afterwards. However, no change in the relationship is observable in models 5 and 6. These results reinforce the initial findings of FE and Tobit estimations, reported in Tables 5.4 and 5.6.[49]

[49]The estimates of coefficients for the non-parametric part are available upon request.

Figure 5.2: Asset Backed Securities and Systemic Risk — Generalized Additive Model

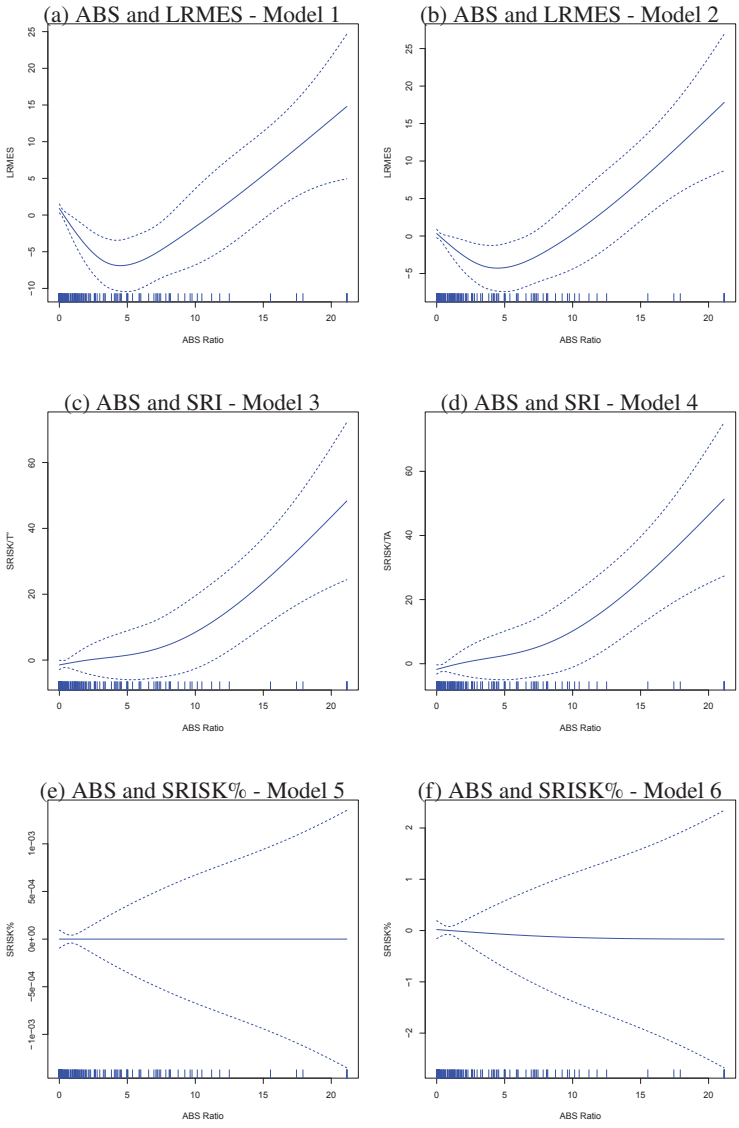


Table 5.9 reports the results of GAM estimation for CBs. This Table shows that the effects of control variables are consistent with Table 5.5. Although the coefficients of some variables

Table 5.9: Covered Bonds and Systemic Risk — Generalized Additive Model

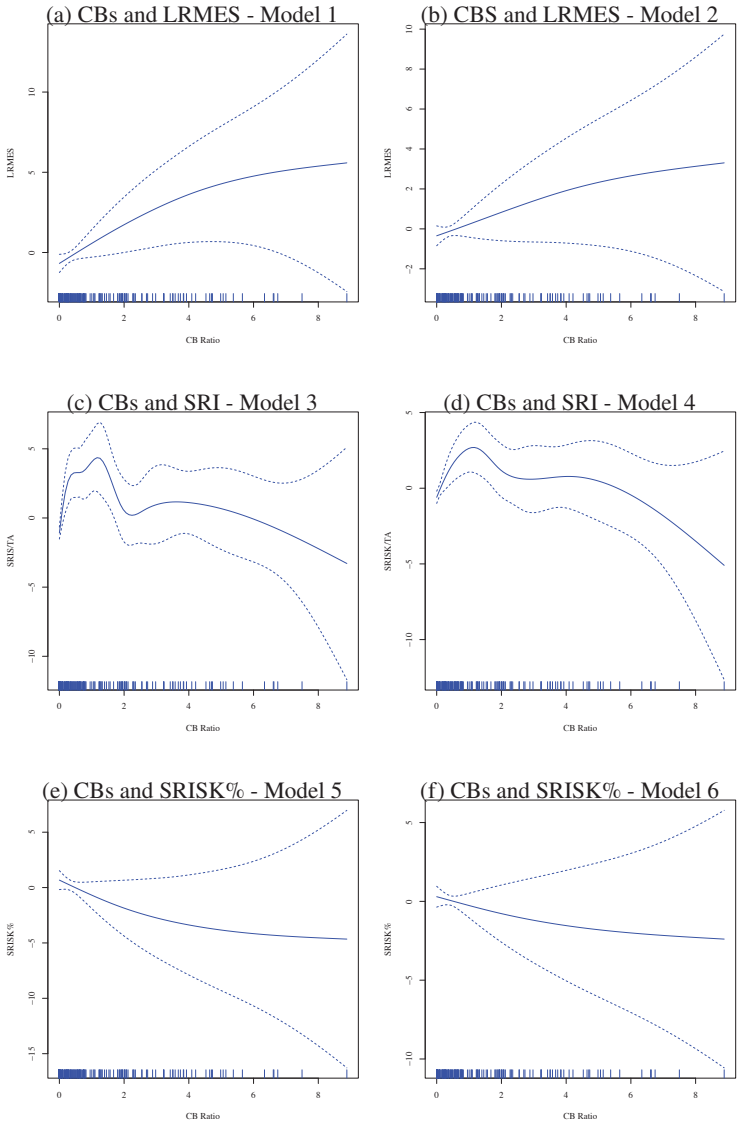
Note: This table provides the results of the GAM for CBs and Systemic Risk Measures. Bank effects were included in the estimations. Standard errors are reported in parenthesis. Two models are estimated for each of the risk measures. One model includes the dummies for GFC and SDC, while other model does not include these dummies.

	(1)	(2)	(3)	(4)	(5)	(6)
	$LRMES_{it+1}$	$LRMES_{it+1}$	SRI_{it+1}	SRI_{it+1}	$SRISK\%_{it+1}$	$SRISK\%_{it+1}$
Volatility	0.095***	0.058*	0.028	-0.058	-0.025	0.014
	(0.031)	(0.032)	(0.051)	(0.052)	(0.050)	(0.052)
Tier 1 Capital Ratio	0.646***	0.512***	-0.477***	-0.727***	-0.139	-0.019
	(0.090)	(0.092)	(0.150)	(0.152)	(0.143)	(0.149)
Deposit to Total Assets	0.079*	0.057	0.011	-0.009	0.203***	0.220***
	(0.048)	(0.047)	(0.078)	(0.075)	(0.076)	(0.076)
Loans to Total Assets	-0.037	-0.048	-0.401***	-0.461***	-0.081	-0.066
	(0.064)	(0.063)	(0.104)	(0.102)	(0.102)	(0.102)
Liquid Assets to Total Assets	-0.143**	-0.091	-0.027	0.028	0.026	-0.018
	(0.064)	(0.064)	(0.105)	(0.102)	(0.103)	(0.104)
Net Interest Margin	-0.168	0.861	-3.122**	-1.307	2.955**	2.027
	(0.854)	(0.860)	(1.395)	(1.390)	(1.362)	(1.396)
Cost/Income	0.016	0.011	0.119**	0.111**	0.05	0.054
	(0.029)	(0.028)	(0.047)	(0.045)	(0.046)	(0.046)
Size	6.843***	6.401***	11.990***	11.582***	7.725***	8.133***
	(0.486)	(0.483)	(0.836)	(0.812)	(0.776)	(0.787)
Financial Crisis		3.937**		12.133***		-4.822*
		(1.565)		(2.558)		(2.553)
Sovereign Debt Crisis		7.647***		12.826***		-6.975***
		(1.551)		(2.721)		(2.521)
Constant	45.779***	-42.819***	-96.654***	-93.813***	-81.970***	-84.817**
	(8.974)	(8.772)	(14.935)	(14.473)	(14.337)	(14.287)
edf s(CB Ratio)	0.7597*	1.059**	6.627***	4.381**	0.912*	0.488
No. of Observations	389	389	389	389	389	389
No. of Groups	38	38	38	38	38	38
R-Square (Adj.)	0.514	0.487	0.347	0.425	0.321	0.329

$^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$,

are not significant here, their signs are consistent with the earlier estimations in FEs and Tobit. The results of non-parametric part are reported in Figure 5.3. The results for CBs are mixed here across various models. Figures 5.3a and 5.3b show that the issuance of CBs leads to a consistent increase in the system risk. However, confidence intervals go on getting larger here. Model 3 and 4 in Figures 5.3c and 5.3d show that CBs have a positive relationship with SRI in the beginning but this relationship becomes negative when a bank increases the issuance of CBs. The confidence intervals become smaller when effects of crises are taken in account in model 4. The effect of CBs as well remains insignificant for *SRISK%* in models 5 and 6, as shown in Figures 5.3e and 5.3f.

Figure 5.3: Covered Bonds and Systemic Risk — Generalized Additive Model



5.4.3 Further Findings For Size Effects

This study has performed some further analysis to test for the potential bank size effects on the relationship of ABS and CBs with the systemic risk. Two dummy variables are generated for the size variable named as 'dsize75a' and 'dsize75b'. The variable dsize75a is equal to 1 if bank size is above 75 percentile and 0 otherwise. The variable dsize75b is equal to 1 if bank size is below 75 percentile and 0 otherwise. Interaction terms of these dummy variables were generated with the ABS Ratio and the CB Ratio. These interaction terms were replaced with the ABS Ratio and the CB Ratio in model given in equation (5.8). A quadratic model is tested through FE estimations with these interaction terms.

The effect of ABS were found similar in the case of bigger or smaller banks and no notable differences were found in these estimations. These results suggest that ABS has a uniform effect across various classes of banks with respect to their size. However, notable differences were seen in the case of CBs. Results of the quadratic model are reported in Tables E.3 and E.4. The coefficient of the CB Ratio is positive and significant here. This reinforces the earlier finding that small issuance of CBs increases bank risk. However, Square of the CB Ratio has a negative and significant coefficient here for the smaller banks. The coefficients of CB Ratio and Square of the CB ratio are not significant for the bigger banks. A possible explaination of these results is that smaller banks are not able to reap the benefits of the CB market with small issuance of these bonds, as investors might be concerned about their ability to deal with the problem of asset encumbrance. However, these concerns can be addressed when these banks enter into jumbo CBs transactions, as these bonds are issued as part of a syndicate and investors might be less concerned about the individual bank's ability to deal with the problem of asset encumbrance. Therefore, these jumbo CBs are more liquid. The analysis with these interactions terms was also performed through FE and Tobit and qualitatively similar results were found.

5.4.4 Robustness Check

After the quadratic model estimations and the GAM, further robustness checks were performed using an accounting measure of bank stability i.e. the modified version of the Altman Z-score. The Z-score reflects a bank's distance to default and it is measured as:

$$Z_{it} = \frac{\mu_{it} + k_{it}}{\sigma_{it}} \tag{5.13}$$

where μ is the Return on Average Assets before Taxes (*ROAA*), k is the ratio equity capital

to total assets and σ is the standard deviation of *ROAA*. Thus, the value of the *Z*-score is determined by the level of capitalisation and the stability of a bank's profitability. The denominator is the standard deviation of the bank's profitability and the numerator includes the bank-level capital. Therefore, the Z-Score shows how much capital is available to a bank to bear a shock of earnings volatility. In other words, how many standard deviations are required to deplete the equity of a bank. Therefore, a higher (lower) value of *Z*-score shows a higher (lower) stability of the bank and a lower(higher) probability of default. Hence, ABS and CBs should exhibit the opposite pattern with Z-score with respect to systemic risk.

The two models estimated earlier for ABS and CBs were estimated for Z-Score as well. The results of the quadratic model estimated with FEs for ABS showed a positive and significant coefficient of the ABS ratio and a negative and significant coefficient of the Square of the ABS Ratio. These results suggest that the issuance of ABS may increases bank stability in the beginning but this relationship turns into a negative one when the ABS issuance is increased by the bank. These results reinforce the earlier findings for the measures of systemic risk. The results are reported in Table E.1.

A similar model is tested for CBs. The results here reinforce the findings reported in Models 1 and 2 of Table 5.5. The coefficient of the CB Ratio is negative at the beginning but the square of the CB Ratio has a positive coefficient. These results again suggest that smaller issuance of CBs does not provide the intended benefits. Only CBs issued in the large quantity increase bank stability. These results are reported in Table E.2. The analysis with the Z-score was also extended to GAM for both ABS and CBs, and the results were qualitatively similar to the ones obtained using the quadratic model.[50]

Furthermore, the GAM models is also tested with the loess curve. The earlier GAM estimations were made with a smoothing spline. Loess is also known as local regression. It fits the non-linear function by computing the fit at a target point z_0 using the nearby observations. Weights are assigned to different points in the neighbourhood and these weights are later on use for the estimation of the fit. The results are reported in Tables E.5 and E.6 and Figures E.1 and E.2.The results here are consistent with the earlier GAM estimations reported in Tables 5.8 and 5.9 and Figures 5.2 and 5.3. These multiple robustness checks ensures that results are not driven by a particular model and settings.

[50]Complete results are available upon request.

5.5 Discussion and Conclusion

The extensive empirical analysis performed in this study provides important insights about the securitisation and the CB market. The study examines the impact of these instruments on systemic risk and bank stability. Contrary to other studies, this study investigates the possibility of the existence of a non linear relationship of these instruments with the bank's risk and stability. The empirical analysis suggests the presence of a U-Shaped relationship between systemic risk and securitisation. The implications of the ABS issuance on the bank stability stem from the level of a bank's reliance on this funding tool.

Initially, the ABS issuance help banks control their funding cost and provide liquidity benefits. However, these positive effects are reversed when a bank increases its reliance on ABS. On the one hand, over-reliance creates a concentration risk and banks face funding and liquidity problems when this market is frozen. A shift back to other funding sources at this points might increase the funding cost. On the other hand, high level of involvement in securitisation increases the bank's risk appetite because of the liquidity gluts created by the continuous securitisation. The materialization of these risks increases the systemic risk of the bank and adversely affects stability. The empirical results in this study endorse the view of "securitisation-scalability" introduced earlier in this chapter. The ratio of ABS to total assets where its relationship with bank stability is reversed varies from 6% to 9% across various models used in this study.[51]

The empirical results did not suggest a similar relationship between CBs and systemic risk and bank stability. The initial results show that a small scale issuance of CBs leads to an increase in systemic risk, but a large scale issuance of CBs helps control this risk. I attribute these findings to the issuance of Jumbo CBs, as these bonds are highly liquid compared to traditional CBs. Further analysis performed to test the bank size effect shows that smaller banks are adversely affected by the issuance of CBs, possibly because of two reasons. First, small banks are not able to issue Jumbo CBs, because of the large size of these bonds. Second, these banks have limited assets and the encumbrance of some assets creates problems for them, as explained earlier in Section 5.3.1. On the contrary, bigger banks have a larger number of assets and are less prone to the adverse effects of asset encumbrance. In a crisis situation, the large stock of unencumbered assets can be used to meet the liquidity and funding needs.

The analysis also shows that the issuance of CBs never crosses a certain threshold. This is because of the inherent limitations of CBs, whereas the issuance of ABS varies a lot across

[51] These figures are estimated by taking the first derivative of the quadratic model and graphs obtained through GAM.

banks and no such limit is observable for ABS. Most of legal frameworks across various jurisdictions for CBs feature risk cushions. These legal frameworks are characterised by the strict supervision, eligibility criteria for assets to be used in the cover pool and continuous monitoring of the cover pool. The strict eligibility criteria and continuous monitoring of the cover pool are important factors that do not allow FIs to encumber assets beyond a certain threshold that might imperil their stability.

Based on the empirical results presented in this chapter, the following financial and regulatory implications are derived. Changes in the systemic risk of a bank due to securitisation have important implications for the investors who need to reassess their portfolios. Prior to increasing the issuance of ABS, financial managers should consider the implications of ABS on systemic risk, along with the availability of other funding sources. Before CB issuance, banks should consider the size of their balance sheets and the amount of unencumbered assets following the issuance of CBs.

This study proposes separate policy implications with respect to ABS and CB. Concerning CBs, the study does not support the imposition of a uniform limit on their issuance. If imposition of such a limit is deemed necessary, the bank size should be considered while devising such limits. Concerning ABS, the regulatory mechanism is required to be framed to restrain the unbounded securitisation. A strict regulatory framework for securitisation, without considering the relative size of the ABS issuance, may deprive banks from realizing the economic benefits of this important funding tool.

Chapter 6

Critical Review of Regulations for Securitisation and Covered Bonds

6.1 Introduction

Regulations for securitisation have been criticized both before and after the Global Financial Crisis (GFC). Before the GFC, regulators were blamed for creating perverse incentives for banks as securitising banks were allowed to hold less capital. As a result, securitisation was heavily regulated on both sides of the Atlantic. However, the regulations devised after the GFC are also criticised by various market participants for further shrinkage of the already comatose securitisation market. It was realised that securitisation can play a vital role in the economic growth by increasing the credit flow in the economy. The stringent and somewhat punitive treatment of securitisation is considered as an impediment to the revival of the securitisation market. Banks may not have an incentive to securitise and the investors find it too expensive to invest in these securities. On the other hand, the relatively favourable regulatory treatment given to Covered Bonds (CBs) raised concerns among the market stakeholders that the market shift may get directed towards a single market instrument.

In response to this criticism, regulations have been revised on a blistering pace that also created a challenging situation for the securitisation industry and gave rise to the uncertainty in the market. The initial regulations concerning ABS after the GFC were strict and somewhat punitive towards securitisation. Though many of these regulations make sense, their uncertainty and complexity has created many challenges for the industry. These regulations are mostly focused on the 'investors', rather than focusing on 'securitisers'. The main aim of these regulations is to revive the investors' confidence to restart this market. However, in

the quest of reviving investors' confidence, securitisation might become more expensive for the 'issuers'. Even if these regulations are successful in reviving investors' confidence, it is hard to restart the market if banks find it expensive to get funding through the generation of Asset-Backed Securities (ABS).

The European Commission (EC) proposed some new regulations for Simple, Transparent and Standardised (STS) securitisation that will be eligible for a favourable treatment in regulations in the recent proposal (hereinafter referred as the STS proposal) (European Commission, 2015a).[1] This proposal is welcomed by many participants and it is considered a step in the right direction (AKA, CCFA, SMMT, & VDA, 2013; Bryan & Ingram, 2015), but there are still various issues that need to be addressed.

The draft report issued by the Committee on Economic and Monetary Affairs (ECON)[2] in response to the STS proposal has attempted to resolve some of the ambiguities but it has given further rise to some complications at the same time. The ECON report has recommended some overly zealous amendments, for instance increase in Risk Retention Regulations (RRR), in an attempt to control the risk of this market.[3] The STS proposal was an attempt to revive the securitisation market and was widely welcomed by the market participants. However, the amendments proposed by ECON are not aligned with this objective and are again focused on controlling risk in the securitisation market like regulations devised after the GFC.

The findings in the previous chapters of the study suggest that securitisation per se may not be the source of problems. However, most of the problems stem from the large scale securitisation. A higher involvement of a bank in this market may increase the risk. This chapters reviews the regulations for both markets (ABS and CBs) and addresses the concerns about their differentiated treatment on the basis of the empirical findings of the analysis performed earlier in chapter 4 and 5. This chapter provides some recommendations on the basis of the empirical findings. The detailed description of these regulations can be found in chapter 3.

This chapter targets the key regulatory sections which are most relevant with the findings of the study. The large scope of the recent regulations make it impossible to review all

[1] See section 3.2.2 and footnote 21 in Chapter 3 for details about the ordinary legislative procedures followed by the STS proposal.

[2] The ECON is responsible for the economic and monetary policies of the Union, the functioning of Economic and Monetary Union and the European monetary and financial system. It also deals with the free movement of capital and payments and with rules on competition and state aid. See http://www.eppgroup.eu/econ for further details.

[3] The amendments proposed by ECON are not binding and the European Council has to review them. The text of the final set of rules for the STS securitisation is still to be finalized and negotiations have been started between the European Commission, the Parliament and the Council (European Commision, 2017).

regulations in a single study. Therefore, most relevant regulations are discussed here, including risk retention regulations, capital regulations, liquidity requirements and due diligence. The chapter attempts to highlight that regulators should focus on limiting the securitisation within the bearable capacity of the banking system and economy. But at the same time cost element of compliance with the introduced regulations should be considered. The economic considerations are important in order to restart the market.

6.2 Key Regulatory Areas

The post-crisis regulations for the securitisation are mainly focused at increasing the alignment of the interest between investors and originators (through risk retention), increasing transparency of the transactions (through disclosure requirements) and controlling risk of Financial Institutions (FIs) (through due diligence, capital and liquidity requirements). Some of the key regulations have been targeted in this section and they have been evaluated in light of the analysis performed in earlier chapters of the study.

6.2.1 Risk Retention Requirements

According to the new Risk Retention Regulations (RRR), originators of the securitisation transactions are required to retain an un-hedged position in these transactions.[4] The positions should be not less than 5% of the total amount of the transaction.[5] The motive of these requirements is twofold. First, the risk retention will maintain the interest of originators in the securitisation that can help align originators' interest with that of investors. Second, this retention is supposed to provide confidence to investors that they are not bearing all the risk associated with securitisation,[6] as a market shock will also affect the originators thereby keeping originators' interest intact in these transactions till the maturity. RRR is not applicable to CBs, as CB issuers retain full risk on their balance sheet.

The new STS proposal brought two main changes in the RRR. First, a direct approach has been introduced this time. Earlier, investors were obliged to check if the originator

[4]The restriction on hedging is an important element of the RRR. The originator is not allowed to use any hedging technique for the retained portion of the risk. The purpose of the risk retention is to ensure that originators has a continuous interest the securitisation transaction. This objective cannot be achieved if the originator hedges the risk of this retained position.

[5]See Article 405(1) of the Regulation EU No. 575/2013

[6]It is misconstrued in the market after the GFC, that securitising banks do not retain a risk after the securitisation and all risk related to these transactions is borne by investors.

is maintaining a risk in the securitisation transaction.[7] The failure to comply with these requirements was resulting in high penalties in the shape of high capital risk weights.[8] Usually, it is a difficult task for an investor to make this assessment because of the lack of proper information. Moreover, banks might not have any incentive to retain this position when their investor base is outside the EU.[9] Therefore, indirect approach has been replaced with the direct one[10] and sanctions are recommended for originators as well in case of non-compliance with the RRR.[11] Second, earlier it was not clear who should be responsible for the risk retention, as there are number of parties involved in the securitisation transactions. Hence, it was important to specify which of these parties should be responsible for the risk retention.[12] Therefore, now these requirements are imposed on originators.

Many theoretical and empirical studies along with the empirical findings in the chapter 4 of this study do not support the imposition of these requirements.[13] A comparison of securitising banks with CB issuing banks shows that securitising banks do not take a high risk after the issuance of ABS. However, results show that CB issuing banks might have a tendency to take higher risk in the long run. Hence, on-balance sheet risk retention might not help in keeping banks from the risk taking.[14] Results in chapter 4 also show that banks in Europe do not securitise for credit risk transfer. For these reasons, pre-existing market-based forms of risk retention might be sufficient. This is especially true when Originate-to-Distribute (OTD) model never flourished in the European securitisation market.[15]

The draft report ECON creates some further ambiguities and introduced even overly-zealous RRR. The STS proposal clarified that the originators of the securitisation transaction should be responsible for the risk retention. Earlier, it was ambiguous who should be

[7]See Article 406(1a) and Article 410(2a) of the Regulation (EU) No. 575/213 and Article 4(1) of the STS proposal

[8]This was termed as an "indirect approach".

[9]The local legislations of non-European investors might not require them to assess the risk retention by the originators. Therefore, originators will not have any interest in making a compliance with the RRR in this situation.

[10]See Article 3(1b), Article 4(1) and Article 9(1) of the STS proposal

[11]See Article 17(1a) of the STS proposal.

[12]According to EBA (2014), the entity retaining this risk should have real substance and must hold an economic capital before the use of the assets for securitisation.

[13]The securitising banks retain risk in one form or another. The way these transactions are structured does not allow banks to close their eye on the performance of these securities. See section 2.1.2 and Chiesa (2008, 2015); Gorton and Metrick (2013) for further details.

[14]The usefulness of the RRR become questionable if full risk retention in case of CBs is not able to keep banks away from higher risk taking.

[15]Many non-banking institutions entered into the credit market under the OTD model. Hence, banks started competing with non-banking institutions. However, credit issuance remained within banking system in Europe and OTD model did not get popular here.

responsible for this risk retention as a number of parties were involved in the securitisation transactions. Especially, the RRR may not provide the intended benefits if the risk is retained by a Special Purpose Vehicle (SPV) as it does not have any economic substance.[16] To circumvent this issue, the Article 4(1) §2 of the STS proposal explicitly state:

> *For the purposes of this Article, an entity shall not be considered to be an originator where the entity has been established or operates for the sole purpose of securitising exposures.*

This paragraph is deleted in the ECON report thereby giving rise again to the ambiguity.[17] The deletion of this paragraph might be interpreted as a permission given to SPVs to retain the required risk in securitisation transactions. Retention of the risk by the SPVs, on one hand, will not be considered of any economic substance and, on the other hand, investors might see it as a return of bad practices, as alleged before the eruption of the GFC. Therefore, the desired objective of the RRR will not be achievable.

The ECON committee has proposed to increase the RRR from 5% to 20% in its recent report issued in response to the STS proposal.[18] This is a substantial economic increase and burden of risk retention will be commercially significant for originators. It might help increasing investors' confidence in the securitisation market, but it may not help restarting the market, as securitising banks might take it as an additional barrier to securitisation. A higher retention burden on originators will reduce the capital relief obtained through securitisation. Therefore, the objective of increasing lending in the economy may not be achieved. Although, the European Banking Authority (EBA) has been given the power to reduce this requirement through Regulatory Technical Standards (RTS) for some specific securitisation transactions, it is unclear which transactions will be eligible for such grandfathering provisions. Hence, the uncertainty still prevails in the market.

There is another potential problem in the risk retention requirements. Investors are required to check the risk retention compliance before making the investment and they may feel that their capital is not prone to penalization because they have taken an exposures in a risk retention compliant securitisation. However, their investment can prove to be non-risk retention compliant at a later stage. This situation may occur either because of the downgrade of securities or under-performance of the underlying assets in the collateral pool

[16] An SPV does not have any net worth, assets, net income and capital. Therefore, it is virtually nothing and risk retention by an SPV means nothing. The risk retention can be only helpful when it is retained by an organisation having a significant economic substance.

[17] See Amendment 41 in the ECON report.

[18] See Amendment 40 in the ECON report.

that may result into a partial or complete depletion of the retained tranches. This retention is usually made from the junior tranches which are the first ones to absorb losses in case of any downgrade or under-performance of the collateral. The investment of the institutions holding these securities will become non-risk retention compliant after the depletion of the securities retained by the originating institution. This may result in making their holdings illiquid in the secondary market. The originators should be required to maintain their risk retention position till the maturity of the issued ABS.

It is argued in the explanatory memorandum (paragraph 3) of EC's proposal for amendments in the Capital Requirement Regulations (CRR)[19] that impact assessment of proposed amendments in the CRR and standards for the STS securitisation shows that investors would be encouraged to re-enter the market, as it will send a signal that risks are better calibrated now. However, the impact assessment has ignored the cost implications of compliance with these proposals. Although it is claimed in the paragraph 3 of the explanatory memorandum of the CRR proposal that this proposal will reduce the operational cost for issuers and investors, it is unclear that how this cost will be reduced when burden of retention is increased for the issuers and granular due diligence requirements are in place for investors.

One may argue that in the presence of the stigma attached to the securitisation after the GFC, it is imperative to impose RRR for the revival of investors' confidence.[20] Investors might not believe in pre-existing market-based forms of risk retention and remain concerned that they will be bearing the entire risk related to these transactions. Nonetheless, a uniform flat-rate RRR may not be appropriate, potentially for the reasons outlined below.

- Many originators may find RRR unnecessary in the presence of pre-existing forms of risk retention. It might be considered as a punitive treatment of securitisation by originators, especially in case of those banks which are not securitising their assets on a large scale and the ones which are securitising their high quality assets. These regulations might be taken as mimicking the US regulations, where the OTD model was widespread. The absence of the OTD model in the European securitisation market exacerbate the concerns that these regulations might not be able to correct anything in

[19]Proposal for a "REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL Amending Regulation (EU) No. 575/2013 on Prudential Requirements for Credit Institutions and Investment Firms". Brussels: European Commission, No. COM(2015) 473, 30-09-2015.

[20]ABS of AAA rating were considered having a probability of 0.1% of default before the GFC. However, these securities defaulted in 16% cases (European Commission, 2015a). As a result of sizeable losses across the globe, investors lost confidence in these securities. A wide-spread perception was that banks do not have enough 'skin in the game' in securitisation transactions. Therefore, the RRR is introduced to give confidence to investors about bank's 'skin in the game' that might help reviving investors confidence in this market.

the European market.

- The ratio of 5% might prove trivial for the banks which securitise at a large scale and especially which are securitising their bad quality loans. In case of bad loans, equity tranche can exhaust quickly and losses may quickly extend to other tranches beyond the limits of 5%. This might not help in increasing the marketability of the securitised instruments. On the contrary, the limit of 20% —as amended by the ECON —might prove to be too high for the banks that securitise at a lower scale. As a result, banks may not be interested in securitising their assets because of the significant burden of retention.

- The high burden of the risk retention might keep smaller banks away from this market. The capital relief through securitisation in the presence of high retention requirements may not be attractive for the smaller banks to securitise. This might deprive them from the funding and liquidity benefits of this market.

- Regulators emphasize that securitisation transactions should be backed by a homogeneous pool of assets.[21] However, these pools are required to be homogeneous in terms of their asset types,[22] not in terms of the risk classification of these assets. Some of these assets can be of higher risk and vice versa. Therefore, a uniform risk retention of 5% might be overly zealous when assets used for securitisation are of high quality and it may not be sufficient in an alternative situation.

- Different classes of ABS performed differently before, during and after the GFC. Therefore, a flat rate RRR may not be suitable for all classes. It can be too strict for the high performing ABS and vice versa (Guo & Wu, 2014).

Kiff and Kisser (2014) suggest linking the RRR with the state of the economy. These requirements should be higher in a bad state of economy and vice versa. This proposal is practically difficult to implement as sudden shocks can make it harder for regulators and banks to respond quickly. Monitoring of loans is actually performed before the loan sale for securitisation purpose. If poor quality loans are already issued and securitised, this situation cannot be reversed at the time of a shock. Moreover, banks are under the pressure of deleveraging in a bad state of economy and their ability to buy back some of the floating securities in the market will be questionable.

[21] See Article 8(4) of the STS proposal
[22] See the amendment of Article 8(4) of the STS proposal in the ECON report

The empirical findings in chapter 5 of this study show that the relationship of securitisation with the systemic risk of banks is not a flat one. Rather, this relationship changes with the level of a bank's involvement in the securitisation activity.[23] Therefore, in light of these empirical findings and above discussion, it would be more appropriate to devise incremental risk retention requirements.[24] These incremental requirements can be linked to three particular aspects of securitisation.

1. The risk classification of the assets being securitised should be considered. Currently, the STS proposal is based on the way transactions are structured and not on the credit quality of the underlying assets. This might be interpreted as ignoring the economic substance of the securitisation and focusing on the legal form. This approach might undermine the use of high quality assets in securitisation and banks may feel motivated to securitise their bad quality loans. Regulators have attempted to counter this situation by putting the disclosure and due diligence requirements.[25] However, characteristics of the underlying pool might change and disclosure or due diligence may become ineffective in such a situation. The 5% risk retention may not suffice in this situation. Therefore, risk retention should be linked with the credit quality of the assets. Banks using higher quality assets in securitisation should face a lower risk retention requirements and vice versa. This will promote the use of high-quality assets in the securitisation.

2. The RRR should be directly proportional to the level of a bank's involvement in securitisation. The RRR should be higher for banks who are involved in securitisation at a large scale and vice versa. However, banks having marginal presence in this market should face less stringent RRR. Such a policy will have twofold benefits. First, it will limits banks' involvement in securitisation and it will not go out of bounds. The likelihood of distortion of monitoring incentives is higher when banks securitise without any bound. Second, it will facilitate the entry of smaller banks in this market which can also reap the benefits of cheap funding through this market.[26] This is in line with the findings of chapter 5 of this study.

3. The RRR should be based on the historical performance of the class of assets being

[23] See Sections 5.4 and 5.5 for the detailed results and discussion of empirical findings.

[24] Regulations should become more strict when a banks increases its involvement the securitisation market.

[25] The originators are required to provide the information about the risk level of the assets and measures taken to manage the involved risks. The investors are required to show their compliance with granular due diligence requirements while taking an exposure in securitisation.

[26] A higher RRR may exclude many small banks as it reduces the capital relief after the securitisation. Hence, these banks may not securitise as intended benefits are no longer achievable.

securitised. The classes with a high past performance should be subject to lower RRR and vice versa. This will help in promoting high quality securitisation.

The incremental RRR will not only help revive investors' confidence in the securitisation market but it will also control the problem of out of bounds securitisation.[27] The high retention applied to the high volume of securitisation will ensure that banks have enough retention even in a situation where market shock deteriorates the underlying exposures. On the other hand, low level of the retention will encourage smaller banks to securitise who might be of the view that they might not be able to achieve the intended capital arbitrage benefits because of the higher retention requirements.

6.2.2 Capital Requirements

Capital requirements for securitisation have been a subject of criticism in the market after the GFC. There have been numerous calls to revise these regulations. Ironically, regulations are forcing investment out of the securitised assets at a time when many commentators are in favour of reviving this market. In terms of relative value, there is a strong case for securitised assets, showing their value to investors as a form of diversification. Mark Hutchinson, Head of Alternative Credit at M&G Investments, one of the larger securitisation managers, says:

> *There are many instances where we have spoken to potential investors on the insurance side and taken them through the stress resilience tests and it has been acknowledged that spreads look favourable compared to corporates, unsecured financial debt and CBs. However, in most cases they point to the brutal capital charges under Solvency II versus those of other markets. If the Solvency II capital charges for ABS recognised the strong credit performance of the asset class, I would think you would see much more participation in the markets from insurers.*
>
> (*cited by* AFME, 2014)

The revised Basel III securitisation framework identifies that risk weights in the Basel II were not calibrated properly. Risk weights assigned to high-rated (low-rated) securities were excessively low (high). This poor calibration of risk weights resulted in 'cliff effects' in the banking system.[28] The revised framework attempts to enhance the risk sensitivity of

[27] See section 5.3.1 in chapter 5 for the detailed discussion about out of bound securitisation.

[28] A small downgrade in the rating of an exposure may result in rapid deterioration of the bank capital. This phenomenon is known as 'cliff effect'.

the framework to avoid the circumstances seen during the GFC. The new Basel III introduced internal risk based rating mechanism that is on top of the hierarchy of approaches for risk weighting. All the securitisation exposures that cannot be rated by any of the three approaches recommended in Basel III Framework will be assigned a risk weight of 1,250%. Under the standardisation approach, the lowest risk weights are assigned to securitisation exposures backed by the residential loans.[29]

Strict capital regulations have been introduced to avoid the situation when capital base of a bank erodes as a result of downgrades in its exposure because of the credit deterioration of the underlying assets. The risk weights have been recalibrated to ensure that a bank has enough capital to avoid the effects of credit deteriorations. However, it is noteworthy that the main problem in the European market was not deterioration of the credit, rather some of the securities became illiquid in the market during the GFC and rapid fall in their prices led to high marked-to-market losses (Blommestein et al., 2011). These marked-to-market losses mounted exponentially for the banks who had larger exposures in the securitised products.[30] Nonetheless, many classes of the securities remained significantly liquid even during the GFC. Hence, high capital requirements for those classes of ABS which remained highly liquid may not be justifiable.

The current regulations perceive that Residential Mortgage-Backed Securities (RMBS) outperform all other classes of ABS. This perception about superiority of RMBS is also visible in the capital regulations, as they receive the lowest risk weights. Perraudin (2014a) shows that some of the non-residential mortgage backed securities outperformed RMBS. Therefore, the historical performance of various classes of ABS should be taken into account while assigning risk weights to them. Moreover, residential loans backed securitisation has never been popular in Europe with an exception of Netherlands and Spain. Residential mortgages were subject to 50% risk weight in Basel II. These high risk weights, on one hand, precluded banks from issuing these loans and, on the other hand, it was more difficult to securitise these loans because of their high risk weights.

The recent CRR proposal by the EC has proposed some revisions in the capital regulations already in force through CRR directive.[31] It is realised in the CRR proposal that the STS proposal per se may not help revive the European securitisation market. A prudential treatment reflecting the specific features of the transaction under the new framework should also be

[29]See BCBS (2016) and chapter 3 for details about the approaches of risk weights calculations

[30]This assertion is supported by the empirical findings in chapter 5 of this study.

[31]CRR proposal was issued along with the STS proposal as it was realised by the EC that STS may not be able to achieve the desired objectives unless capital regulations already in place in the CRR directives are also not calibrated with the STS securitisation.

introduced. The capital charges for the securitisation transactions meeting the requirements in the STS proposal are lowered in the CRR proposal. This proposal has introduced many provision that should be welcomed by the industry. A positive aspect of this proposal is the introduction of the 'capital neutrality' or 'look through' approach, as advocated by some of the market participants (Federation Bancaire Francaise, 2014). An FI is not required to apply higher risk weights to a senior positions in securitisation than the risk weight applicable to the underlying assets had they not been securitised.

The risk floor (the lowest risk) for the STS-compliant securitisation has been reduced to 10% from 15% in the CRR proposal.[32] This will help create a level playing field. This proposal seems to be a step in the right direction. However, AKA et al. (2013) argue that this risk floor is still higher than the pre-existing one i.e. 7%. Securitisation transactions meeting the STS criteria will be most senior securitisation transactions. The granular disclosure and due diligence requirements along with the RRR is likely to result in a very high-quality securitisation. Therefore, reducing their risk weight to the current level in order to keep the interest of investors alive in this market might make some sense. Moreover, the CRR proposal stipulates that the aggregate exposure value of all exposures to a single obligor should not exceed 1% of the total outstanding exposures of the pool of underlying assets.[33] The 1% level is too strict. It might cause the exclusion of many of the otherwise eligible assets from the securitisation pool. This limit should be increased.

Cerasi and Rochet (2014) suggest that capital regulations should be linked with the macroeconomic conditions, similar to the proposal of Kiff and Kisser (2014) about the RRR. However, this proposal is also practically difficult to implement for the same reasons as explained above for the RRR. The sudden changes in macro economic conditions can make it difficult for banks to make the necessary adjustments in their capital structure promptly. Banks might not be able to raise new capital or cut back their level of securitisation exposures. It would also be difficult for regulators to respond promptly in this situation and revise the capital requirements as per the intensity of the shock.

An important development in the the Basel III framework is that it draws the attention towards the tranche thickness of non-senior tranches.[34] The thickness of a tranche in the

[32]Risk floor is the lowest risk weight that can be assigned to a particular security. The minimum capital required against the holding of a particular security is determined on the basis of the risk floor. The risk floor of 10% for ABS implies that even the highest class of ABS will receive a minimum risk weight of 10%.

[33]See Article 243(2b) of the CRR proposal

[34]Thickness of a tranches is defined by its attachment and detachment points. The attachment points shows the amount of subordination enjoyed by the relevant tranche, whereas detachments points is representative of the maximum sustainable loss of the tranches. Tranches thickness is measured by subtracting the attachment point from the detachment point. Supposedly, there are two tranches of same class (e.g. Mezzanine tranches),

calculation of risk weights should be taken in account. Thus, Basel Committee on Banking Supervision (BCBS) recommends a differentiated treatment of non-senior securitisation on the basis of tranches thickness. Table 2 of the Basel III Framework provides the risk weights against different ratings of securitisation exposures. The thickness of the tranche is taken into account as:

$$RW_s = [\textit{risk weight after adjusting for maturity}] \times [1 - \min(T; 50\%)] \quad (6.1)$$

where RW_s is the risk weight for the securitisation exposure and T represents the tranche thickness. Along with the recalibration of risk weights in light of the recommendations given by AKA et al. (2013); Federation Bancaire Francaise (2014), I introduce the incremental risk weights for the securitisation exposures. These incremental risk weights can be calculated as follows:

$$RW_s = \sum_{i=1}^{N} \left\{ (RW_i) \times (1 + S_i) \right\} \quad (6.2)$$

where RW_i is relevant risk weight for the rating class of the i^{th} exposure of the FI, N is the number of exposures and S_i is the securitisation factor of the i^{th} exposure that is given by:

$$\underset{s=0}{\overset{q}{S}} = f\left\{ \frac{Securitisation\ Exposure}{Total\ Assets} \right\} \quad (6.3)$$

The lower limit of the securitisation factor is 0 and the upper limit is a random value q. The securitisation factors should be introduced after a certain level of securitisation exposure taken by the bank and it should increase with an increase in the securitisation exposure of the bank. I believe these incremental weights are more suitable than flat rates applicable for all banks. They will not only help reviving investors' confidence but also help control the detrimental affects of the high securitisation exposures. The suitability of these incremental risk weights stems from the following arguments.

First, many of the investors are not willing to return to the securitisation market because of higher risk weights requiring them to retain higher capital against their securitisation exposures. This is especially true for smaller institutional investors who have a lower capital

Tranches A and Tranche B, having attachment points of 4% and 8% and detachment points of 10% and 20%, respectively. It implies that investors in tranche A will start suffering after the 4th default and entire class will be lost after the 10th. However, the loss for the investors in tranche B will start after the 8th default and entire tranche will be lost after the 20th. Hence, tranche B is safer than tranche A as it is enjoying a higher level of subordination because of higher thickness.

[35]The risk weights are taken from the Table 2 in the Basel III document at p. 23.

base and have problems in raising new capital. The recalibrated rates with a 0 securitisation factor or a lower securitisation factor will attract a large number of investors in this market, especially small institutional investors. As the pre-existing rates will be applicable up to certain limits of the securitisation exposure, this strategy will help overcome their concerns about higher weights.

Second, the incremental weighting methodology will refrain investors from taking excessive exposures in securitisation. This will also discourage originators to securitise excessively because investors will not be willing to cross a certain threshold while taking exposures in the securitisation market. The cliff effects highlighted in Basel III were mainly visible because of banks' large exposures in the securitisation market. I believe that small downgrades in the securitisation exposures eroded banks' capital base largely because the size of their securitisation exposure was very high.

The study does not support the assertions that the higher issuance of CBs can lead to higher risk for banks. According to the results reported in the chapter 5, the issuance of ABS helps banks control their systemic risk but after a certain threshold this relationship is reversed.[36] However, such situation is not observed in case of CBs. The issuance of CB does not cross a certain threshold.[37] It is recommended in the above sections that ABS should not be given a flat treatment but incremental regulations are proposed here. Regulators should provide a differentiated treatment to ABS on the basis of the issuance size and the class of issued securities. However, because of the differences in behaviour of these two instruments (as reported in empirical findings of chapters 4 and 5) and issuance trend, a differentiated treatment for CBs akin to the one recommended for ABS may not be suitable.

The empirical findings in the chapter 5 suggest that small issuance of these bonds by the smaller banks might increase the risk level, while bigger banks might not get affected. CBs only reduce the bank risk when they are issued in large quantity i.e. jumbo CBs. The level of unencumbered assets should be taken into account while assigning Risk Weights (RWs) to CBs, as the underlying pool can be affected by the quality and quantity of unencumbered assets. These results imply that CBs are not the right instruments for every bank. Only banks with a large asset base should enter into this market. Therefore, instead of putting differentiated capital regulations for CBs, I support the licensing mechanism. Some countries are already following this mechanism and only the credit institutions having the licence to issue CBs can issue these bonds. Moreover, the Article 129(7) of the CRR provides a preferential treatment to CBs on the basis of transparency requirements. Among other transparency requirements,

[36] See sections 5.4 and 5.5 in Chapter 5 for detailed results and discussion.
[37] See Table 5.2 and accompanying discussion.

I also recommend that credit institutions should be asked to disclose the details about the unencumbered assets after the issuance of CBs.

6.2.3 Liquidity Requirements

The long term need for a stable liquidity was never felt before the GFC when banks faced serious liquidity problems. It was generally assumed — before the eruption of the GFC — that funds were always available with a bank. Therefore, proper liquidity management systems were not well developed in the banking system — as opposed to the capital planning. The GFC unravelled how quickly liquidity can dry up and how much time it can take to return to the banking system (BCBS, 2014a). The BCBS introduced liquidity standards as part of their Basel III framework (BCBS, 2013). The purpose of these standards was to ensure that banks remain liquid at all times. Under the Liquidity Coverage Ratio (LCR) framework, banks are required to maintain High-Quality Liquid Assets (HQLA) that should be enough to survive over a period of 30 days under a stressed situation.

LCR is an important regulatory development after the GFC. The liquidity standards introduced by the BCBS were followed by the EU in the CRR directive and delegated regulations were introduced for LCR requirements later on (European Union, 2014). According to the LCR requirements, the available liquidity should be equal or greater than the required liquidity, given as:

$$\text{LCR}(\%) = \frac{\text{Liquidity Buffer}}{\text{Net Liquidity Cash Outflows (over a 30 calendar day stress period)}} \tag{6.4}$$

The recital 10 of the LCR regulations, realises that scope of the securitised instruments included in the earlier LCR framework introduced by BCBS and the one mentioned in the CRR Directive is quite limited. Some other ABS, especially auto loan ABS, showed a consistent performance during the shocks of the GFC that is comparable to RMBS. This in line with the concerns of AKA et al. (2013) who argue that Auto ABS have the lowest spread among all classes of ABS. European Auto ABS exhibited resistance during the GFC and investors did not face losses similar to other classes of securitised products. Moreover, ABS backed by Small and Medium Enterprise (SME) loans should also be given consideration subject to their compliance with the high quality requirements. Many of these recommendations are included in the revised LCR framework.[38]

[38]See Table 3.1 for details of assets included in the LCR framework and Chapter 2 of the Regulation (EU)

Despite many improvements in the revised LCR framework, there is still need to reconsider some of the provisions in this framework. The current framework is not consistent with the STS securitisation and this is also realised by the EC in the paragraph 6 of the explanatory memorandum of the CRR proposal. Currently, all securitised products are placed in the last category of HQLA i.e. level 2B Assets. As a result, securitised products are subject to higher haircuts. Though, many of the current provision are sensible — especially, limits imposed on the level of various classes are justifiable in light of empirical findings of this study. The treatment of ABS should be made comparable with some of the similar securities.

The current LCR framework includes CBs in all levels of HQLA, even in level 1 along with bank notes and reserves from central bank.[39] ABS are part of level 2B Assets of the LCR framework i.e. the last category of HQLA. ABS are receiving a disfavoured treatment as compared to some high quality corporate debt securities as well. I believe that high quality securitised instruments should also to be upgraded to the upper levels of HQLA. The treatment should be comparable to CBs with respect to RWs and Credit Quality Step (CQS) of the underlying assets. The ABS meeting the STS criteria and backed by a pool with a low Loan-to-Value (LTV) ratio (at least 60%) should make a place in level 1 assets. The inclusion of high quality ABS in all levels of LCR will certainly improve the liquidity profile of banks and provide greater flexibility to banks. However, regulators may decide to apply a higher haircut as compared to CB depending on the risk classification of the ABS. Moreover, limits should be placed on the amount of these ABS and holding of ABS in any category should not go beyond a certain threshold.

A differentiated treatment for various classes of CBs is visible in the LCR. This differentiated treatment is mainly based on RWs of CBs, CQS of underlying assets and size of the CB issuance. This treatment of CBs is supported by the empirical findings of this study, as smaller issuance of CBs is found contributing towards risk creation and (jumbo) CBs issued in larger size have been more liquid than other (non-jumbo) CBs. The pattern of the treatment should be similar for ABS with respect to CQS and risk weights. However, this pattern should be opposite with respect to the issuance size. A differentiated treatment to various classes of ABS should be given on the basis of their historical performance. Regulators can apply lower haircuts to ABS with strong historical performance and vice versa. Failure to amend the regulatory framework to reflect the historical evidences would make many classes of ABS ineligible for the LCR.

There are three important concerns related to the current LCR framework that need to be

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[39]CBs included in level 1 assets are subject to haircut of 7%.

addressed.

1. The risk might get pushed towards smaller banks (House, Sablik, & Walter, 2016). CBs included at all levels of the LCR are subject to the higher issuance limits. Many of the CBs issued by smaller banks remain excluded from the LCR and holders of these bonds cannot use them under the LCR framework. Consequently, smaller banks cannot improve their liquidity profile through including CBs because of the large size of eligible CBs. This provision coupled with inclusion of ABS in the last category of HQLA provides these banks with limited options. Therefore, these banks should be given the option to use ABS in the LCR framework, even with some incremental haircuts.

2. The allowed limit of CB is higher than ABS (40% vs 10% respectively). In my view, there is nothing inherently wrong in this higher limit for CBs. However, an important element should be taken into account about this difference in the limit of these two instruments. The CB issuance in the economy cannot cross a certain limit because of the inherent limitations of CBs. Therefore, some bank might not be able to exhaust this allowed limits. Hence, they will have to move towards other instruments to meet the LCR and some of them can be expensive for banks.

3. Many investors are concerned that ABS are still disfavoured to many other market instruments in the LCR framework. The objective to revive the securitisation market may not be achievable unless these concerns are addressed by the regulators.

Differentiating between different classes of ABS is recommended for the following reasons.

1. The inclusion of high performing classes of ABS will ensure the integrity of the liquidity buffer.

2. Small banks — who cannot use CBs in the LCR because of the large size of eligible CBs — will be able to improve their liquidity profile by using ABS, whereas in the mean time limits placed on ABS will restrain them from hoarding ABS.

3. The inclusion of the STS securitisation in the upper levels of HQLA will address the concerns of investors who are of the view that compliance with the granular requirements of STS securitisation does not provide the proportional benefit. Hence, this recalibration of LCR can play a vital role in restarting the securitisation market.

4. The inclusion of multiple categories of ABS across different levels of HQLA will provide a flexibility to investors and they will be attracted to other classes of ABS.

5. The right treatment given to the well-performing classes of ABS will keep the market of these securities alive. Such treatment will help stimulate the growth of the sectors which are financed by these securities.

6. Higher haircuts on lower classes of ABS refrain investors from investing in low quality securitisation.

6.2.4 Due Diligence

The recent securitisation regulations emphasize on the due diligence of investors. As per the Paragraph 2(d) of Article 3 of the STS proposal, an investor must be able to demonstrate that he has performed the due diligence while taking a position in securitisation. However, it is not specified that how regulator can ensure the compliance with granular due diligence requirements. The proposal does not clarify what kind of documentation can be provided by the investors to buttress their claim of due diligence. The STS proposal may not provide the intended benefits in the absence of a monitoring mechanism.

The due diligence requirements are imposed in case of securitisation exposures only, while it is believed that investors are already supposed to perform due diligence in all forms of investment. Many investors might be unwilling to take the pain of meeting the requirements of STS when they can have other lucrative investment options getting a relatively better treatment in regulations. Therefore, regulations for different classes of securities should be made comparable in order to create a level playing field. This might be especially true when ABS are subject to higher risk weights in the capital regulations and higher haircuts in the LCR framework. This discriminatory treatment of ABS vs CBs will give rise to concerns that ABS are treated punitively in regulations.

The due diligence might not be required in case of CBs because the regulators are strictly monitoring the cover pools that kept investors confidence intact in this asset class even at the time of the turbulence during the GFC. Therefore, instead of placing a heavy burden of granular due diligence requirements, it might be more useful that regulators should devise a monitoring system for ABS akin to CBs. This will not only simplify things for originators and investors, but investors' confidence will also be revived in the market. The burden of due diligence will be reduced and monitoring by supervisory authorities will provide a greater confidence to investors who are concerned about the self-certification. This monitoring mechanism will be

considered more trustworthy than the STS notification issued by the originators.

If due diligence requirements are deemed necessary, such requirements should also be introduced for CBs. The investors should evaluate the level of unencumbered assets on the bank balance sheet after the issuance of CBs, as they result in encumbrance of some high quality assets. This is specifically important when a bank takes exposures in CBs issued by smaller banks. The evaluation of unencumbered assets might be necessary as the replenishment of cover pool can be affected when a bank has small amount of unencumbered assets.[40]

Exercising the required due diligence by the investors is heavily dependent on the availability of the data. Most of these data are provided by originators. An investor might not be able to perform the required due diligence when appropriate data are not made available by the originators. There are many disclosure requirements in the STS proposal to overcome this issue. I would like to make two recommendations for the disclosure requirements. First, the originators should disclose the amount of securitised assets relative to its total assets generated during a year. This will help investors evaluate the level of an originator's involvement in the securitisation. Investors will be in a better position to evaluate the risk implications of this involvement of the originator in the securitisation activity. Second, the disclosure should also be made about the remaining unencumbered assets after the issuance of CBs. The investors will be better able to evaluate the risk characteristic of their CBs exposures. The quality of these unencumbered assets will help them evaluate the effects of a crisis situation on the underlying cover pool and ability of the originator to replenish this cover pool.

6.3 Quantity vs Quality — The Right Question

Most of the post crisis regulations for securitisation market are premised on the view that problems in this market are linked with the complexity of securitisation. Investors were not able to understand the risk embedded in the complex securities and price them accordingly (Krainer & Laderman, 2014). Many of the traditional models were not able to evaluate the risk of these complex securities (Brunnermeier et al., 2012). Moreover, most of the information related to the issued securities and underlying pools of assets were not disclosed by the originator (Cheng et al., 2011; European Commission, 2015c). Therefore, the problem of "selling lemons" was also pervasive because of the wider information asymmetry (Z. Chen

[40]Banks are required to replenish the cover pool at continuous basis. The non-performing assets in the cover pool are replaced with the performing ones. The small amount of high quality unencumbered assets might make this replenishment difficult for the bank at the time of a crisis and increase risk for CB holders.

et al., 2017; Farruggio & Uhde, 2015). Hence, regulators have emphasized on a greater level of transparency and structuring of standardized and simple securities. The recent STS proposal is aimed at achieving this objectives. It is believed that more transparency will result in a higher quality securitisation and risks can be better managed with the high level of information.

It might be true to some extent that complexity of the securitised instruments resulted in an inability of investors to properly evaluate the risk of these securities. However, it is also pertinent to note that the losses resulting from the collapse of securitisation market during the GFC mounted inordinately because of the large exposures of these institutions in the market. The 'cliff effects' were catastrophic because of the size of these exposures. However, the scale of a bank's involvement in securitisation has not received proper attention in the regulatory framework and focus is visible on the due diligence, transparency and disclosure. The compliance with all these requirements might not help in avoiding astronomical losses if the issue of large exposures is not addressed. A situation may arise where neither the investors nor the originators are at fault. For instance, interest rate risk or currency risk may no longer remain hedged if a counter party stop operating or get downgraded (Slaughter and May, 2015). The investors might face significant losses in this situation as the value of their investment might fall. However, it is uncertain if they can take an action against the securitising parties. These losses can be astronomical in case of large exposures in securitisation transactions regardless of the quality of the securitised products.

The rising trend of CBs gave rise to concerns that CBs can be the next "next thing". These concerns called for imposing limits on the issuance of these bonds. Some countries already started following these recommendations and they capped the issuance of CBs at 8% of total assets of an FI. However, the case of CBs is a bit different from the case of ABS. The underlying pool of assets in case of CBs does not leave the balance sheet of the issuing institutions. Therefore, the issuer is required to hold capital against these assets. This is a major reason for which CB market cannot grow out of bounds like securitisation. CBs floating in a economy cannot surpass the capital constraints of the financial system. The empirical results presented in the chapter 5 do not support the assertions related to imposing limits on CB issuance.[41] However, it is noteworthy that apart from the capital holdings requirements, some other inherent limitations of CBs are most probably playing a role in the positive performance of CBs. These limitations include strict eligibility criteria for the cover pool assets and constant monitoring by supervisor authority. If these limitations are removed

[41] See Table 5.2

then situation might become different.

The situation might vary for small banks and the bigger ones in case of CBs. Smaller banks have limited assets and they might not be able to deal with the negative effects of asset encumbrance because of their balance sheet size. Therefore, it is important to evaluate the capacity of a bank to withstand the asset encumbrance resulting from the CB issuance. Smaller banks must follow a specific limit for the unencumbered assets of the bank. The banks meeting the requirement of unencumbered assets should be allowed to issue CBs. In this way, I support the licensing mechanism followed by many countries for issuing CBs. The licensing will ensure that banks having sufficient capacity to issue CBs enter this market.

Contrary to CBs, the extensive involvement of banks in the securitisation market has been visible. This is because of the capital relief provided by the securitisation through the transfer of assets out of the balance sheet. This feature of securitisation incited banks to securitise without any limits. I believe that this limitless securitisation has been the culprit and not the securitisation per se. Hence, a flat stringent treatment of securitisation may not be justified. The regulators need to control the limitless securitisation instead of increasing the regulatory burden for all types of securitisation transactions. Currently, the regulations are only focusing on controlling the risk in the securitisation market, mainly through RRR and strict LTV requirements. However, this objective is competing with the objective of reviving this market. Therefore, a differentiated approach is more plausible. The high performing classes of ABS and low issuance of ABS should be subject to lax regulations and vice versa. This will not only help in resuscitating the securitisation market but strict requirements for the higher size of securitisation exposure and issuance will discourage the limitless securitisation in the market.

6.4 Concluding Remarks

Pressure on European banks increased over the time to de-lever. The reliance on banks during these times may not provide the requisite capital to the economy. Securitisation in this situation can be an important source of the capital provision. It can stimulate the economic growth of banks, especially when banks are under the pressure of deleveraging. The lending capacity of the banks was severely affected after the GFC and banks are still struggling to increase their lending capacity. At this time, securitisation can be a stimulant to increase the lending capacity of the banking system.

A number of regulations are introduced for the securitisation market after the GFC. Many

of the regulations for CBs were also updated during this period. Most of the regulations are introduced in response to the post crisis criticism on securitisation. However, once the dust of the GFC was settled, it was felt that many of these regulations are overly zealous and securitisation market will be marginalised as a result of these regulations. Hence, the regulations have been repeatedly revised during the last few years. Regulators are trying to meet two competing goals: (i) making banks less risky and (ii) maintaining the credit flow in the economy. Getting the balance right is difficult, but apparently, in the pursuit of the former goal, the latter is being jeopardised. Moreover, a third goal is being ignored here i.e. controlling the cost of securitisation transactions for the issuers and investors. The securitisation market cannot be restarted until it is not very cost effective for the issuers. Even the revival of investors' confidence in this market may not help restarting it, as issuers might find it expensive to securitise. The achievement of all these goals is imperative for restarting the securitisation market and building a stable banking system.

The STS proposal has been welcomed by many participants in the European securitisation market. However, the proposal itself is not simple and transparent. It has many vague provisions that are open to different interpretations. STS proposal does not provide any information on how this proposal will help diversify the risk and make the financial system more stable. A mere compliance with STS proposal may not help banks control the risk. Moreover, in the presence of credit enhancement and tranching, securitisation can by anything but simple transparent or standardized. The real benefits of the STS securitisation may not be achievable under the circumstances explained above, rather the cost can be significant. Therefore, only the promulgations of STS securitisation may not help restarting the securitisation market.

Currently, measures are focused on making the securitisation transactions safer. However, the element of high administrative and market cost associated with these (safe) transactions is ignored. The costly compliance with these regulations may cause a loss of issuers' and investors' interest in these securities. After the compliance with these regulations, securitisation might become a more expensive funding source for banks as compared to other options. The STS proposal also envisages severe sanctions in case securitisation is not compliant with the STS proposal. In presence of ambiguities in the proposal, investors will be reluctant to enter the securitisation market as non-compliance may result in severe sanctions. The proposed procedures to determine the non-compliance by the competent authorities leads to a high level of uncertainty among originators. These sanctions appear to be more severe when many of the provisions in this proposal are open to different interpretations. Even the violation of one requirements will lead to strict sanctions.

In order to revive the securitisation market in Europe, it is imperative to make it economic

for originators to issue ABS and for investors to hold them. Punitive and inequitable regulatory treatment of securitisation in the EU is preventing the resumption of this market. One might argue that many of the post-crisis regulations make sense, as complex and opaque securitisation played a significant role in the onset of the crisis. However, it is important to understand the differences in various markets and identify the actual sources of risk. The regulators should align the regulations accordingly. This alignment is necessary if regulators want to reverse the shrinkage of securitisation in Europe after the GFC.

Chapter 7

Conclusion, Policy Implications and Recommendation for Future Research

This chapter comprises of three parts. The first part concludes the study, the second part summarises and enlists the policy implications, and the third part provides some recommendations for the future research.

7.1 Conclusion

European economy is facing a hefty challenge of stimulating its growth and increasing employment. Threat of deflation is also hovering around that needs to be dispelled. To meet these goals, a financial system with a good capacity of delivering capital is needed. Europe is still heavily reliant on the banking system for funding, even during the times when banks are deleveraging. This situation is generating funding gaps for many companies.[1] The initiative of the Capital Market Union (CMU) has also been taken in order to meet this challenge. This initiative is expected to increase the integration of capital markets in Europe and breakdown the cross border barriers. CMU aims at providing new funding sources to businesses, reducing the cost of new capital, supporting long term projects, and stabilising the financial system of the EU. CMU is focused on shifting the financial intermediation to the capital markets.

Securitisation is a key funding tool in Europe and a channel for borrowers to access capital markets. Traditionally, it has contributed to funding real economy assets such as residential mortgages, auto loans and Small and Medium Enterprise (SME) lending. At a time when businesses and households across the EU are experiencing difficulties in accessing finance,

[1] See AFME (2014)

securitisation can improve the availability of credit; both directly by providing new sources of cash to finance growth and investment, and indirectly by allowing banks to recycle and reallocate capital for further lending. A recovery in the securitisation market should play an important role in unlocking credit markets and supporting a wider economic recovery across Europe.

Although dust of the Global Financial Crisis (GFC) has settled down but fingers are still pointed towards securitisation. Regulations devised after the GFC are greatly influenced by the criticism and blames placed on securitisation. As a result, the new regulatory regime is imperilling the region's already struggling securitisation market and further constricting credit supply to the economy. The preferential treatment given to some other instruments like Covered Bonds (CBs) is another element that might be discouraging investors to re-enter the securitisation market.[2] The preferential treatment given to the CBs might make some sense because of the good performance of these bonds. However, the gap between the regulations for CBs and Asset-Backed Securitiess (ABSs) needs to be reduced.[3] The higher discrimination can be a potential barrier in restarting the securitisation market, as investors might remain inclined to other products with lax regulations. Although, ABSs offer higher yield as compared to CBs but this feature might become unattractive because of the accompanying higher capital requirements. I do not argue about giving a similar treatment to ABS as given to CBs, but the regulations for these two instruments should be made comparable given their yield and capital cost. This is based on the different behaviour of these two instruments and their implications for the banking system, as seen in the empirical findings of chapters 4 and 5.[4]

Currently, regulators in Europe have realised that securitisation can play a vital role in the economic growth and they are aimed at building a sustainable securitisation market. Efforts are being made to restart the market. The recent Simple, Transparent and Standardised (STS) proposal and the proposal for amendments in the Capital Requirement Regulations (CRR) by the European Commission (EC) are steps in this direction.[5] However, many of the regulations are still considered punitive for securitisation and they serve as a barrier to the investors

[2]See Section 3.4 for details about the preferential treatment given to CBs.

[3]The empirical findings of chapter 4 suggest that CB issuance might not keep banks from risk taking and ABS issuance might not precipitate risk taking. See sections 4.4 and 4.5 for detailed results and accompanying discussion.

[4]CBs have different implications on banks with respect to the size of bank. See section 5.4.3 for detailed results. However, effects of securitisation change with a change in banks' involvement in this activity, irrespective of the bank size. A non-linear relationship between systemic risk and ABS issuance is suggested by the results. See sections 5.4.1, 5.4.2 and 5.5 for detailed empirical results and accompanying discussion.

[5]See Footnote 14 and subsection of 'Capital Regulations' under the section 3.2.2 in Chapter 3 for details about the EC's proposal for amendments in the CRR Directive.

willing to enter this market. For instance, many of the securitisation transactions might not be able to meet the criteria of STS proposal. Especially, many of the market segments who performed quite well during the GFC either remain excluded from the STS or are subject to strict criteria.

Initial analysis of the recent regulations concerning ABS and CBs shows that many of the premises of these regulations may not be justifiable. Many of them stand in contrast not only with the theoretical understanding of the securitisation process but also with the historical performance of the securitisation market in Europe. The flaws identified in these premises highlight that these regulations may not have been properly calibrated on the actual problems in this market and many of them might be motivated by the market criticism and political reactions towards this market. Moreover, the current European regulations also do not take in account the realities of the European market and influence of the situation in the US market is quite visible.

The empirical analysis strengthens the legal analysis. A major blame placed on securitisation is that it leads to lax lending standards. Banks feel motivated to issue more risk loans as they issue these loans with a view to securitise them at a later stage. The empirical analysis performed in this study does not support this perception. The idea that securitising banks take more risk because of the 'no skin in the game' is not supported by the the positive impact of CBs on the credit risk taking behaviour of banks in the long run.[6] CBs are issued against specific loans that are generally less riskier. Banks using CBs to meet their liquidity requirements might feel motivated to issue some riskier loans in order to get a larger market share, as their market share remains limited priorly because of the requirements for the assets eligible for CB issuance. Hence, even a strong 'skin in the game' in case of CBs is not able to refrain these banks from issuing risky loans.

The issuance of loans is pro-cyclical in its nature. When there is an economic upturn and default probabilities are lower, banks loosen their lending standards, and vice versa. There is high demand for loans in the market and every bank tries to capture the largest market share. This competitive pressure causes the risk appetite of the banks to increase. Many of the loans they issue may be risky because of lax lending standards. However, capital regulations constrain banks' ability to issue loans beyond their capital limitations. The more covetous of those banks might use securitisation to deal with capital constraints, since loan securitisation leaves them with more free capital. Hence, securitisation becomes a secondary factor that contributes to the issuance of risky loans. Securitisation should not be blamed

[6]See chapter 4.

for the issuance of risky loans. It only adds fuel to the pre-existing fire. The securitisation also becomes pro-cyclical here. The 'cliff effects' become drastic because of this pro-cyclical nature of the securitisation activity.

Up to this point, the study argues about the flaws in the premises of the regulations. These premises are important in order to understand the problems in the regulations. However, the question arises if the premises are not correct, then what is the actual problem in the securitisation market. The chapter 5 answers this question. This chapter argues that the relationship of the ABS or CBs with bank stability may not be a linear one. The nature of the relationship might change with the level of a bank's involvement in any of these markets. Initially, the issuance of such instruments might support the banks and help in improving their risk profile. However, after a certain level this relation might be reversed. This can be referred to the concentration risk. This idea is inspired by the proposal of European Banking Authority (EBA) to impose limits on issuance of CBs. Some countries like Australia and Belgium have already introduced such regulations.

The empirical analysis in the chapter 5 supports the idea that problems start because of the pro-cyclicality of the securitisation activity. The initial issuance of the ABS helps banks control their systemic risk. However, a high level of the ABS issuance might reverse the situation for them, mainly because of two factors. First, banks become flushed with the liquidity. This liquidity has to be used somewhere and banks start using this liquidity to create long term assets and some of these assets can be risky. Second, securitisation becomes a replacement for the traditional on-balance sheet liquidity. Instead of managing liquid funds on the balance sheet, banks use securitisation as a liquidity generating vehicle. Whenever, there are liquidity needs banks securitise some of their loans. However, this reliance on securitisation for liquidity might become a slayer for the banking system. A liquidity crisis becomes inevitable when the securitisation market is frozen.

On the other hand, CBs exhibit a different behaviour. Small issuances of these bonds are not able to provide the intended benefits. This behaviour is mainly ascribed to the issuance of Jumbo CBs. These jumbo bonds are bigger in size and investors show a greater confidence in them. As a result, these bonds are more liquid than the traditional CBs. Small banks might not be able to enter the jumbo market because of their balance sheet constraints. Moreover, small banks might face difficulties in dealing with effects arising out of the resulting asset encumbrance after the CB issuance and dynamic cover pool. This situation highlights that this market has its own dynamics and cannot be considered as a replacement to the traditional securitisation. Many CB issuing banks might also feel that they are left behind the competition because their loan generation is limited to particular sectors. This might increase their risk

appetite in the long run.

IOSCO (2011) argues about regulating ABSs and CBs in similar way because of their similarities. Although, these instruments share some common characteristics and they can be regulated similarly in many ways, a complete similar treatment may not make sense. The regulations for securitisation in certain areas can be made comparable to CBs, but many areas require differentiated treatment of these securities. For instance, issuance of CBs requires banks to hold capital against them, unlike securitisation. Therefore, banks who are poorly capitalised are not able to issue these bonds, at least they cannot issue more liquid Jumbo CBs. Moreover, bank size plays an important role in determining the impact of CB issuance on its stability. Hence, where size of the bank must be accounted while regulating CBs, no such requirements are needed for the securitisation market.

The economics of securitisation need to be restored. For issuers, the yield on highly rated securitised tranches must be economic compared with other sources of both secured and unsecured funding. Key investors are unsure about remaining in the market, raising serious doubts about which part of the investor community will be capable of filling the void. In light of this, it is important for policy-makers to support the sector through sensibly calibrated regulatory measures. Securitisation itself should not be considered as a risk creating activity for banks. However, the over use of securitisation should be discouraged. The regulators need to control the cyclicality of the securitisation instead of securitisation itself. Moreover, because of some poor performing classes of ABS, all classes of ABS should not be penalised.

In light of the empirical and legal analysis and discussion, the study concludes that no instrument can be considered as a panacea for the financial system. It is impractical to regulate away all risk in ABS or CBs. Every instrument has certain benefits but these benefits come with an associated cost. The real challenge is to reap those benefits while controlling the cost. The regulators need to create a balance between the costs and benefits. The risk arising out of the issuance of ABS and CBs needs to be controlled but this should not be done at the cost of marginalisation of any of these markets. The diversity within these markets must be considered while devising the regulations and regulations should be more aligned with the historical performance and structure of the securities. A differentiated treatment of various classes of ABS can make more sense, especially when such a differentiated treatment is already given to CBs.

7.2 Policy Implications

The policy implications in the light of the discussion made in the chapter 6 are summarised and listed below.

1. There are various classes of securitised products. The characteristics of these products varies in terms of underlying assets, over-collateralisation requirements, payment structure and risk classification. These classes also performed differently during the shocks of the GFC. Therefore, a uniform treatment of all securitised products may not be suitable. The classes with a good historical performance might be getting a punitive treatment and others might be getting an undesirably favourable treatment. Hence, the historical performance of various classes of ABS should be taken into account and a differentiated regulatory framework should be developed.

2. The current regulations focus on the ways these securitisation are structured and risk weights are assigned on the basis of this structuring. Many of the safety provisions provided during the structuring of the securitisation transactions might change at a later stage. The rapid adjustments of risk weights might be a challenge for banks and regulators as well. The intended benefits achieved through structuring these transactions in specific ways as advocated in the recent STS proposal may not be achievable. Hence, the risk classifications of the underlying assets should also be taken into account.

3. The premises of the new regulations should be reviewed and regulations should be recalibrated in the light of this review. The regulations should not be driven by the market criticism and stigma attached to the securitisation market. Regulators should focus more on the historical performance of various classes of ABS.

4. The capital requirements should be lowered for the high performing classes of ABS and vice versa. A flat treatment given to all classes might prove too punitive for some high performing classes and vice versa.

5. The regulators should consider introducing incremental capital regulations. The incremental capital regulations can help in controlling the element of pro-cyclicality. It might also help in achieving the objective of restarting the securitisation market as banks with a level of securitisation activity will be comfortable entering in the market.

6. The regulatory burden of diligence requirements should be reduced on investors. These regulations are disincentivising for many investors who might be otherwise willing to return to the securitisation market.

7. The high performing classes of ABS should be given a treatment that is comparable to CBs. The discrimination needs to be reduced otherwise investor might remain inclined to other securities as the relative higher yield might not be attractive for customer because of the high associated capital cost, comparative to CBs.

8. There might be no need to restrict the issuance of CBs through placing a limit on the issuance of these bonds. However, regulators should specify the banks who are allowed to issue CBs. Smaller banks may face difficulties after issuing the CBs because of the resulting asset encumbrance. The licensing mechanism for issuance of CBs followed by some countries seems a plausible system as it provides an opportunity to regulators for evaluating the capability of a bank to issues CBs and withstand the resulting asset encumbrance before issuing the license to issue CBs.

7.3 Recommendations for Future Research

There are many aspects of the securitisation and covered bonds markets. The current study could not take care of all these aspects. Some recommendations for the future research are provided below.

1. Future research should focus on the different types of ABS. An analysis of various classes of ABS can provide greater insights about the contribution of these classes to the systemic risk of the banking system.

2. A differentiated analysis of jumbo and non-jumbo CBs can also help in better understanding the dynamics of this market.

3. A cross country analysis should also be performed in order to evaluate the role of local legislations in the stability of these markets.

4. A comparative empirical study of US and Europe can also provide greater insights and help in comparing the regulations on both sides of the Atlantic.

Summary

Regulations for securitisation have been subject to criticism before and after the Global Financial Crisis (GFC). It was widely blamed for spawning the GFC that led to strict regulations for this market. As a result, this market was frozen and banks were not able to issue Asset-Backed Securities (ABS) to access non-depository funds and they moved to alternate instruments. Covered Bond (CB) was an important instrument used by the European banks for this purpose. Preferential regulatory treatment given to CBs also played an important role in focusing on this market. However, once the dust of the GFC was settled, many questions were raised on the blames placed on securitisation. It was realised that securitisation plays an important role in the economic growth and strict regulatory treatment should not be given to this market. Regulators are currently trying to restart this market but strict regulations are hindering the resumption. It is still an open question as to how this market should be regulated optimally? This study attempts to contribute in finding the answer of this question.

This study makes a comparison of ABS with CBs as they are close counterparts, but blames that are placed on ABS cannot be applied to CBs. Banks transfer their assets out of their balance sheet during the securitisation process and it is perceived that they do not have the so-called 'skin in the game' after this transfer. For this reason, securitisation is mainly blamed for creating the problems of moral hazards that allegedly led to the issuance of large scale risky loans. However, such a transfer of underlying asset does not take place in case of CB issuance and banks are supposed to have a strong 'skin in the game'. Hence, the allegations on securitisation should not stand true if CB issuing banks also face similar problems.

The initial legal analysis in this study highlight three elements. First, some questions are raised on the premises of the regulations devised for securitisation after the GFC. It seems that many of these regulations are influenced by the market criticism and political reactions towards the securitisation market. Second, the European regulations are highly influenced by the situation in the US market and not based on the European realities. Many complex forms

of ABS that were omnipresent in the US market were not commonly issued in the European securitisation market. Moreover, the Originate-to-Distribute (OTD) model of securitisation that has been subject of mass criticism was also not present in the European market. Third, CBs are given a favourable treatment as compared to ABS that also plays a role in hindering the efforts to restart this market. The investors might feel that CBs are better instruments, even they offer a lower yield as compared to ABS, because of the high capital requirements in case of exposures in ABS. An empirical analysis has been performed to deeply study these concerns about the regulations.

Chapter 4 of this study compares the impact of ABS and CBs on credit risk taking behaviour of banks by using the data of 253 banks from 7 European countries for the period 2000-2014. This analysis helps evaluate the regulations inspired by the perception that securitising banks take more risk. The study uses the Covariate Balancing Propensity Score (CBPS) with Difference-in-Differences (DID) for the analysis. Initial results suggest that European banks do not securitise for the credit risk transfer, rather main motive behind securitisation and CBs is liquidity generation. I examine effects of securitisation and CBs on credit risk-taking behaviour in the short and long run. The results suggest that securitisation may not have a positive impact on credit risk-taking behaviour of banks. The findings do not support the perception that securitising banks under-price their risk. However, results indicate that CBs may have a positive impact on credit risk-taking in the long run. These results are attributed to the recourse provided in securitisation transactions, competitive pressure and asset encumbrance in case of large scale CB issuance. The 'skin in the game' in form of on-balance sheet retention may not help in reducing credit risk-taking.

Chapter 5 of this study goes a little deeper and empirically investigates how the relationship of securitisation and CBs with bank stability varies with the level of variations in banks involvement in any of these two instruments. The study uses here the data from 46 securitising and CB issuing listed banks in Europe for 2000-2014. The initial results show that some banks have been heavily involved in the securitisation activity, while CB issuance does not go beyond a certain limit. The results obtained using a quadratic model and a generalized additive model suggest a U-shaped relationship between securitisation and systemic risk of the banks. However, this relationship is reversed for CBs. Small issuance of these bonds fail to provide the intended benefits and increase the banks' risk. Further investigation reveal the presence of a strong size effect. The systemic risk of smaller banks increases after the issuance of CB, while larger banks remain unaffected. The study does not support imposing uniform limits on the CB issuance; instead such limits should be linked with the bank size. However, some framework is needed to limit the banks' involvement in securitisation.

The empirical analysis suggests that securitisation per se does not lead to high risk taking, rather the problem starts when banks increase their level of securitisation. In the light of these findings, the study suggests that flat regulatory treatment given to all securitising banks may not be suitable. The revival objective of the securitisation market may not be achievable in the presence of strict treatment given to all forms and levels of securitisation. The study recommends differentiated treatment of different classes of ABS and incremental capital regulations. The capital regulations should be relaxed for banks having a reasonable presence in the securitisation market but they should increase when a bank accelerates its securitisation activity. A differentiated treatment with respect to the classes of ABS and a bank's involvement in this market will encourage those banks which have a lower presence in this market and discourage banks to extensively involve in the securitisation activity.

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Appendices

Appendix A

Structure of Covered Bonds in Major Markets in Europe

Table A.1: Structure of Covered Bonds in European Jurisdictions

	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuldverschreibugnen	Caisse de Refinancement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	(OBG)	Dutch Registered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obrigações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Structure of the Issuer												
Issuer	Licensed UCI	Licensed UCI	Specialised Credit Institution	Specialised Credit Institution	Specialised Credit Institution	Specialised Credit Institution	Licensed UCI	UCI	Licensed UCI	UCI, Specialised Credit Institution	UCI, Specialised Credit Institution	UCI, Specialised Credit Institution
Recourse to credit institution	Yes, direct	Yes, direct	Yes, direct	Yes, direct	Yes, direct	Yes, direct	Yes, direct	Yes, direct	Yes, direct	Yes, direct	Yes, direct	Yes, direct
Owner of cover assets	Credit Institution acting as fiduciary	Credit Institution acting as fiduciary	Credit Institution, pledged to the issuer	Credit Institution, pledged to the issuer	The issuer directly	Credit Institution, pledged to the issuer	The issuer directly	SPE which guarantees the CBs	SPE which guarantees the CBs	The issuer directly	The issuer directly	The issuer directly
Issuer is originator of assets	Flexible	Flexible	No	No	Flexible	No	Yes	Yes	Flexible	Yes	Yes	Yes
Framework												
Special legilsation	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Legal framework for the bankcruptcy of issuer	Special legal framework superseding general insolvency law	Special legal framework superseding general insolvency law	Special legal framework superseding general insolvency law	General insolvency law	Special legal framework superseding general insolvency law	Special legal framework superseding general insolvency law	Special legal framework superseding general insolvency law	Special legal framework superseding general insolvency law	General insolvency law	Special legal framework superseding general insolvency law	Special legal framework superseding general insolvency law	Special legal framework superseding general insolvency law
Cover Assets												

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Table A.1: – continued from previous page

	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuldverschreibugnen	Caisse de Refinancement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Registered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obrigações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Types of assets	Public Sector loans Mortgage loans Loans to credit institutions	Public Sector loans Mortgage loans Loans to credit institutions	Mortgage Loans	Mortgage Loans	Public Sector loans Mortgage loans Loans to credit institutions Senior MBS	Mortgage loans Senior MBS	Public Sector loans Mortgage loans Loans to credit institutions Ship loans Aircraft loans	Public Sector loans Mortgage loans Senior MBS	Public Sector loans Mortgage loans Loans to credit institutions Ship loans	Mortgage loans Senior MBS	Public Sector loans Senior MBS	Mortgage Loans
Geographical scope of cover assets	Domestic, EEA, CH	Domestic, EEA, CH	Domestic (France Only)	Domestic	Flexible	Flexible	Domestic, EEA, CH, USA, Canada, Japan	EEA, CH	Domestic and EEA	EEA	EEA	EEA
Regulator CB specific disclosure requirements to public	Not mandatory	Not mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Not mandatory	Mandatory	Not mandatory	Not mandatory	Mandatory
Valuation of the Mortgage Cover Pool and LTV Criteria												
Valuation used for LTV Calculation	Mortgage lending value	Mortgage lending value	Other	Market value	Mortgage lending value	Market value	Mortgage lending value	Market value	Market value	Market value	N/A	Mortgage lending value
LTV Limit	60%	No Limit, but 60% is industry practice	N/A	80%		80%	60%	80% (Residential) 60% (Commercial)	80%	80% (Residential) 60% (Commercial)	N/A	80% (Residential) 60% (Commercial)
Type of Assets subject to LTV Limit	Residential, Commercial and Agricultural	Residential, Commercial and Agricultural	Residential	Residential	Residential, Commercial	Residential	Residential, Commercial, Agricultural, Ships, Aircraft	Residential, Commercial	Residential	Residential, Commercial	N/A	Residential, Commercial

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	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuldverschreibugnen	Caisse de Refinancement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Registered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obrigações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Benefits to CB holder of the limit exceeding LTV Cap	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	N/A	No
LTV Cap making the entire loan ineligible for cover pool	No	No	No	Loans over 100% LTV	No	No	No	> 80% (Residential) > 60% (Commercial)	> 103%	> 80% (Residential) > 60% (Commercial)	N/A	No
LTV cap requiring removal of loan from cover pool	No	No	No	100%	No	No	No	No	No	> 80% (Residential) > 60% (Commercial)	N/A	No
Any Additional LTV Limits	No	No	No	No	No	No	No	No	No	No	N/A	No
Asset-Liability Guidelines												
Mandatory mitigation of market risk exposure by law	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Method for mitigation of market risk	Natural Matching and stress testing	Natural Matching and stress testing	Natural matching and stress testing (by law perfect matching is required)	Use of derivative hedge instruments on a trigger event such as rating downgrade	Natural Matching and stress testing	Use of derivative hedge instruments by the time of issue of CBs or entry of assets in cover pool	Natural Matching and stress testing	Use of derivative hedge instruments by the time of issue of CBs or entry of assets in cover pool	Use of derivative hedge instruments by the time of issue of CBs or entry of assets in cover pool	Use of derivative hedge instruments by the time of issue of CBs or entry of assets in cover pool	Use of derivative hedge instruments by the time of issue of CBs or entry of assets in cover pool	Use of derivative hedge instruments by the time of issue of CBs or entry of assets in cover pool

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	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuldverschreibugnen	Caisse de Refinancement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Registered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obrigações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Type of coverage test	Nominal Cover Present Value Cover	Nominal Cover Present Value Cover	Nominal Cover Present Value Cover	Nominal cover	Not relevant	Nominal cover	Nominal Cover Present Value Cover	Nominal Cover Present Value Cover	Nominal cover	Nominal Cover Present Value Cover	Nominal Cover Present Value Cover	Not relevant
Frequency of coverage calculation	Daily	Monthly Quarterly	Monthly	Monthly	Daily	Monthly	Daily	Every six months	Monthly	Monthly	Monthly	Daily
Type of applied stress scenarios	Static Dynamic	Not relevant	Dynamic	Dynamic	Static Dynamic	Dynamic	Static Dynamic Model based	Not relevant	Dynamic	Static Dynamic	Static Dynamic	Not relevant
Frequency of stress testing	Monthly	Not relevant	Monthly	Monthly	Quarterly	Monthly	Weekly	Not relevant	At least annually	Monthly	Monthly	Not relevant
Mandatory mitigation of liquidity risk exposure by law	No	No	Yes, by law	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes
Method for mitigation of liquidity risk	Natural Matching and stress testing	Natural Matching and stress testing (Not mandatory)	Natural matching stress testing and liquidity facilities	Contractual arrangements	Natural Matching and stress testing	Contractual arrangements	Natural Matching and stress testing	Natural Matching and stress testing	Contractual arrangements	Natural Matching and stress testing	Natural Matching and stress testing	Natural Matching and stress testing
Grace period in case of a breach of liquidity risk mitigants	No	No	No	No	No	No	No	No	Varying	No	No	No

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Table A.1: – continued from previous page

	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuld-verschreibug-nen	Caisse de Fe-financement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Regis-tered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obri-gações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Consequence for not fixing breach in liquidity risk mitigants	Regulatory or rule-based action	Regulatory or rule-based action	Programme Freeze and other reg-ulatory or rule-based actions	Programme Freeze Event of default of the issuer	Regulatory or rule-based action	Programme Freeze Event of default of the issuer	Regulatory or rule-based action	Regulatory or rule-based action	Programme Freeze Al-ternative administra-tion Event of default of the issuer Other regulatory or rule-based action	Regulatory or rule-based action	Regulatory or rule-based action	N/A
Monitor of maintenance of coverage tests	Supervisory Authority Trustee/CPM	Supervisory Authority	Supervisory authority, rat-ing agencies and other	Rating agency Trustee/CPM	Supervisory Authority Trustee/CPM Other	Supervisory authority, rating agen-cies and Trustee/CPM	Supervisory authority, rating agen-cies and Trustee/CPM	Trustee/CPM	Supervisory authority, rating agen-cies and Trustee/CPM	Supervisory authority and Trustee/CPM	Supervisory authority and Trustee/CPM	Supervisory authority
Regulator public re-porting requirements for liquidity and market risk	No	No	Not relevant	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes
Minimum over-collateralisation Required	Mandatory by Law	By Law and by published voluntary commitments	Mandatory by legis-lations, contractual obligations and published voluntary commitments	By con-tractual obligation	Mandatory by law	Mandatory by law	Mandatory by Law	Mandatory by law	Mandatory by law or contractual obligation	Mandatory by law	Not manda-tory	Mandatory by law

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Table A.1: – continued from previous page

	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuld-verschreibug-nen	Caisse de Fe-financement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Regis-tered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obri-gações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Level of over-collateralisation	2%	N/A	25%	92.5% asset percentage	5%	5%	2%	Assets should be equal to liabilities both on nominal and NPV basis.	5%	5.26%	0%	25%
Protection of OC level above minimum OC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Grace period in case of a breach of coverage test	No	No	No	3 months	No	No	No	No	Varying	No	No	10 days
Consequence for not fixing breach in coverage test	Regulatory or rule-based action	Regulatory or rule-based action	Programme Freeze and other reg-ulatory or rule-based actions	Programme Freeze, event of default of issuer, other regulatory or rule-based actions	Regulatory or rule-based action	Programme Freeze Event of default of the issuer	Regulatory or rule-based action	Regulatory or rule-based action	Programme Freeze Al-ternative administra-tion Event of default of the issuer Other regulatory or rule-based action	Regulatory or rule-based action	Regulatory or rule-based action	Regulatory or rule-based action
CPM and Banking Supervision												
License requirements for issuers	Yes with additional requirements	Yes, but no additional requirements	Yes with additional requirements	Yes, but no additional requirements	Yes with additional requirements	Yes, but no additional requirements	Yes with additional requirements	No, but with additional requirements	No, but with additional requirements	No	No	Yes, but no additional requirements

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Table A.1: – continued from previous page

	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuld-verschreibug-nen	Caisse de Fe-financement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Regis-tered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obri-gações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Reporting to supervisory authorities	Periodic reporting required	Periodic reporting required	Periodic reporting required	Periodic reporting required and reporting on demand	Periodic reporting required	Periodic reporting required and reporting on demand	Periodic reporting required	Reporting on demand	Periodic reporting required and reporting on demand	Periodic reporting required	Periodic reporting required	Periodic reporting required and reporting on demand
Role of bank-ing supervi-sion	Checking the fulfilment of eligibility criteria and documenta-tion	Checking the fulfilment of eligibility criteria and documenta-tion	Checking the fulfilment of eligibil-ity criteria, quality of cover assets, monitoring of exposure to market and liquidity risk, evaluation of operational, checking minimum OC and docu-mentation	No special role	Checking the fulfilment of eligibil-ity criteria, quality of cover assets, monitoring of exposure to market and liquidity risk, evaluation of operational, checking minimum OC and docu-mentation	Checking the fulfilment of eligibil-ity criteria, quality of cover assets, monitoring of exposure to market and liquidity risk, evaluation of operational, checking minimum OC and docu-mentation	Checking the fulfilment of eligibil-ity criteria, quality of cover assets, monitoring of exposure to market and liquidity risk, evaluation of operational, checking minimum OC and docu-mentation	Checking the fulfilment of eligibility criteria and documenta-tion	Checking the fulfilment of eligibil-ity criteria, quality of cover assets, monitoring of exposure to market and liquidity risk, evaluation of operational, checking minimum OC and docu-mentation	Checking the fulfilment of eligibility criteria, quality of cover assets, monitoring of exposure to market and liquidity risk	Checking the fulfilment of eligibility criteria, quality of cover assets, monitoring of exposure to market and liquidity risk	Checking the fulfilment of eligibil-ity criteria, quality of cover assets, monitoring of exposure to market and liquidity risk, evaluation of operational, checking minimum OC and docu-mentation

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Table A.1: – continued from previous page

	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuld-verschreibug-nen	Caisse de Fe-financement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Regis-tered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obri-gações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Special role of banking supervision in crisis	Safeguarding management of cover pool Involvement in transfer of cover assets and CBs to other credit institution	Safeguarding management of cover pool Involvement in transfer of cover assets and CBs to other credit institution	Safeguarding management of cover pool Involvement in transfer of cover assets and CBs to other credit institution	Safeguarding management of cover pool Involvement in transfer of cover assets and CBs to other credit institution	Safeguarding management of cover pool directly or via a special administrator	Safeguarding management of cover pool directly or via a special adminis-trator and involvement in transfer of cover assets and CBs to other credit institution	Safeguarding management of cover pool directly or via a special adminis-trator and involvement in transfer of cover assets and CBs to other credit institution	Safeguarding management of cover pool directly or via a special administrator	No specific role	Involvement in transfer of cover assets and CBs to other credit institution	Involvement in transfer of cover assets and CBs to other credit institution	No specific role
Independence of CPM from Issuer	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Duties of CPM	Audit of cover pool, reporting to supervisory authorities, verification of coverage tests	Reporting to supervisory authorities and veri-fication of coverage tests	Audit of cover pool, reporting to supervisory authorities, verification of coverage tests	Audit of cover pool, reporting to supervisory authorities, verification of coverage tests	Audit of cover pool, reporting to supervisory authorities, verification of coverage tests	Audit of cover pool, reporting to supervisory authorities, verification of coverage tests	Audit of cover pool, reporting to supervisory authorities, verification of coverage tests	Audit of cover pool and veri-fication of coverage tests	Audit of cover pool and veri-fication of coverage tests	Audit of cover pool, reporting to supervisory authorities, verification of coverage tests	Audit of cover pool, reporting to supervisory authorities, verification of coverage tests	N/A
Segregation of Assets & Bankruptcy Remoteness of Covered Bonds												
Automatic acceleration of CBs in case of in-solvency of UCI	No	No	No	No	No	No	No	No	No	No	No	No

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Table A.1: – continued from previous page

	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuld-verschreibug-nen	Caisse de Fe-financement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Regis-tered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obri-gações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Cover pool formulation	All assets in cover register are considered cover pool	All assets in cover register are considered cover pool	All assets in cover register are considered cover pool	All assets pledged	All assets of issuer's balance sheet	All qualify-ing assets	All assets in cover register are considered cover pool	All assets transferred to SPE	All assets transferred to SPE	All assets in cover register are considered cover pool	All assets in cover register are considered cover pool	All assets in cover register are considered cover pool
Protection of CB holders from other creditors' claims in case of insolvency	Preferential claim by law, specific cover pool adminis-tration	Preferential claim by law, specific cover pool adminis-tration	Preferential claim by law	Sale of cover assets to an SPE and specific cover pool adminis-tration	Preferential claim by law	Preferential claim by law, specific cover pool adminis-tration	Preferential claim by law, specific cover pool adminis-tration	Preferential claim by law	Transfer of assets to an SPE	Preferential claim by law	Preferential claim by law	Preferential claim by law
Recourse to UCI in case of default of cover pool	Yes, pari passu with unsecured creditors	Yes, pari passu with unsecured creditors	Yes, pari passu with unsecured creditors	Yes, senior to unsecured creditors	Yes, senior to unsecured creditors	Yes, senior to unsecured creditors	Yes, pari passu with unsecured creditors	Yes, senior to unsecured creditors	Yes, pari passu with unsecured creditors	Yes, pari passu with unsecured creditors	Yes, pari passu with unsecured creditors	Yes, pari passu with unsecured creditors
Provisions required for continuation of deriva-tives in case of insolvency of issuer	Yes	Yes	Not relevant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ranking of derivatives in the cover pool	Pari passu to CB holders	Pari passu to CB holders	Not relevant	Senior to covered bond holders	Pari passu or sub-ordinate to CB holders	Pari passu to CB holders	Pari passu to CB holders	Pari passu to CB holders	Flexible	Pari passu to CB holders	Pari passu to CB holders	Senior to covered bond holders
Risk Weighting & Compliance with European Legislation												
Fulfilment of criteria in UCITS 52(4)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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Table A.1: – continued from previous page

	Austria		France				Germany	Italy	Netherlands	Portugal		Spain
	Pfandbriefe	Fundierte Bankschuld-verschreibug-nen	Caisse de Fe-financement de l'Habitat (CRH)	General Law Based CBs	Obligations Foncieres (OF)	Obligations a l'Habitat (OH)	Pfandbriefe	Obbligazioni Bancarie Garantite (OBG)	Dutch Regis-tered CBs	Mortgage CB (Obrigações Hipotecárias)	Public Sector CBs (Obri-gações sobre o Sector Público)	Cédulas Hipotecarias (CH)
Compliance with article 129 of CRR	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Eligibility for repo transac-tions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Special in-vestment regulations for CBs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes

Appendix B

Pre-Treatment Covariates

Table B.1: Pre-Treatment Covariates for Calculating Propensity Scores

Acronym	Variable Name	Description
	DETERMINANTS OF SB ISSUANCE	
Credit Risk		
RWATA	Risk Weighted Asset Ratio	Risk Weighted Assets / Total Assets
NPLs	Non-Performing Loans	NPLS / Total Loans
LLP	Loan Loss Provision	Loan Loss Provision / Total Loans
Profitability		
NIM	Net Interest Margin	Net Interest Income / Total Earning Assets
ROA	Return on Assets	Operating Income / Total Assets
ROE	Return on Equity	Net Income / Total Equity
Funding Structure and Cost		
LFD	Loans Funded by Deposits	Loans / Customer Deposits%
FTD	Funding Through Deposits	Customer Deposits / Total Funding excel Derivatives%
LFST	Loans Funded by Short Term Funding	Net Loans / Short Term Funding

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Table B.1 – continued from previous page

Acronym	Variable Name	Description
LFLT	Loans Funded by Long Term Funding	Net Loans / Long Term Funding
FCTL	Funding Cost for Total Liabilities	Total Interest Expense / Total Liabilities
FCTD	Funding Cost for Total Deposits	Interest Expense on Deposits / Total Deposits
Liquidity		
LAFST	Liquid Assets Funded by Short Term Funding	Liquid Assets / Short Term Funding
LAFLT	Liquid Assets Funded by Long Term Funding	Liquid Assets / Long Term Funding
Liq. R	Liquidity Ratio	Cash + Securities / Total Assets
Capital Ratios		
ER	Equity Ratio	Total Equity / Total Assets
CAR	Capital Adequacy Ratio	(Tier 1 Capital + Tier 2 Capital) / Risk Weighted Assets
LOAN PORTFOLIO		
LBR	Loans to Banks	Loans to Banks / Total Loans
RMLR	Residential Mortgage Loans Ratio	Residential Mortgage Loans / Total Loans
OMLR	Other Mortgage Loan Ratio	Other Mortgage Loan / Total Loans
CRLR	Consumer & Retails Loans Ratio	Consumer & Retails Loans / Total Loans
CCLR	Corporate & Commercial Loans Ratio	Corporate & Commercial Loans / Total Loans
OLR	Other Loans Ratio	Other Loans Ratio / Total Loans
LR	Loan Ratio	Total Loans / Total Assets
INSTITUTIONAL CHARACTERISTICS		
Income and Cost Structure		
C/I	Cost / Income	Operating Cost / Operating Income

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Table B.1 – continued from previous page

Acronym	Variable Name	Description
LInc.R	Loan Income Ratio	Interest Income on Loan / Total Loans
LIIR	Loan Interest Income Ratio	Interest Income on Loans / Total Interest Income
OIR	Other Interest Ratio	Other Interest Income / Total Interest Income
IEDR	Interest Expense on Deposits Ratio	Interest Expense on Deposits / Total Interest Expense
OIER	Other Interest Expense Ratio	Other Interest Expense / Total Interest Expense
Solvency		
D/E	Debt to Equity Ratio	Total Liabilities / Total Equity
D/A	Debt to Assets Ratio	Total Liabilities / Total Assets
ICR	Interest Coverage Ratio	EBIT / Total Interest Expense
Other Institutional Characteristics		
AG	Assets Growth	Growth of Total Assets%
LG	Loan Growth	Growth of Gross Loans%
DPO	Dividend Payout	Total Dividends Paid / Net Income
Size	Size of Bank	Ln (Total Assets)
Rep	Reputation of Bank	Letter of Guarantees / Total Assets
COR	Charge Off Ratio	Net Charge Offs / Total Loans

Appendix C

Sample Details - Chapter 4

Table C.1: Sample Details

	Frequency	Percent
Country		
Austria	39	15.4
Germany	64	25.3
Spain	36	14.2
France	26	10.3
Italy	40	15.8
Netherlands	24	9.5
Portugal	24	9.5
Status		
Active	228	90.1
Dissolved	25	9.9
Listing Status		
Non-Listed	191	75.5
Listed	62	24.5
Specialisation		
Commercial Banks	98	38.7
Real Estate & Mortgage Banks	31	12.3
Bank Holding Companies	23	9.1
Cooperative Banks	34	13.4
Saving Banks	38	15
Investment Banks	10	4
Specialized Governmental Credit Institutions	19	7.5
Total	253	100

Appendix D

Robustness Tests - Chapter 4

D.1 ANOVA and Tuckey's HSD

Table D.1: One Way ANOVA —Weighted

This table provides the results of one way *ANOVA*. The grouping variable here is treatment and dependent variables are already mentioned in the table. The provides the F-statistics and p-values for equality of means. The null hypothesis tested here is: *Means values of dependent variables are equal across treatment groups*.

	F-Statistics	p-Value
$\Delta\text{RWATA}_{(t+1)}$	5.073	0.006**
$\Delta\text{RWATA}_{(t+3)}$	1.098	0.334
$\Delta\text{LLP}_{(t+1)}$	20.53	0.000***
$\Delta\text{LLP}_{(t+3)}$	3.669	0.026*

*p < 0.1; **p < 0.05; ***p < 0.01

Table D.2: Tuckey's HSD —Weighted

This table provides the results of Post-Hoc Tuckey Test. The results have been produced after estimation of ANOVA in free software R. Computed Tuckey's HSD are based on One-Way ANOVA, provided in Table D.1. The null hypothesis tested here is: *Means values of dependent variables are equal across treatment groups*.

	ABS -None	p-ValueÂ	CB-None	p-Value	CB-ABS	p-ValueÂ
$\Delta RWATA_{(t+1)}$	-0.0094	0.5604	0.0029	0.9372	0.0123	0.5702
$\Delta RWATA_{(t+3)}$	0.0057	0.7995	0.0048	0.828	-0.0008	0.9972
$\Delta LLP_{(t+1)}$	0.0225**	0.0011	0.0023	0.9189	-0.0202**	0.0422
$\Delta LLP_{(t+3)}$	-0.0105	0.297	0.0013	0.9801	0.0118	0.4228

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

D.2 Generalised Boosted Models (GBM)

Table D.3: Weighted Least Square Estimations (GBM) — Outcome: $\Delta RWATA_{(t+1)}$

This table provides the results of Weighted Least Square (WLS) after getting the weights from the Generalised Boosted Models (GBM). Estimations include the economic covariates, country dummies, year dummies and interaction terms of the selected economics covariates. These four types of variables have been sequentially added to the model. The outcome variable here is $\Delta RWATA_{(t+1)}$.

	(1)	(2)	(3)	(4)
Asset-Backed Securities	0.003	−0.001	−0.003	−0.003
Covered Bonds	0.013***	0.014***	0.013***	0.013***
Risk Weighted Asset Ratio	−0.026	−0.047**	−0.049***	−0.050***
Loan Loss Provision	0.037	−0.02	−0.049	−0.062
Net Interest Margin	−0.236	−0.139	−0.181	−0.166
Return on Equity	0.029	0.019	0.006	0.006
Loans Funded by Deposits	−0.002*	−0.002*	−0.002**	−0.002**
Funding Through Deposits	0.013	0.015	0.018*	0.019*
Loans Funded by Short Term Funding	0.0003	0.001	0.001	0.0005
Funding Cost for Total Liabilities	−0.119	0.001	−0.034	−0.033
Liquid Assets Funded by Short Term Funding	0.002	0.0002	−0.001	−0.002
Liquid Assets Funded by Long Term Funding	0.014	0.013	0.013	0.012
Liquidity Ratio	0.003	0.007*	0.006*	0.006*
Capital Adequacy Ratio	−0.01	−0.006	−0.009	−0.011
Residential Mortgage Loans Ratio	0.040***	0.032**	0.034**	0.033**
Consumer & Retails Loans Ratio	−0.013	−0.027	−0.03	−0.031
Corporate & Commercial Loans Ratio	−0.013*	0.002	−0.001	−0.003
Cost / Income	0.006	0.008	0.006	0.007
Loan Interest Income Ratio	−0.019***	−0.011	−0.008	−0.008
Interest Expense on Deposits Ratio	0.002	−0.002	−0.003	0.0001
Debt to Assets Ratio	−0.032	0.012	−0.03	−0.033
Interest Coverage Ratio	0.017**	0.012	0.01	0.009
Loan Growth	0.002	−0.002	−0.006	−0.007
Dividend Payout	−0.004	−0.004	−0.002	−0.003
Size of Bank	0.0001	0.001	0.001	0.001
Reputation of Bank	0.070**	0.054*	0.042	0.034
Charge Off Ratio	0.161	−0.087	−0.178	−0.157
Germany		−0.002	−0.007	−0.004
Spain		0.036***	0.031***	0.034***
France		−0.015*	−0.016*	−0.012

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Table D.3: – continued from previous page

	(1)	(2)	(3)	(4)
Italy		0.019**	0.019**	0.021**
Netherlands		0.009	0.008	0.009
Portugal		0.005	0.004	0.003
2002			−0.007	−0.006
2003			0.0005	0.001
2004			0.006	0.007
2005			0.014*	0.015*
2006			−0.006	−0.006
2007			−0.014	−0.019*
2008			−0.011	−0.019*
2009			0.002	−0.004
2010			−0.01	−0.01
2011			−0.015	−0.021**
LFD * FC				0.0004
LFST * FC				0.002
CCLR * FC				0.012
IEDR * FC				−0.011
LG * FC				0.048***
Constant	0.02	−0.025	0.027	0.033
Observations	1.210	1.210	1.210	1.210
R^2	0.085	0.106	0.121	0.131
Adjusted R^2	0.064	0.081	0.089	0.095
Residual Std. Error	0.075	0.074	0.074	0.074
F Statistic	4.057***	4.226***	3.749***	3.652***

*p < 0.1; **p < 0.05; ***p < 0.01

Table D.4: Weighted Least Square Estimations (GBM) — Outcome: $\Delta RWATA_{(t+3)}$

This table provides the results of WLS after getting the weights from the GBM. Estimations include the economic covariates, country dummies, year dummies and interaction terms of the selected economics covariates. These four types of variables have been sequentially added to the model. The outcome variable here is $\Delta RWATA_{(t+3)}$.

	(1)	(2)	(3)	(4)
Asset-Backed Securities	−0.010**	−0.008	−0.007	−0.007
Covered Bonds	0.013***	0.008	0.010**	0.010**
Risk Weighted Asset Ratio	−0.057***	−0.059***	−0.063***	−0.063***
Loan Loss Provision	0.029	−0.034	−0.007	0.002
Net Interest Margin	0.475***	0.458***	0.402***	0.397***
Return on Equity	−0.004	−0.01	−0.01	−0.004
Loans Funded by Deposits	0.0002	−0.0001	0.0002	0.0003
Funding Through Deposits	0.005	0.001	0.01	0.011
Loans Funded by Short Term Funding	0.003	0.005*	0.005*	0.005*
Funding Cost for Total Liabilities	−0.216*	−0.116	−0.062	−0.058
Liquid Assets Funded by Short Term Funding	−0.001	−0.004	−0.003	−0.002
Liquid Assets Funded by Long Term Funding	−0.008	−0.013	−0.014	−0.014
Liquidity Ratio	0.003	0.005	0.005	0.005
Capital Adequacy Ratio	−0.01	−0.007	−0.008	−0.008
Residential Mortgage Loans Ratio	0.043***	0.050***	0.057***	0.054***
Consumer & Retails Loans Ratio	0.025	0.053	0.045	0.044
Corporate & Commercial Loans Ratio	0.003	−0.002	−0.003	−0.006
Cost / Income	−0.035***	−0.033***	−0.036***	−0.035***
Loan Interest Income Ratio	0.003	0.0003	0.004	0.004
Interest Expense on Deposits Ratio	0.003	0.013*	0.007	0.012
Debt to Assets Ratio	−0.068	−0.09	−0.131*	−0.140**
Interest Coverage Ratio	−0.015*	−0.018**	−0.021**	−0.021**
Loan Growth	0.008	0.006	0.004	0.004
Dividend Payout	−0.012*	−0.01	−0.009	−0.009
Size of Bank	−0.002**	−0.001	0.0001	0.0003
Reputation of Bank	0.113***	0.108***	0.095***	0.089***
Charge Off Ratio	−3.147***	−3.082***	−3.136***	−3.191***
Germany		−0.011	−0.018**	−0.018**
Spain		0.006	0.002	0.002
France		−0.019**	−0.021**	−0.020**
Italy		−0.007	−0.01	−0.008
Netherlands		−0.040***	−0.039***	−0.042***
Portugal		−0.012	−0.016*	−0.019*
2002			0.026***	0.026***

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Table D.4: – continued from previous page

	(1)	(2)	(3)	(4)
2003			0.028***	0.029***
2004			0.01	0.011
2005			0.012	0.012
2006			0.016**	0.016**
2007			0.013	0.014
2008			0.001	0.003
2009			−0.006	−0.005
2010			0.011	0.012
2011			0.004	0.005
LFD * FC				−0.0004
LFST * FC				0.002
CCLR * FC				0.009
IEDR * FC				−0.018
LG * FC				0.003
Constant	0.141*	0.161**	0.184**	0.188**
Observations	1.210	1.210	1.210	1.210
R^2	0.089	0.106	0.131	0.133
Adjusted R^2	0.068	0.081	0.099	0.097
Residual Std. Error	0.075	0.074	0.074	0.074
F Statistic	4.288***	4.239***	4.075***	3.713***

*p < 0.1; **p < 0.05; ***p < 0.01

Table D.5: Weighted Least Square Estimations (GBM) — Outcome: $\Delta LLP_{(t+1)}$

This table provides the results of WLS after getting the weights from the GBM. Estimations include the economic covariates, country dummies, year dummies and interaction terms of the selected economics covariates. These four types of variables have been sequentially added to the model. The outcome variable here is $\Delta LLP_{(t+1)}$.

	(1)	(2)	(3)	(4)
Asset-Backed Securities	0.013***	0.011***	0.015***	0.014***
Covered Bonds	−0.001	−0.004	−0.005	−0.004
Risk Weighted Asset Ratio	0.022	−0.002	0.003	−0.001
Loan Loss Provision	−0.329***	−0.427***	−0.392***	−0.401***
Net Interest Margin	−0.055	0.001	0.027	0.046
Return on Equity	−0.001	−0.017	0.007	−0.002
Loans Funded by Deposits	0.001	0.001	0.0001	0.0003
Funding Through Deposits	−0.001	0.003	−0.007	−0.011
Loans Funded by Short Term Funding	−0.004*	−0.003	−0.003	−0.003
Funding Cost for Total Liabilities	−0.189*	0.015	0.094	0.045
Liquid Assets Funded by Short Term Funding	−0.0004	−0.002	−0.003	−0.004
Liquid Assets Funded by Long Term Funding	−0.012	−0.018*	−0.014	−0.014
Liquidity Ratio	−0.005*	−0.002	−0.003	−0.003
Capital Adequacy Ratio	−0.001	0.001	0.009	0.008
Residential Mortgage Loans Ratio	0.002	−0.002	−0.013	−0.007
Consumer & Retails Loans Ratio	−0.057**	−0.086***	−0.076***	−0.073***
Corporate & Commercial Loans Ratio	−0.007	0.001	0.007	0.006
Cost / Income	−0.001	−0.0003	0.004	0.004
Loan Interest Income Ratio	0.006	0.027***	0.021***	0.021***
Interest Expense on Deposits Ratio	0.002	−0.001	0.005	−0.007
Debt to Assets Ratio	−0.129**	−0.095*	−0.018	−0.015
Interest Coverage Ratio	−0.012*	−0.019***	−0.014**	−0.014**
Loan Growth	−0.009	−0.012**	−0.008	−0.008
Dividend Payout	0.001	0.003	−0.001	−0.001
Size of Bank	0.001	0.002	0.001	0.0004
Reputation of Bank	−0.031	−0.048**	−0.033	−0.022
Charge Off Ratio	1.119*	0.717	0.614	0.732
Germany		−0.025***	−0.013**	−0.014**
Spain		0.032***	0.037***	0.037***
France		−0.023***	−0.020***	−0.022***
Italy		0.001	0.004	0.001
Netherlands		−0.005	−0.004	0.001
Portugal		−0.020***	−0.015**	−0.01
2002			−0.004	−0.004

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Table D.5: – continued from previous page

	(1)	(2)	(3)	(4)
2003			−0.009*	−0.010*
2004			−0.011*	−0.013**
2005			−0.007	−0.009*
2006			−0.004	−0.007
2007			0.003	−0.005
2008			0.034***	0.024***
2009			0.001	−0.006
2010			−0.004	−0.014*
2011			0.041***	0.034***
LFD * FC				−0.003
LFST * FC				0.001
CCLR * FC				0.012
IEDR * FC				0.048***
LG * FC				−0.024**
Constant	0.145**	0.125**	0.038	0.05
Observations	1.210	1.210	1.210	1.210
R^2	0.088	0.143	0.222	0.249
Adjusted R^2	0.068	0.119	0.193	0.218
Residual Std. Error	0.058	0.057	0.054	0.054
F Statistic	4.245***	5.951***	7.723***	8.012***

*p < 0.1; **p < 0.05; ***p < 0.01

Table D.6: Weighted Least Square Estimations (GBM) — Outcome: $\Delta LLP_{(t+3)}$

This table provides the results of WLS after getting the weights from the GBM. Estimations include the economic covariates, country dummies, year dummies and interaction terms of the selected economics covariates. These four types of variables have been sequentially added to the model. The outcome variable here is $\Delta LLP_{(t+3)}$.

	(1)	(2)	(3)	(4)
Asset-Backed Securities	−0.010**	−0.009**	−0.008*	−0.008*
Covered Bonds	0.001	0.001	−0.003	−0.004
Risk Weighted Asset Ratio	0.001	−0.001	0.001	0.003
Loan Loss Provision	−0.021	−0.027	−0.05	−0.062
Net Interest Margin	−0.027	−0.039	0.005	−0.01
Return on Equity	0.021	0.02	0.016	0.009
Loans Funded by Deposits	0.004***	0.004***	0.003***	0.003***
Funding Through Deposits	0.007	0.011	0.015*	0.014
Loans Funded by Short Term Funding	0.001	0.0003	0.001	0.002
Funding Cost for Total Liabilities	−0.250**	−0.229**	−0.069	−0.006
Liquid Assets Funded by Short Term Funding	0.001	0.001	0.001	0.001
Liquid Assets Funded by Long Term Funding	−0.002	−0.005	−0.002	−0.003
Liquidity Ratio	0.001	0.001	−0.002	−0.003
Capital Adequacy Ratio	0.003	0.001	0.006	0.007
Residential Mortgage Loans Ratio	0.001	−0.002	−0.003	−0.002
Consumer & Retails Loans Ratio	0.093***	0.079**	0.028	0.032
Corporate & Commercial Loans Ratio	−0.0001	−0.001	0.003	0.011
Cost / Income	−0.018**	−0.020**	−0.016*	−0.014*
Loan Interest Income Ratio	−0.002	0.004	0.003	0.001
Interest Expense on Deposits Ratio	0.002	−0.003	0.004	0.004
Debt to Assets Ratio	−0.096*	−0.089	−0.083	−0.069
Interest Coverage Ratio	−0.008	−0.009	−0.014*	−0.012*
Loan Growth	−0.006	−0.005	−0.006	−0.007
Dividend Payout	0.002	0.003	0.004	0.003
Size of Bank	0.0002	0.0002	−0.001	−0.001
Reputation of Bank	0.015	0.018	0.011	0.016
Charge Off Ratio	−1.139	−1.045	−0.601	−0.489
Germany		−0.008	−0.006	−0.007
Spain		−0.007	−0.005	−0.004
France		−0.002	0.001	−0.002
Italy		−0.002	0.005	0.005
Netherlands		0.005	0.006	0.006
Portugal		−0.004	−0.006	−0.005
2002			0.012**	0.013**

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Table D.6: – continued from previous page

	(1)	(2)	(3)	(4)
2003			0.01	0.010*
2004			0.017***	0.018***
2005			0.036***	0.037***
2006			0.041***	0.043***
2007			0.001	0.015
2008			0.008	0.018**
2009			0.031***	0.042***
2010			0.022***	0.033***
2011			0.027***	0.038***
LFD * FC				−0.003
LFST * FC				−0.002
CCLR * FC				−0.033***
IEDR * FC				−0.002
LG * FC				0.016
Constant	0.109*	0.106	0.088	0.069
Observations	1.210	1.210	1.210	1.210
R^2	0.04	0.043	0.098	0.108
Adjusted R^2	0.018	0.016	0.064	0.071
Residual Std. Error	0.064	0.064	0.062	0.062
F Statistic	1.840***	1.595**	2.936***	2.935***

*p < 0.1; **p < 0.05; ***p < 0.01

Appendix E

Robustness Tests - Chapter 5

E.1 Use of Accounting Measure — Z-Score

Table E.1: Asset-Backed Securities and Z-Score

This table provides the results of the quadratic model estimation for ABS and Z-Scores. Models 1 and 2 are estimated using fixed effects and all standard errors are clustered with respect to bank. Multi-way clustering is used in Models 3 and 4 and all standards are clustered with respect to year and bank. All standard errors are reported in parenthesis. Two models are estimated for each of the settings. One model includes dummies for the GFC and the SDC, while other model does not include them.

	(1)	(2)	(3)	(4)
	Z-Score	Z-Score	Z-Score	Z-Score
ABS Ratio	0.888***	0.783**	0.993**	0.881*
	(0.315)	(0.315)	(0.468)	(0.496)
ABS Square Ratio	-0.0514**	-0.0469**	-0.0570**	-0.0523**
	(0.0200)	(0.0200)	(0.0236)	(0.0251)
Volatility	-0.0387***	-0.0298**	-0.0444*	-0.0337
	(0.0139)	(0.0150)	(0.0253)	(0.0253)
Tier 1 Capital Ratio	-0.0116	0.0267	-0.00883	0.0318
	(0.0423)	(0.0449)	(0.102)	(0.106)
Deposit to Total Assets	0.0454**	0.0519***	0.0354	0.0422
	(0.0199)	(0.0199)	(0.0531)	(0.0543)
Loans to Total Assets	0.0336	0.0386	0.0615	0.0686
	(0.0333)	(0.0333)	(0.0817)	(0.0847)
Liquid Assets to Total Assets	0.127***	0.114***	0.141**	0.129**
	(0.0322)	(0.0309)	(0.0628)	(0.0624)
Net Interest Margin	0.378	0.0854	0.0901	-0.232
	(0.492)	(0.506)	(1.278)	(1.331)
Cost/Income	-0.0164	-0.0148	-0.0188	-0.0172
	(0.0142)	(0.0136)	(0.0230)	(0.0235)
Size	1.441***	1.604***	1.544**	1.722**
	(0.265)	(0.272)	(0.675)	(0.722)
Financial Crisis		-0.636		-0.967
		(0.908)		(1.525)
Sovereign Debt Crisis		-2.036**		-2.106
		(0.879)		(1.295)
Constant	-8.015*	-9.554**	-9.689	-11.45
	(4.756)	(4.710)	(11.04)	(11.29)
Standard Errors Clustering	Bank	Bank	Bank, Time	Bank, Time
No. of Observations	382	382	382	382
No. of Groups	35	35	35	35
R-squared	0.168	0.180	0.127	0.135

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table E.2: Covered Bonds and Z-Score

This table provides the results of the quadratic model estimation for CBs and Z-Scores. Models 1 and 2 are estimated using effects and all standard errors are clustered with respect to bank. Multi-way clustering is used in Models 3 and 4 and all standards are clustered with respect to year and bank. All standard errors are reported in parenthesis. Two models are estimated for each of the settings. One model includes dummies for the GFC and the SDC, while other model does not include them.

	(1)	(2)	(3)	(4)
	Z-Score	Z-Score	Z-Score	Z-Score
CB Ratio	-0.908**	-0.782*	-3.829**	-3.513*
	(0.436)	(0.451)	(1.890)	(1.960)
CB Sqaure Ratio	0.123	0.107	0.779*	0.742*
	(0.0774)	(0.0788)	(0.409)	(0.423)
Volatility	0.00323	0.000165	-0.0414*	-0.0277
	(0.0110)	(0.0116)	(0.0240)	(0.0265)
Tier 1 Capital Ratio	0.101**	0.105**	0.0111	0.0483
	(0.0464)	(0.0489)	(0.0958)	(0.103)
Deposit to Total Assets	0.0333	0.0384*	0.0247	0.0322
	(0.0205)	(0.0209)	(0.0536)	(0.0545)
Loans to Total Assets	0.0293	0.0251	0.0869	0.0926
	(0.0294)	(0.0296)	(0.0806)	(0.0853)
Liquid Assets to Total Assets	0.0761***	0.0744***	0.137**	0.126**
	(0.0282)	(0.0282)	(0.0571)	(0.0568)
Net Interest Margin	1.011**	1.002**	0.0965	-0.229
	(0.449)	(0.450)	(1.210)	(1.305)
Cost/Income	-0.0137	-0.0128	-0.0210	-0.0186
	(0.00897)	(0.00902)	(0.0222)	(0.0230)
Size	-1.464***	-1.558**	1.676**	1.883**
	(0.553)	(0.684)	(0.689)	(0.741)
Financial Crisis		0.538		-1.398
		(0.570)		(1.305)
Sovereign Debt Crisis		-0.131		-2.296**
		(0.631)		(1.095)
Constant	23.80***	24.83***	-11.18	-13.38
	(6.431)	(7.902)	(10.82)	(11.22)
Standard Errors Clustering	Bank	Bank	Bank, Time	Bank, Time
No. of Observations	406	406	406	406
No. of Groups	39	39	39	39
R-squared	0.200	0.206	0.157	0.167

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

E.2 Size Effects — Covered Bonds and Systemic Risk

Table E.3: Covered Bonds and Systemic Risk — FE Estimations for Size Below 75 Percentile

This table provides the results of the quadratic model estimation for CBs and measures of systemic risk. The variables of CB Ratio and Square of CB Ratio have been multiplied with the size dummy for the banks below 75 percentile as explained in the section 5.4.3. All standard errors are heteroskedasticity consistent and are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them. All standard errors are clustered with respect to the bank.

	(1)	(2)	(3)	(4)	(5)	(6)
	LRMES	LRMES	SRI	SRI	SRISK%	SRISK%
CBxSize (Below 75 percentile)	4.139**	3.618**	0.921	0.805	-0.822	-0.556
	(1.623)	(1.471)	(0.659)	(0.622)	(0.870)	(0.980)
Sq. CBxSize (Below 75 percentile)	-0.487**	-0.437**	-0.103	-0.102	0.160	0.141
	(0.210)	(0.193)	(0.0866)	(0.0809)	(0.132)	(0.136)
Volatility	0.123***	0.0920**	0.0436***	0.0142*	-0.00591	0.0253
	(0.0387)	(0.0397)	(0.0105)	(0.00834)	(0.0361)	(0.0295)
Tier 1 Capital Ratio	0.354*	0.113	0.0207	-0.0940	-0.235	-0.0696
	(0.204)	(0.182)	(0.0590)	(0.0697)	(0.279)	(0.289)
Deposit to Total Assets	0.0876	0.0455	-0.0384	-0.0464*	-0.0194	0.00123
	(0.0771)	(0.0640)	(0.0244)	(0.0269)	(0.109)	(0.110)
Loans to Total Assets	-0.210*	-0.123	-0.121**	-0.0844*	-0.00380	-0.0600
	(0.121)	(0.122)	(0.0480)	(0.0422)	(0.190)	(0.172)
Liquid Assets to Total Assets	-0.299**	-0.217*	-0.108**	-0.0682**	0.0206	-0.0361
	(0.132)	(0.112)	(0.0446)	(0.0323)	(0.150)	(0.159)
Cost/Income	-0.000800	0.00227	-0.0273**	-0.0215**	0.0246	0.0195
	(0.0393)	(0.0368)	(0.0118)	(0.00956)	(0.0266)	(0.0253)
Equity to Total Assets	-0.0597	-0.0851	-0.281	-0.368*	-1.664	-1.595
	(0.555)	(0.467)	(0.253)	(0.203)	(1.032)	(1.019)
Size	11.96***	6.006**	3.823***	0.0167	-0.193	4.555
	(2.175)	(2.773)	(1.164)	(1.323)	(4.813)	(5.951)
Financial Crisis		5.324***		4.549***		-5.033
		(1.829)		(0.609)		(3.084)
Sovereign Debt Crisis		8.962***		5.075***		-6.700
		(2.937)		(0.768)		(4.444)
Constant	-89.83***	-27.30	-27.00**	13.73	32.10	-18.30
	(28.60)	(30.01)	(13.01)	(15.13)	(62.61)	(71.69)
Standard Errors	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
No. of Observations	403	403	403	403	403	403
No. of Groups	38	38	38	38	38	38
R-squared	0.457	0.500	0.387	0.530	0.064	0.086

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$,

Table E.4: Covered Bonds and Systemic Risk — FE Estimations for Size Above 75 Percentile

This table provides the results of the quadratic model estimation for CBs and measures of systemic risk. The variables of CB Ratio and Square of CB Ratio have been multiplied with the size dummy for the banks above 75 percentile as explained in the section 5.4.3. All standard errors are heteroskedasticity consistent and are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them. All standard errors are clustered with respect to the bank.

	(1)	(2)	(3)	(4)	(5)	(6)
	LRMES	LRMES	SRI	SRI	SRISK%	SRISK%
CBxSize (Above 75 percentile)	-1.019	-2.616	-0.365	-0.867	-6.058	-5.551
	(2.109)	(1.868)	(0.643)	(0.687)	(4.018)	(3.875)
Sq. CBxSize (Above 75 percentile)	0.547	0.800*	0.121	0.205	1.277	1.192
	(0.470)	(0.440)	(0.154)	(0.157)	(0.862)	(0.832)
Volatility	0.118***	0.0903**	0.0424***	0.0143	-0.00305	0.0277
	(0.0378)	(0.0392)	(0.0105)	(0.00857)	(0.0354)	(0.0291)
Tier 1 Capital Ratio	0.530***	0.243	0.0635	-0.0683	-0.200	-0.0620
	(0.183)	(0.173)	(0.0504)	(0.0672)	(0.258)	(0.277)
Deposit to Total Assets	0.0835	0.0317	-0.0398	-0.0514*	-0.0238	-0.0127
	(0.0791)	(0.0675)	(0.0262)	(0.0290)	(0.102)	(0.104)
Loans to Total Assets	-0.219*	-0.112	-0.122**	-0.0790*	0.0224	-0.0220
	(0.127)	(0.126)	(0.0492)	(0.0438)	(0.179)	(0.156)
Liquid Assets to Total Assets	-0.341**	-0.239*	-0.116**	-0.0703**	0.0389	-0.00935
	(0.147)	(0.120)	(0.0472)	(0.0322)	(0.136)	(0.140)
Cost/Income	-0.00721	-0.000533	-0.0285**	-0.0217**	0.0391	0.0317
	(0.0405)	(0.0363)	(0.0119)	(0.00932)	(0.0284)	(0.0260)
Equity to Total Assets	-0.241	-0.235	-0.326	-0.404**	-1.640	-1.551
	(0.491)	(0.420)	(0.237)	(0.189)	(1.000)	(0.988)
Size	11.84***	5.815**	3.857***	0.0159	1.013	5.141
	(2.399)	(2.828)	(1.134)	(1.260)	(4.658)	(5.750)
Financial Crisis		5.437***		4.563***		-4.973
		(1.909)		(0.606)		(3.038)
Sovereign Debt Crisis		9.766***		5.329***		-5.670
		(3.129)		(0.838)		(4.005)
Constant	-86.34***	-24.32	-26.93**	13.80	15.97	-27.87
	(31.09)	(30.78)	(12.43)	(14.10)	(58.96)	(68.26)
Standard Errors	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
No. of Observations	403	403	403	403	403	403
No. of Groups	38	38	38	38	38	38
R-squared	0.439	0.488	0.376	0.526	0.082	0.099

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$,

E.3 Generalised Additive Model with Loess Curve

Table E.5: Asset Backed Securities and Systemic Risk — Generalized Additive Model with Loess Curve (Parametric Part)

This table provides the results of the GAM with Loess Curve for ABS and measures of systemic risk. Individual bank effects are included in the estimations. Standard errors are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them.

	(1)	(2)	(3)	(4)	(5)	(6)
	LRMES	LRMES	SRI	SRI	SRISK%	SRISK%
Volatility	0.119***	0.059**	0.051	-0.024	-0.054	0.006
	-0.03	(0.03)	(0.08)	(0.08)	(0.05)	(0.06)
Tier 1 Capital Ratio	0.472***	0.251***	1.070***	0.928***	0.06	0.262*
	-0.08	(0.08)	(0.21)	(0.23)	(0.14)	(0.15)
Deposit to Total Assets	0.042	0.008	0.783***	0.765***	0.145**	0.176***
	-0.035	(0.03)	(0.09)	(0.09)	(0.06)	(0.06)
Loans to Total Assets	-0.038	-0.082	-1.069***	-1.143***	-0.116	-0.07
	-0.056	(0.05)	(0.15)	(0.15)	(0.10)	(0.10)
Liquid Assets to Total Assets	-0.175***	-0.111*	-1.005***	-0.996***	-0.126	-0.179*
	-0.063	(0.06)	(0.17)	(0.17)	(0.11)	(0.11)
Net Interest Margin	-4.096***	-2.352***	-7.727***	-6.290***	4.577***	2.942*
	-0.845	(0.83)	(2.23)	(2.32)	(1.47)	(1.52)
Cost/Income	-0.008	-0.016	0.065	0.062	0.048	0.055
	-0.025	(0.02)	(0.07)	(0.07)	(0.04)	(0.04)
Size	4.474***	3.480***	-5.335***	-6.086***	7.266***	8.188***
	-0.47	(0.46)	(1.24)	(1.29)	(0.82)	(0.84)
Financial Crisis		6.388***		12.099***		-6.934**
		(1.51)		(4.22)		(2.77)
Sovereign Debt Crisis		11.235***		5.743		-10.047***
		(1.50)		(4.19)		(2.74)
Constant	-6.512	3.608	111.963***	121.805***	-72.803***	-82.499***
	-8.236	(7.84)	(21.74)	(21.92)	(14.33)	(14.36)
AIC	2894.378	2845.831	3633.833	3629.345	3316.607	3307.116

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Figure E.1: Asset Backed Securities and Systemic Risk — Generalized Additive Model with Loess Curve (Non-Parametric Part)

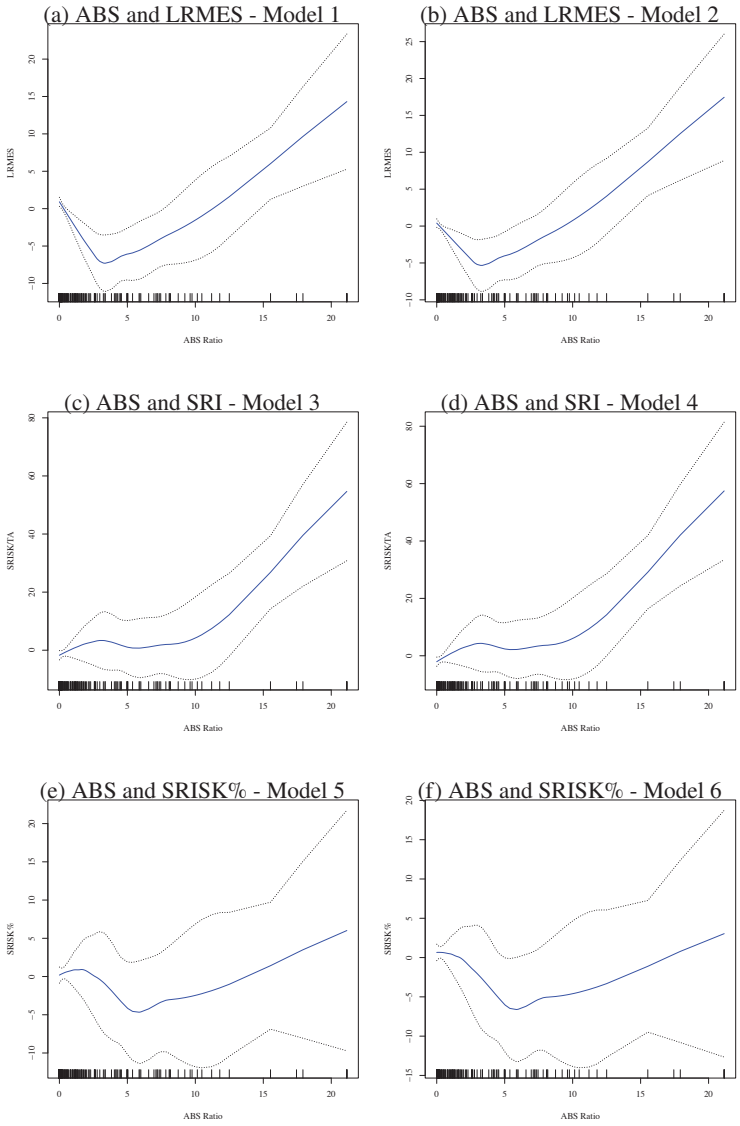


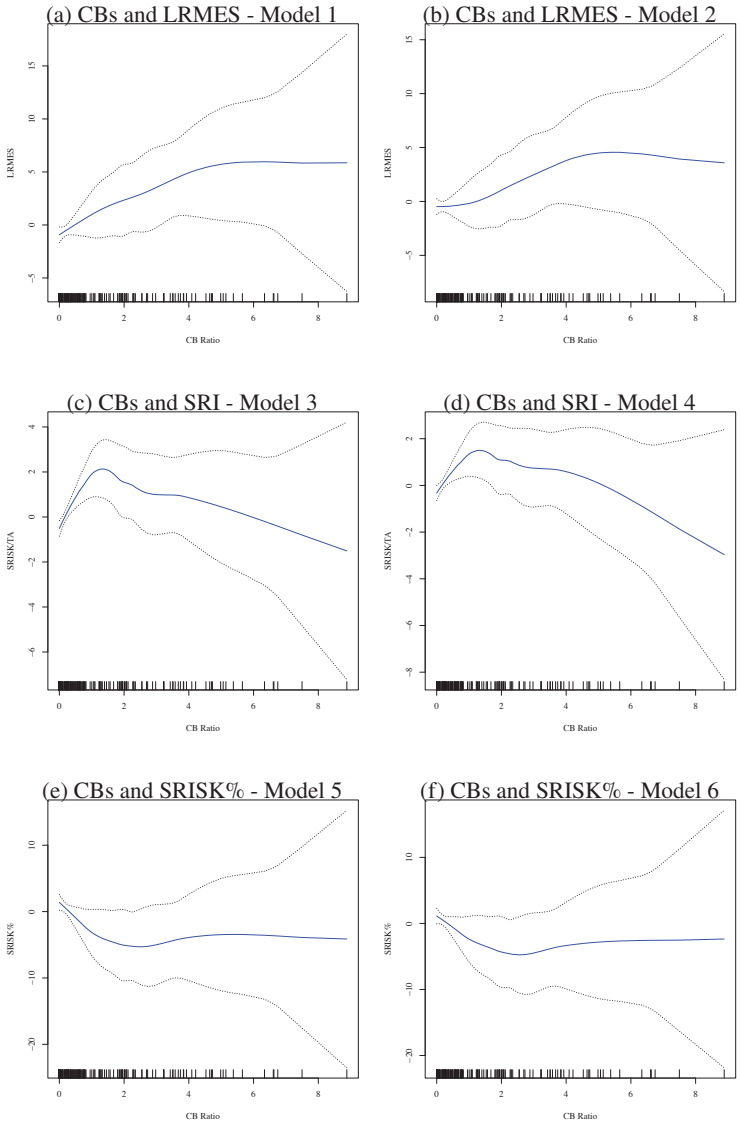
Table E.6: Covered Bonds and Systemic Risk — Generalized Additive Model with Loess Curve (Parametric Part)

This table provides the results of the GAM with Loess Curve for CBs and measures of systemic risk. Individual bank effects are included in the estimations. Standard errors are reported in parenthesis. Two models are estimated for each of risk measure. One model includes dummies for the GFC and the SDC, while other model does not include them.

	(1)	(2)	(3)	(4)	(5)	(6)
	LRMES	LRMES	SRI	SRI	SRISK%	SRISK%
Volatility	0.095***	0.059*	0.045***	0.009	-0.021	0.016
	(0.031)	(0.032)	(0.015)	(0.014)	(0.050)	(0.052)
Tier 1 Capital Ratio	0.623***	0.487***	-0.028	-0.134***	-0.113	0.006
	(0.090)	(0.093)	(0.043)	(0.042)	(0.144)	(0.152)
Deposit to Total Assets	0.079*	0.058	0.043*	0.035*	0.205***	0.217***
	(0.048)	(0.047)	(0.022)	(0.021)	(0.076)	(0.076)
Loans to Total Assets	-0.046	-0.057	0.065**	0.038	-0.063	-0.040
	(0.064)	(0.063)	(0.030)	(0.028)	(0.102)	(0.103)
Liquid Assets to Total Assets	-0.140**	-0.093	0.060**	0.090***	0.011	-0.025
	(0.064)	(0.064)	(0.030)	(0.028)	(0.103)	(0.104)
Net Interest Margin	-0.009	1.017	-3.996***	-3.181***	2.695**	1.783
	(0.861)	(0.868)	(0.405)	(0.389)	(1.375)	(1.417)
Cost/Income	0.017	0.012	0.043***	0.041***	0.049	0.051
	(0.029)	(0.028)	(0.014)	(0.013)	(0.046)	(0.046)
Size	6.775***	6.387***	0.039	-0.300	7.959***	8.326***
	(0.485)	(0.483)	(0.229)	(0.216)	(0.775)	(0.788)
Financial Crisis		4.039***		5.044***		-4.923*
		(1.565)		(0.702)		(2.555)
Sovereign Debt Crisis		7.601***		5.080***		-6.063**
		(1.558)		(0.698)		(2.543)
Constant	-45.465***	-42.831***	0.751	3.847	-84.500***	-87.571***
	(8.940)	(8.753)	(4.211)	(3.923)	(14.280)	(14.288)
AIC	2992.767	2973.521	2407.116	2349.272	3357.118	3354.814

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Figure E.2: Covered Bonds and Systemic Risk — Generalized Additive Model with Loess Curve (Non-Parametric Part)



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Summary

Regulations for securitisation have been subject to criticism before and after the Global Financial Crisis (GFC). It was widely blamed for spawning the GFC that led to strict regulations for this market. As a result, this market was frozen and banks were not able to issue Asset-Backed Securities (ABS) to access non-depository funds and they moved to alternate instruments. Covered Bond (CB) was an important instrument used by the European banks for this purpose. Preferential regulatory treatment given to CBs also played an important role in focus on this market. However, once the dust of the GFC was settled, many questions were raised on the blames placed on securitisation. It was realised that securitisation plays an important role in the economic growth and strict regulatory treatment should not be given to this market. Regulators are currently trying to restart this market but strict regulations are hindering the resumption. It is still an open question that how this market should be regulated optimally? This study attempts to contribute in finding the answer of this question.

This study makes a comparison of ABS with CBs as they are close counterparts, but blames those are places on ABS cannot be applied to CBs. Banks transfer their assets out of their balance sheet during the securitisation process and it is perceived that they do not have the so-called 'skin in the game' after this transfer. For this reason, securitisation is mainly blamed for creating the problems of moral hazards that allegedly led to the issuance of large scale risky loans. However, such a transfer of underlying asset does not take place in case of CB issuance and banks are supposed to have a strong 'skin in the game'. Hence, allegations on securitisation should not stand true if CB issuing banks also face similar problems.

The initial legal analysis in this study highlight three elements. First, some questions are raised on the premises of the regulations devised for securitisation after the GFC. It seems that many of these regulations are influenced by the market criticism and political reactions towards the securitisation market. Second, the European regulations are highly influenced by the situation in the US market and not based on the European realities. Many complex forms of ABS those were omnipresent in the US market were not commonly issued in the European

securitisation market. Moreover, the Originate-to-Distribute (OTD) model of securitisation that has been subject of mass criticism was also not present in the European market. Third, CBs are given a favourable treatment as compared to ABS that also plays a role in hindering the efforts to restart this market. The investors might feel that CBs are better instruments, even they offer a lower yield as compared to ABS, because of the high capital requirements in case of exposures in ABS. An empirical analysis has been performed to deeply study these concerns about the regulations.

Chapter 4 of this study compares the impact of ABS and CBs on credit risk taking behaviour of banks by using the data of 253 banks from 7 European countries for the period 2000-2014. This analysis helps evaluate the regulations inspired by the perception that securitising banks take more risk. The study uses the Covariate Balancing Propensity Score (CBPS) with Difference-in-Differences (DID) for the analysis. Initial results suggest that European banks do not securitise for the credit risk transfer, rather main motive behind securitisation and CBs is liquidity generation. I examine effects of securitisation and CBs on credit risk-taking behaviour in the short and long run. The results suggest that securitisation may not have a positive impact on credit risk-taking behaviour of banks. The findings do not support the perception that securitising banks under-price their risk. However, results indicate that CBs may have a positive impact on credit risk-taking in the long run. These results are attributed to the recourse provided in securitisation transactions, competitive pressure and asset encumbrance in case of large scale CB issuance. The 'skin in the game' in form of on-balance sheet retention may not help reduce credit risk-taking.

Chapter 5 of this study goes a little deeper and empirically investigates how the relationship of securitisation and CBs with bank stability varies with the level of variations in banks involvement in any of these two instruments. The study uses here the data from 46 securitising and CB issuing listed banks in Europe for 2000-2014. The initial results show that some banks have been heavily involved in the securitisation activity, while CB issuance does not go beyond a certain limit. The results obtained using a quadratic model and a generalized additive model suggest a U-shaped relationship between securitisation and systemic risk of the banks. However, this relationship is reversed for CBs. Small issuance of these bonds fail to provide the intended benefits and increase the banks' r isk. Further investigation reveal the presence of a strong size effect. The systemic risk of smaller banks increases after the issuance of CB, while larger banks remain unaffected. The study does not support imposing uniform limits on the CB issuance; instead such limits should be linked with the bank size. However, some framework is needed to limit the banks' involvement in securitisation.

The empirical analysis suggests that securitisation per se does not lead to high risk taking,

rather the problem starts when banks increase their level of securitisation. In the light of these findings, the study suggest that flat regulatory treatment given to all securitising banks may not be suitable. The objective of the revival of the securitisation market may not be achievable in the presence of strict treatment given to all forms and levels of securitisation. The study recommends differentiated treatment of different classes of ABS and incremental capital regulations. The capital regulations should be relaxed for banks having a reasonable presence in the securitisation market but they should increase when a banks accelerate its securitisation activity. A differentiated treatment with respect to the classes of ABS and a bank's involvement in this market will encourage those banks who have a low presence in this market and discourage banks to extensively involve in the securitisation activity.

Samenvatting

Zowel vóór als na de wereldwijde financiële crisis is de regelgeving voor securitisatie voorwerp van kritiek geweest. Securitisatie werd alom verantwoordelijk gehouden voor het ontstaan van de wereldwijde financiële crisis. Deze crisis heeft geleid tot strenge regelgeving voor de securitisatie, met als gevolg dat deze stilviel. Banken konden geen door activa gedekte effecten (*asset-backed securities*, ABS) meer uitgeven om toegang te krijgen tot niet op deposito's gebaseerde middelen (*non-depository funds*) en namen daarom hun toevlucht tot alternatieve instrumenten. Een belangrijk instrument dat de Europese banken voor dit doel gebruikten, was de gedekte obligatie (*covered bond*, CB). De preferentiële behandeling die in de regelgeving werd gegeven aan gedekte obligaties, speelde ook een belangrijke rol in de focus op deze markt. Toen het stof van de wereldwijde financiële crisis was gaan liggen, werden echter veel vragen gesteld over de schuld die bij securitisatie werd gelegd. Men realiseerde zich dat securitisatie een belangrijke rol speelt in de economische groei en dat de securitisatiemarkt niet moest worden onderworpen aan strenge regelgeving. Regelgevende instanties trachten momenteel deze markt weer op gang te brengen, maar de strenge regelgeving verhindert opleving. De vraag hoe deze markt het beste kan worden gereglementeerd, staat nog open. Deze studie tracht bij te dragen tot het vinden van het antwoord op deze vraag.

In deze studie worden door activa gedekte effecten vergeleken met gedekte obligaties, omdat ze min of meer tegenhangers zijn, hoewel de schuld die bij door activa gedekte effecten wordt gelegd, niet van toepassing is op gedekte obligaties. In het securitisatieproces plaatsen banken activa buiten hun balans en de indruk bestaat dat ze na deze overbrenging zelf geen zogenoemde '*skin in the game*' meer hebben. Daarom wordt vooral securitisatie verantwoordelijk gehouden voor het veroorzaken van problematische morele risico's die, naar verluidt, hebben geleid tot grootschalige verstrekking van riskante leningen. Een dergelijke overbrenging van onderliggende activa vindt niet plaats in geval van de uitgifte van gedekte obligaties en banken worden verondersteld in dat geval wel '*skin in the game*' te hebben. Dit betekent dat de beweringen over securitisatie onterecht zijn als banken die gedekte obligaties uitgeven met vergelijkbare problemen te maken hebben.

De initiële juridische analyse in deze studie haalt drie elementen naar voren. Op de eerste plaats worden er vragen gesteld over de vooronderstellingen van de regelgeving voor securitisatie die na de wereldwijde financiële crisis is opgesteld. Een groot deel van deze

regelgeving blijkt te zijn beïnvloed door de marktkritiek en politieke reacties op de securitisatiemarkt. Op de tweede plaats worden de Europese verordeningen sterk beïnvloed door de situatie op de markt in de Verenigde Staten en zijn ze niet gebaseerd op de Europese werkelijkheid. Veel complexe vormen van door activa gedekte effecten die alomtegenwoordig waren in de Amerikaanse markt, werden niet algemeen uitgegeven in de Europese securitisatiemarkt. Bovendien kwam ook het verstrekken-verpakken-verkopenmodel (*originate-to-distribute*, OTD) van securitisatie, dat zwaar wordt bekritiseerd, op de Europese markt niet voor. Op de derde plaats worden gedekte obligaties gunstig behandeld vergeleken met door activa gedekte effecten, en ook dit speelt een rol in het hinderen van de inspanningen om deze markt nieuw leven in te blazen. De beleggers kunnen het gevoel hebben dat gedekte obligaties, ook al bieden ze een lager rendement dan door activa gedekte effecten, betere instrumenten zijn vanwege de hoge kapitaalvereisten in geval van blootstelling aan door activa gedekte effecten. Er is een empirische analyse uitgevoerd om deze regelgevingsaangelegenheden diepgaand te bestuderen.

In hoofdstuk 4 van deze studie wordt het effect van door activa gedekte effecten en gedekte obligaties op het gedrag van banken met betrekking tot het nemen van kredietrisico vergeleken op basis van de gegevens van 253 banken uit 7 Europese landen over de periode 2000-2014. Deze analyse helpt de regelgeving te evalueren die is ingegeven door de perceptie dat banken die securitiseren meer risico nemen. In deze studie wordt voor de analyse de '*covariate balancing propensity score*' (CBPS) met de zogenoemde verschil-in-verschillenaanpak (*difference-in-differences*, DID) gebruikt. De eerste resultaten wijzen erop dat Europese banken niet securitiseren om kredietrisico over te dragen, maar dat het belangrijkste motief voor securitisatie en gedekte obligaties het genereren van liquiditeit is. De effecten van securitisatie en gedekte obligaties op het gedrag met betrekking tot het nemen van kredietrisico op de korte en lange termijn zijn onderzocht. De resultaten wijzen erop dat securitisatie mogelijk geen positief effect heeft op het gedrag van banken met betrekking tot het nemen van kredietrisico. De bevindingen ondersteunen niet de perceptie dat banken die securitiseren hun risico te laag beprijzen. De resultaten wijzen er echter wel op dat gedekte obligaties een positief effect kunnen hebben op het nemen van kredietrisico op de lange termijn. Deze resultaten worden toegeschreven aan de geboden verhaalmogelijkheid in securitisatietransacties, concurrentiedruk en bezwaring van activa in geval van grootschalige uitgifte van gedekte obligaties. De '*skin in the game*' in de vorm van op de balans aangehouden belang helpt mogelijk niet om het nemen van kredietrisico te beperken.

Hoofdstuk 5 van deze studie gaat iets dieper en onderzoekt empirisch hoe de relatie tussen securitisatie en gedekte obligaties met stabiliteit van banken varieert met veranderingen in de omvang van hun betrokkenheid bij een van deze twee instrumenten. In deze studie worden

hiervoor de gegevens over 2000-2014 gebruikt van 46 beursgenoteerde banken in Europa die securitiseren en gedekte obligaties uitgeven. Uit de eerste resultaten blijkt dat sommige banken zich intensief hebben beziggehouden met securitisatieactiviteiten, terwijl de uitgifte van gedekte obligaties beneden een bepaalde limiet bleef. De resultaten die zijn verkregen met een kwadratisch model en een gegeneraliseerd additief model, wijzen op een U-vormige relatie tussen securitisatie en het systeemrisico van banken. Deze relatie is echter omgekeerd voor gedekte obligaties. Kleine uitgiften van gedekte obligaties bieden niet de beoogde voordelen en verhogen het risico van banken. Nader onderzoek wijst uit dat het effect sterk afhankelijk is van grootte. Het systeemrisico van kleinere banken neemt toe na uitgifte van gedekte obligaties, terwijl dat van grotere banken ongewijzigd blijft. De resultaten van deze studie ondersteunen het opleggen van uniforme limieten aan de uitgifte van gedekte obligaties niet; in plaats daarvan zouden zulke limieten moeten worden gekoppeld aan de grootte van de bank. Er is echter wel een kader nodig om de betrokkenheid van banken bij securitisatie te beperken.

De empirische analyse wijst erop dat securitisatie op zich niet hoeft te leiden tot het nemen van grote risico's. Integendeel, het probleem ontstaat wanneer banken hun niveau van securitisatie verhogen. In het licht van deze bevindingen wijst de studie erop dat uniforme regelgeving voor alle banken die securitiseren mogelijk niet geschikt is. De doelstelling van de heropleving van de securitisatiemarkt is mogelijk niet haalbaar bij de huidige strenge behandeling die op alle vormen en niveaus van securitisatie wordt toegepast. Op basis van de bevindingen van deze studie wordt een gedifferentieerde behandeling van verschillende klassen van door activa gedekte effecten en incrementele kapitaalvoorschriften aangeraden. De kapitaalvoorschriften zouden moeten worden versoepeld voor banken met een redelijke aanwezigheid in de securitisatiemarkt, maar zouden moeten worden aangescherpt voor banken die hun securitisatieactiviteiten versnellen. Een gedifferentieerde behandeling die rekening houdt met de klassen van door activa gedekte effecten en de verwikkeling van een bank in deze markt, zal banken met een lage aanwezigheid in deze markt aanmoedigen en zal banken ontmoedigen om zich op grote schaal bezig te houden met securitisatieactiviteiten.

European Doctorate in Law & Economics

Curriculum vitae

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Short bio	
I am a PhD Candidate in European Doctorate in Law and Economics. My areas of research are financial economics, banking regulations, financial innovation, financial risk management, and change management. I have 4 years' experience of teaching at various renowned universities in Pakistan. My areas of teaching are investment management, financial management, econometrics, research methodology, analysis of financial statements and quantitative methods for research. I also have an industry experience of working as a project manager.	
Education	
European Doctorate in Law and Economics (University of Bologna, University of Hamburg and Erasmus University, Rotterdam)	In Progress
Master in Science (Finance) Shaheed Zulfikar Ali Bhutto Institute of Science and Technology, Islamabad, Pakistan.	2012
Master in Business Administration (Finance) National University of Modern Languages, Islamabad, Pakistan.	2009
Bachelors (Economics) – The University of Punjab, Lahore, Paksitan.	2006
Work experience	
Adjunct Faculty Member Army Public College of Management Sciences, Rawalpindi, Pakistan.	2014
Adjunct Faculty Member Shaheed Zulfikar Ali Bhutto Institute of Science and Technology, Islamabad, Pakistan	2011-2014
Adjunct Faculty Member Fatima Jinnah Women University, Rawalpindi, Pakistan.	2011-2014
Adjunct Faculty Member PMAS Arid Agriculture University, Rawalpindi, Pakistan.	2011-2012
Project Manager M/S Speed-flo Filter Industries, Islamabad, Pakistan	2005-2013
Prizes and awards	
Erasmus Mundus Fellowship	2014
Scholarship in MBA from NUML	2007-2009
Best Paper Award in 18th Annual Conference on Accounting and Finance at University of Economics, Prague.	2017

Publications	
Determinants of Capital Structure: An Evidence from Non-Financial Sector of Pakistan, *International Journal of Empirical Finance,* Vol. 3, No. 2, pp. 76-89.	2014
Credit Risk and Growth of Banking System, *Universal Journal of Management and Social Sciences*, Vol. 4, No. 11.	2014
Academic Research Commercialization in Pakistan: Issues and Challenges, *Jurnal Kemanusiaan*, Bil. 22.	2014
Knowledge Creating Capabilities and Academic Entrepreneurship, *World Applied Sciences Journal,* Vol. 32, No. 7, pp. 1192-1203	2014
Determinants of Dividend Policy: A Sectoral Analysis from Pakistan, *International Journal of Business and Behavioural Sciences*, Vol. 3, No. 9, pp. 16-33	2013
Liquidity Risk and Performance of Pakistani Banking System, *Journal of Financial Regulation and Compliance* (Emerald Publishers) Vol. 20, No 2, pp. 182-195.	2012
Credit Risk and Shareholders' Value in a Developing Economy: Evidence from Pakistani Banking Sector, *Journal of Economics and Behavioural Studies,* Vol. 4, No. 2, pp. 87-95.	2012
Impact of Long Working Hours on Family Wellbeing of Corporate Family, *World Applied Sciences Journal* (ISI Indexed), Vol. 16 No. 9, pp. 1302-1307.	2012
Dividend Policy and Earnings Management: An Empirical Study of Pakistani Listed Companies, *Information Management and Business Review,* Vol. 3, No. 2, pp. 68-77.	2011
Others	
Securitisation, Covered Bonds and Credit Risk Taking Behaviour of Banks	Working Paper
Effects of Securitisation, Covered Bonds on Bank Stability	Working Paper
Regulations for Securitisation and Covered Bonds – Too Much or Too Little	Working Paper
Rethinking Regulatory Treatment of Securitisation and Covered Bonds – Diversification and Differentiation Perspectives	Working Paper
Role of Risk Management in Value Creation in Banking System	Working Paper
Balance Score Card: A tool for Change Management in Margalla Textile Mills Pvt. Ltd.	Working Paper

European Doctorate in Law & Economics

EDLE PhD Portfolio

Name PhD student : Ahmed Arif
PhD-period : 2014-2017
Promoters : Sergio Pastorello and Alessio Paccess

PhD training

Bologna courses	*year*
Introduction to the Italian Legal System	2014
Basic Statistics	2014
Experimental L & E Topics	2014
Game Theory and Law	2014
Economic Analysis of Law	2014
Causal Inference	2014
Behavioural Law and Economics – Enforcement Mechanism	2015
Behavioural Law and Economics	2015
European Securities and Company Law	2015
European Competition Law and Intellectual Property Rights	2015
Specific courses	*year*
Seminar 'How to write a PhD'	2015
Academic Writing Skills for PhD students (Rotterdam)	2015
Seminar Series 'Empirical Legal Studies'	2016
Seminars and workshops	*year*
Bologna November seminar (attendance)	2014, 2016
BACT seminar series (attendance)	2015, 2016
EGSL lunch seminars (attendance)	2015, 2016
Joint Seminar 'The Future of Law and Economics' (attendance)	2016
Rotterdam Fall seminar series (peer feedback)	2015
Rotterdam Winter seminar series (peer feedback)	2016
.....	
Presentations	*year*
Bologna March seminar	2015
Hamburg June seminar	2015
Rotterdam Fall seminar series	2015
Rotterdam Winter seminar series	2015

Bologna November seminar	2016
Joint Seminar 'The Future of Law and Economics'	-
.....	
Attendance (international) conferences	*year*
12th Annual Meeting of Italian Association of Law and Economics at University of Turin	2016
18th Annual Conference on Finance and Accounting (ACFA) at University of Economics, Prague	2017
34th Symposium on Money, Banking and Finance at University of Nantere, Paris.	2017
Teaching	*year*
....	
Others	*year*
Visit to Penn Law School	2017