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Reputation, Pricing and Performance in the European Securitisation Market

being a thesis submitted for the degree of PhD in Finance

by

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Table of Contents

List of Tables ..... **v**
Table of Figures ..... **vii**
List of Abbreviations ..... **viii**
Acknowledgement ..... **xi**
Declaration ..... **xii**
Abstract ..... **xiii**
Chapter 1. Introduction **1**
1.1. Background 1
1.2. Aims and Objectives 3
1.3. Research Questions 5
1.4. Data and Methodology 6
1.5. Contributions to the Literature 7
1.6. Structure of the Thesis 10
Chapter 2. Background **11**
2.1. Introduction 11
2.2. What is Securitisation? 11
2.3. Originate-to-Distribute 12
2.4. Securitisation Process 12
2.4.1. Originator 13
2.4.2. Servicer 14
2.4.3. Trustee 14
2.4.4. Underwriter 14
2.4.5. Credit Rating Agencies 15
2.4.6. Investors 15
2.5. Credit Enhancement (Credit Support) 15
2.5.1. Internal credit enhancement 16
2.5.2. External credit enhancement 17
2.6. Tranching 18
2.7. Securitisation Structures 18
2.7.1. Cash securitisation 18
2.7.2. Synthetic securitisation 19
2.8. Securitisation Instruments 19
2.8.1. Asset backed commercial paper (ABCP) 20
2.8.2. Mortgage backed securities (MBS) 22
2.8.3. Asset backed securities (ABS) 22
2.8.4. Collateralized debt obligations (CDOs) 22

2.9. A Historical and Regional Overview of Securitisation 25
2.9.1. Origins of the market in the 1970s 26
2.9.2. Savings and Loans crisis of the 1980s 27
2.9.3. Private enterprises entering the market 28
2.9.4. Basel I and Securitisation for regulatory capital arbitrage in the 1990s 28
2.9.5. European Securitisation 29
2.9.6. A comparison of the US and European market 32
2.9.7. The US versus European market – Graphical Overview 36
2.9.8. Growth in the 2000s prior to the 2007-2009 financial crisis 41
2.9.9. Securitisation and the Financial Crisis 43
2.9.10. Post-crisis Regulation of the securitisation market 45
2.9.11. STS Framework 51
2.10. Conclusion 52
Chapter 3. Literature Review 54
3.1. Introduction 54
3.2. Security Design and Information Asymmetry 54
3.3. The Determinants of Securitisation 57
3.3.1. Funding/Liquidity 57
3.3.2. Credit risk transfer 58
3.3.3. Regulatory capital arbitrage 59
3.4. Effects of Securitisation 60
3.4.1. Risk 61
3.4.2. Credit Supply 65
3.4.3. Shareholder Wealth 66
3.5. Securitisation Pricing 67
3.6. Research Gap 68
3.7. Conclusions 69
Chapter 4. Issuer Reputation in Securitisation Pricing 71
4.1. Introduction 71
4.2. Literature Review 74
4.2.1. Opportunistic Issuer Behaviour in Securitisation 74
4.2.2. Issuer and Ratings Agency Interaction 76
4.2.3. Distance to the origination market 76
4.2.4. Information content of yield spreads of MBS 78
4.3. Data and Methodology 78
4.3.1. Data Sources 78
4.3.2. Empirical Model 78
4.3.3. Interacting *Reputation* 81

4.3.4. Incorporating Loan Growth into the Model 81
4.3.5. Descriptive statistics 82
4.4. Regression Results 87
4.4.1. MBS Sample 87
4.4.2. RMBS Sample 91
4.4.3. Prime versus Non-Prime Tranches 92
4.4.4. Impact of Loan Growth on MBS spreads 104
4.5. Conclusion 107
Chapter 5. Trustee Reputation in Securitisation Pricing 109
5.1. Introduction 109
5.2. Background and Literature Review 111
5.2.1. The Role of the Securitisation Trustee 112
5.2.2. Literature Review 114
5.3. Data and Methodology 117
5.3.1. Data Sources 117
5.3.2. Data Selection 117
5.3.3. Empirical model 118
5.3.4. Descriptive statistics 125
5.4. Regression Results 128
5.4.1. Trustee reputation variables 129
5.4.2. Other variables 132
5.4.3. Prime versus non-prime tranches 133
5.4.4. Robustness checks 139
5.5. Conclusion 143
Chapter 6. Issuer Reputation, Pricing and Performance 145
6.1. Introduction 145
6.2. Background 149
6.2.1. The European Securitisation Market 150
6.3. Related Literature 151
6.4. Data and Empirical Framework 153
6.4.1. Data 153
6.4.2. Empirical Model: Reputation 166
6.4.3. Empirical Model: Pricing 167
6.4.4. Descriptive Statistics 169
6.5. Regression Results 172
6.5.1. Does issuer reputation explain future performance? 172
6.5.2. Are yield spreads informative during boom periods? 184
6.6. Concluding Remarks 186

Chapter 7. Conclusion 188
7.1. Summary of Main Findings 189
7.2. Policy Implications 191
7.3. Limitations 193
7.4. Suggestions for Further Research 194
References 195

List of Tables

Table 2-1 An example of tranching 18
Table 2-2 STS vs Non-STS risk weights 50
Table 4-1 Sample characteristics 83
Table 4-2 Country of risk 84
Table 4-3 Descriptive statistics 85
Table 4-4 The impact of issuer reputation on initial yield spreads of MBS tranches 88
Table 4-5 The impact of issuer reputation on initial yield spreads of RMBS tranches 93
Table 4-6 The impact of issuer reputation on initial yield spreads of prime MBS tranches 95
Table 4-7 The impact of issuer reputation on initial yield spreads of prime RMBS tranches 97
Table 4-8 The impact of issuer reputation on initial yield spreads of non-prime MBS tranches 99
Table 4-9 The impact of issuer reputation on initial yield spreads of non-prime RMBS tranches 102
Table 4-10 The impact of loan growth on initial yield spreads of MBS tranches 105
Table 5-1 Sample characteristics 126
Table 5-2 Country of risk 127
Table 5-3 Descriptive statistics 128
Table 5-4 The impact of trustee reputation on initial yield spreads of MBS tranches 130
Table 5-5 The impact of trustee reputation on initial yield spreads of prime and non-prime MBS tranches 135
Table 5-6 The impact of trustee reputation on initial yield spreads of prime and non-prime MBS tranches 137
Table 5-7 First stage selection model results 141
Table 5-8 Second stage estimations with inverse Mill's ratio 142
Table 6-1 Definitions and sources of independent variables 155
Table 6-2 Sample characteristics 162
Table 6-3 Country of origination 165
Table 6-4 Descriptive statistics 171
Table 6-5 The impact of reputation on performance (Downgrades) 173
Table 6-6 The impact of reputation and bank characteristics on performance (Downgrades) 176

Table 6-7 The impact of reputation on performance (Delinquency) 179
Table 6-8 The impact of reputation and bank characteristics on performance (Delinquency)..... 182
Table 6-9 The predictive potency of yield spreads 185

Table of Figures

Figure 2-1 The securitisation process 13
Figure 2-2 Historical European ABCP issuance (billion EUR) 21
Figure 2-3 Historical US & European ABCP outstanding (billion EUR) 21
Figure 2-4 US CDOs outstanding by purpose (billion USD) 24
Figure 2-5 US CDOs outstanding by type (billion USD) 25
Figure 2-6 UK Securitisation issuances (1985-1999) (billion USD) 31
Figure 2-7 UK Securitisation issuances (1999-2016) (billion USD) 32
Figure 2-8 US issuance (billion USD) 33
Figure 2-9 US RMBS issuances before the financial crisis (billion USD) 33
Figure 2-10 US RMBS issuances after the financial crisis (billion USD) 34
Figure 2-11 US and European issuances (billion USD) 36
Figure 2-12 European Covered bond and Securitisation issuance 37
Figure 2-13 European & US Securitisation outstanding (billion USD) 38
Figure 2-14 2016 European Securitisation outstanding by collateral 38
Figure 2-15 European issuance (billion USD) 39
Figure 2-16 US issuance (billion USD) 39
Figure 2-17 European issuance by collateral 40
Figure 2-18 2016 European issuance and outstanding by region 40
Figure 2-19 Securitisation outstanding by rating 41
Figure 2-20 US and European Securitisation issuances (billion USD) 42
Figure 2-21 European Securitisation issuance (billion USD) 45
Figure 6-1 Distribution of delinquency rates 161

List of Abbreviations

ABA	American Bankers Association
ABCP	Asset Backed Commercial Paper
ABS	Asset Backed Security
AIC	Akaike Information Criterion
AIG	American International Group
ARM	Adjustable Rate Mortgage
BCBS	Basel Committee on Banking Supervision
BIC	Bayesian Information Criterion
BIS	Bank for International Settlements
BoE	Bank of England
CDO	Collateral Debt Obligation
CDS	Credit Default Swap
CLO	Collateral Loans Obligation
CMBS	Commercial Mortgage Backed Security
CMU	Capital Markets Union
CRA	Credit Ratings Agencies
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
DTI	Debt-to-Income
EBA	European Banking Authority
EC	European Commission
ECB	European Central Bank
ECOBATE	European Conference on Banking and the Economy
ESF	European Securitisation Forum
ESMA	European Securities and Markets Authority
EU	European Union
EUR	Euro
EURIBOR	Euro Interbank Offered Rate
FCC	Fonds Commun de Creances
FHA	Federal Housing Administration
FNMA	Federal National Mortgage Association

FRB	Federal Reserve Board
FREDDIE MAC	Federal Home Loan Mortgage Corporation
FTH	Fondos de Titulizacion Hipotecaria
GAAP	Generally Accepted Accounting Principles
GBP	British Pound
GDP	Gross Domestic Product
GNMA	Government National Mortgage Association
GSE	Government Sponsored Enterprise
HQLA	High Quality Liquid Assets
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IMR	Inverse Mills Ratio
IPO	Initial Public Offering
JFSC	Jersey Financial Services Commission
LBO	Leveraged Buyout
LCR	Liquidity Coverage Ratio
LIBOR	London Interbank Offer Rate
LLC	Limited Liability Company
LLP	Limited Liability Partnership
LLR	Loan Loss Reserves
LTV	Loan to Value
MBS	Mortgage Backed Security
NRAM	Northern Rock (Asset Management)
NSFR	Net Stable Funding Ratio
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PSA	Pooling and Servicing Agreements
RMBS	Residential Mortgage Backed Security
RTC	The Resolution Trust Corporation
S&P	Standard and Poor’s
SEC	Securities and Exchange Commission
SEC-ERBA	Securitisation External Ratings – Based Approach
SEC-IRBA	Securitisation Internal Ratings – Based Approach

SEC-SA	Securitisation Standardised Approach
SIFMA	Securities Industry and Financial Markets Association
SIV	Structured Investment Vehicle
SME	Small and Medium Enterprises
SPV	Special Purpose Vehicle
STC	Simple Transparent and Comparable
STS	Simple Transparent and Standardised
UK	United Kingdom
US	United States
USD	United States Dollar
WALTV	Weighted Average Loan to Value

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Declaration

A version of Background has been published in a research themed book titled *Securitization: Past, Present and Future* (pp. 7-91) by Palgrave Macmillan.

A version of Chapter 4 was presented at the European Conference on Banking and the Economy (ECOBATE 2016) at Winchester. A version of this chapter is currently under consideration for publication in the Journal of International Finance, Money, Institutions and Markets.

A version of Chapter 5 was presented at the 2016 Portsmouth-Fordham Conference on Banking & Finance. A version of this chapter is currently under consideration for publication in the Journal of Financial Markets, Institutions & Instruments.

A version of Chapter 6 has been accepted for presentation at the Southern Finance Association 2017 Annual Meeting in Florida, and the 2017 Paris Financial Management Conference.

Abstract

This study investigates the impact of reputation on the pricing and performance of securitised bonds. On the one hand, we ascertain whether investors incorporate the reputation and experience of issuers and trustees into pricing mortgage-backed securities (MBS). On the other hand, we examine the link between the disciplining mechanisms of price and issuer reputation on the performance of mortgage-backed securities proxied by delinquency rates and rating changes. We address these objectives using pricing and performance data on the MBS issued from 1999-2007 in 14 European countries' securitisation markets.

In perfect capital markets, asset backed securitisation should be irrelevant. However in an environment with asymmetric information, banks prefer to securitise assets rather than fund assets with deposits. The literature concurs that European banks mainly engage in securitisation to augment their liquidity positions and diversify their funding alternatives. Other incentives include risk diversification and regulatory capital arbitrage, however, this was a more common motive in the US, prior to the financial crisis. During that period, the growth of securitisation was fuelled by increased credit supply which in turn was nurtured by relaxed lending standards and a low interest rate environment. Furthermore, banks retained riskier loans and junior tranches to signal the quality of securitised bonds to investors. Hence securitisation, originally designed to transfer credit risk, ultimately involved very limited risk transfer. This trend resulted in the accumulation of risks on banks' balance sheet which in tend increased the likelihood of a systemic crisis. Contemporary evidence from the equity markets also indicates securitisation announcements typically had negative wealth effects on the market value of issuing banks. As MBS issuance levels increased in the years preceding the financial crisis, investors in securitisation transactions also began to incorporate varying credit factors in excess of credit ratings into the launch spreads of securitised bonds. More importantly, spreads were informative enough to predict bond performance in terms of cumulative losses and rating downgrades.

We examine pricing from two dimensions. In the first empirical chapter, we assess the certification value of issuer reputation in securitisation by examining initial yield spreads of MBS. We find that issuer reputation has a certification value for riskier, difficult to evaluate MBS, especially when information asymmetries in credit markets intensify. Furthermore, we show that MBS originated by subsidiaries of foreign banks are perceived

to be riskier, regardless of the repuation of the issuer. We also find that investors require higher yields if there is a higher probability of rating shopping and when issuers expand rapidly.

In the second empirical chapter, we consider the role of trustees –who are nominated to protect the interests of investors– in securitisation pricing and whether investors rely on them to mitigate risks. We assess the effect of trustee reputation on initial yield spreads and we find that engaging reputable trustees led to lower spreads during the credit boom period prior to the 2007-2009 financial crisis. Our findings suggest that trustees' reputation was considered by investors to be more important when risk assessment became more challenging. Thus, investors began to associate trustee reputation with effective debt monitoring as the concern for defaults grew in the boom period. In hindsight, it is evident that investors took steps to protect their investments, however inadequate, by adjusting the valuations of the structured notes they purchased.

Concerning performance, in the third empirical chapter, we find that reputable issuers sold bonds collateralized by low-quality assets during the boom period. However, these bonds were less likely to be downgraded by rating agencies, probably due to the compensating effects of structuring techniques. We attribute this decline in quality to reduced monitoring efforts. We also find that foreign reputable issuers tend to sell lower quality bonds, which are more likely to be downgraded. Furthermore, we confirm that initial yield spreads are informative enough to predict performance. More specifically, this finding is solely driven by non-AAA rated bond yields. Our key finding, however, is that initial yields were generally not informative in the years preceding the boom period (2004-2007). Therefore, at the turn of the millennium, most investors exclusively relied on credit ratings. However, during the growth period, sophisticated investors began to price the increased uncertainty and complexity associated with MBSs.

Overall, the analysis provides some insights on the role of reputation in the securitisation markets. Investors demanded lower spreads on securities with reputable sponsors and trustees especially during the growth period preceding the 2007-09 financial crisis. Although the quality of the assets underlying these securities deteriorated rather rapidly, the securitised bonds were less likely to be downgraded, most likely due to countervailing structural features. Furthermore, the findings of this study show that investors, mainly sophisticated investors, grew increasingly sceptical in the years preceding the financial

crisis. This is evident in the relative predictive potency of initial yield spreads on non-prime bonds issued during this period.

Chapter 1. Introduction

1.1. Background

There is widespread consensus that the rapid rise in securitisation activity amplified the magnitude of losses incurred during the 2007-09 financial crisis. As the crisis unfolded, investor appetite for asset backed securities (ABS) declined, the securitisation markets became illiquid and folded. The misalignment and conflict of interests between parties within the securitisation chain have been blamed for the market collapse (Franke and Krahnen, 2008; Fender and Mitchell, 2009; Blommestein et al., 2011). The crisis had a lasting effect as it took several years for the largest economies to recover.[1] Regulators recognise that a vibrant securitisation market is instrumental in boosting credit supply to the real economy and diversifying funding sources. Consequently, policy makers are keen on reviving the market by encouraging responsible securitisation (Hale, 2017). The recovery, however, has remained stunted and subdued due to limited investor interest and increased issuance costs.

Securitisation involves bundling and repackaging income generating assets (such as mortgages) into marketable securities. The process starts with the origination of assets which are pooled and sold to a Special Purpose Vehicle (SPV), a trust established solely for the purpose conducting the transaction. The pooled assets are structured (tranched), rated and sold to investors to finance the purchase of the collateral. A servicer is appointed to collect payments from underlying borrowers and remit these collections to the SPV. Due to investor anonymity and the liquidity of the securities, a trustee is appointed to represent the collective interests of investors. This form of securitisation originated in the US in 1970 and gradually emerged in Europe during the 1980s.

Banks tend to use securitisation to transfer credit risk, augment liquidity or arbitrage regulatory capital. The appeal of securitisation to banks and investors fuelled its growth which in turn indelibly transformed the financial intermediation process with the introduction of the originate-to-distribute model of banking. This model, however, presents a number of problems. Contemporary financial intermediation theories (Diamond, 1984) argue that in the face of information asymmetry, banks have a

[1] Using 2007 figures as the base, large economies such as the US, German and French economies reached or surpassed pre-crisis real GDP levels for the first time in 2011. For the UK and Japan, this occurred in 2013. Meanwhile nations affected by the Eurozone crisis such as Portugal, Italy and Greece still have not recovered. Others such as Ireland and Iceland reached pre-crisis levels in 2014 and Spain only showed signs of recovery in 2017 (Manibog and Foley, 2017).

comparative advantage in screening and monitoring borrowers. The incentive to perform these roles prudently hinge on banks retaining the loans they originate. Hence Pennacchi (1988) and Gorton and Pennacchi (1995) contend that, by enabling the sale of loans, securitisation without recourse weakens the lender's incentives to carefully screen and monitor borrowers. In fact, there is well-established evidence that originators failed to diligently screen loans that were subsequently securitised (Keys et al., 2010; Keys et al., 2012; Purnanandam, 2011; Mian and Sufi, 2009; Dell'Ariccia et al., 2012; Bord and Santos, 2015). Furthermore, other studies such as Rajan et al. (2015) and Anderson et al. (2011) show that lenders securitised loans that rate high on observable characteristics (hard information) even if unreported information (soft information) indicate low quality.[2]

Conversely, other studies show that banks remained exposed to the risks of assets securitised via risk retention mechanisms[3] (Acharya et al., 2013; Gorton, 2009; Benmelech et al., 2012). Concerning loan quality, in line with theoretical predictions (Greenbaum and Thakor, 1987), certain empirical studies (Ambrose et al., 2005; Albertazzi et al., 2015) find that banks were more likely to securitise their high quality loans. Albertazzi et al. (2015) analyse the Italian prime mortgage securitisation market and confirm that banks are more likely to securitise better quality and less opaque assets. Also, the relative size of the equity tranche declines with the issuer's securitisation history. Therefore, reputation concerns mitigate the likelihood of selling lemons since banks are less likely to resort to securitisation as a one-off process due to the fixed costs involved. Ideally, reputational concerns should compel lenders to invest in screening if the failure to do so risks losing future income regardless of the stage of the business cycle. Similarly, conventional wisdom suggests that reputable intermediaries produce the best quality securities. In the context of securitisation, if the originator aims to rely on this mechanism as a reliable funding alternative, then its reputation concerns should counteract the incentives to relax lending standards. Under perfect capital assumptions, these reputation concerns should mitigate the origination and distribution of lemons on a systematic basis.[4]

[2] Consequently, statistical models that relied on historical data without accounting for this moral hazard misled ratings agencies as well as investors

[3] These include securitising high quality assets, retaining the riskiest tranche or providing implicit recourse to make the transaction incentive-compatible.

[4] Investors failing to detect this tendency is probably an indication of market failure.

1.2. Aims and Objectives

This research is motivated by the literature on the importance of reputation in security issuance. Many economic interactions occur repeatedly over time. A common intuition about these repeated interactions is that reputation building is costly and time consuming hence reputable banks are more likely to take long term views such that they are less likely to focus on short term gains at the expense of risking future cash flows. In seminal theoretical works such as Klein and Leffler (1981), Shapiro (1983) and Allen (1984) where product quality is unobservable before purchase, sellers sacrifice immediate cost savings from reducing quality in return for protecting their reputation and as well as their ability to sell high quality products in the future. In the model of Chemmanur and Fulghieri (1994), investment banks acquire reputation by maintaining strict evaluation standards and their credibility is dependent on past deals. They show that, in equilibrium, reputable intermediaries underwrite safer issues and secure higher prices for issuers. Booth and Smith (1986) model reputation as a bonding strategy to address information asymmetry problems between intermediaries and investors. Thus, reputational capital is correlated with quality under information asymmetry. In the context of loan sales, Pennacchi (1988) argue that a bank's ability to sell loans profitably is a function of investors' perception of the bank's monitoring incentive and ability. Consequently, we argue that investors may have relied on the reputation of issuers to address declining underwriting standards and they may also have depended on trustees to protect them from perverse issuer behaviour especially during the boom period. The main objective of this study is, therefore, to provide an analytical framework to examine the value of intermediary reputation in terms of pricing and performance.

In a model with repeated underwriting, Griffin et al. (2014) discount the conventional intuition on reputation. They show that, in the case of complex securities, reputable underwriters may create assets that perform poorly during economic downturns. On the contrary, Winton and Yerramilli (2015) use a repeated originate-to-distribute lending model to show that reputational concerns can sustain monitoring incentives, especially during credit booms. Thus reputable banks are more likely to maintain prudent monitoring while less reputable banks seek to exploit this demand and forgo monitoring. They also show that reputable banks retain smaller loan fractions. This is quite suggestive that reputation and retention can be substitutes. Parlour and Winton (2013) model an originating bank's choice of risk transfer through loan sales or credit default swaps

(CDSs)[5]. In a single period game, loan sales dominate CDSs for riskier loans. However, in a repeat lending context with reputation concerns, CDSs dominate loan sales for safer loans –this is indicative of better monitoring. Cortes and Thakor (2015) show that initially, lenders with reputational concerns tend to overinvest in screening precision in order to mitigate the likelihood of reputational damage. However, as the quality of the asset pool increases, the lender's screening incentive declines.[6] Thus, in equilibrium, the bank chooses a screening effort that trades off the cost of marginal screening precision versus the reputational benefit of marginal screening precision. On the empirical front, Using a sample of over 3,000 bonds issued between 1991 and 2000, Fang (2005) finds that reputable banks that offer higher quality underwriting services are able to secure lower yields and higher net proceeds for issuers.

In regard to reputational concerns, the literature primarily focuses on the originator/issuer however the typical securitisation transaction features multiple parties. Originators are heavily scrutinised because of their influence on initial asset quality. However, the securitisation arrangement presents collective action and free-rider (under-monitoring) problems as the tranched notes are issued to multiple investors. On the one hand, ownership fluidity, fragmented ownership, investor anonymity and bond liquidity worsen the collective action problem by undermining concerted investor effort (Schwarcs and Sergi, 2008). On the other hand, no single investor has the incentive to incur the fixed cost of monitoring the borrower (originator) and enforcing covenants. Therefore, engaging a delegated monitor to mitigate both problems where an intermediary – the trustee – monitors the borrower(s) on behalf of the dispersed lenders (investors) is a more efficient option (Diamond, 1984; Haubrich, 1989; Diamond, 1996). Thus, the financial intermediary minimises monitoring costs by avoiding the duplication of efforts in information production and facilitates the coordination of strategies among investors. This setup creates an incentive for the issuer to *persuade* the trustee to disregard contraventions of the covenants stipulated in the pooling and servicing agreement (PSA). Hence, issuers would prefer reputable and honest trustees to increase investor appeal and

[5] Under a loan sale arrangement, ownership and control of the loan is transferred with the risk however credit default swaps only transfer the risk of the underlying asset.

[6] Pooling yields diversification benefits, hence pooling assets issued by reputation conscious banks increases pool quality. However, as the diversification benefits increase for larger pools, the reputation effect and hence the benefit of screening precision diminishes. This in turn reduces the quality and idiosyncratic risk and increases the systematic risk of the pool.

minimise borrowing costs. Investors would also prefer honest trustees as this mechanism is expected to mitigate perverse issuer/servicer behaviour post issuance.

Andres et al. (2012) examine the initial yields of US non-investment-grade corporate bonds issued between 2000 and 2008 and find that engaging trustees with underwriting businesses reduced issuer borrowing costs by at least 33 basis points after conditioning on credit ratings. Consistent with superior monitoring efforts, they also find significantly lower bond defaults and less downgrade risk associated with these trustees. They interpret their results as evidence of reputational spillover effects of intermediaries that provide multiple services within a market segment. However, they do not find any evidence in support of larger trustees being better debt monitors.

In addition, Fender and Mitchell (2009) argue that depending on the quality of information available and investor sophistication, the price mechanism can be used to impose discipline on deal parties within the securitisation chain. Evidently, launch spreads on securitised bonds incorporated credit factors that had already been accounted for in credit ratings (Fabozzi and Vink, 2012a, b). Spreads also reflect the market share of the issuer, rating shopping (He et al., 2012) as well as rating disagreements (Fabozzi and Vink, 2015). Other studies find that initial spreads can predict the performance of securitised bonds (Adelino, 2009; He et al., 2016). Investors demanded lower spreads as a result of incentive aligning mechanisms such as retention of the first loss piece and implicit recourse (Albertazzi et al., 2015; Begley and Purnanandam, 2017; Gorton and Souleles, 2007). Despite this widening positive view, Ghent et al. (2017) show that spreads failed to account for the complexity of securitisations, however, the evidence presented by Fabozzi et al. (2017) discount this stance. Therefore investors do not ignore additional credit factors even after conditioning on credit ratings.

1.3. Research Questions

In this study, we address a number of important questions. First, using launch spreads as a measure of investor perception, we investigate whether investors valued the reputation and securitisation experience of issuers and how this varied during the credit boom. We also investigate the performance of bonds issued by reputable issuers. Second, we examine yield spreads to determine whether investors relied on experienced trustees to mitigate perverse issuer behaviour, especially during the years leading to the financial crisis. Third, informational theories of banking (Stein, 2002; Mian, 2006; Detragiache et al., 2008; Berger et al., 2008) suggest that foreign banks face informational difficulties in

loan underwriting relative to domestic lenders. This information disadvantage of foreign banks, suggests that they are less capable of processing soft information and hence more likely to originate poor quality loans. In fact, Loutskina and Strahan (2011) find empirical evidence suggesting that geographical diversification led to a decline in screening incentives as securitisation volumes surged.[7] Therefore we assess investors' disposition to foreign bank securitisations as well as the relative performance of bonds issued by foreign banks. Fourth, issuers are not required to report all solicited ratings, however, we contend that deals rated by all three agencies suggest more transparency while ratings from either one or two agencies may indicate suppression of negative ratings. In order to understand investors' response to rating shopping, we study the information content of yield spreads in relation to the number of credit ratings reported. We also provide new insights on the performance of single rated bonds and bonds with multiple ratings. Fifth, as the securitisation markets developed, deals increasingly grew opaque and complex. We contend that investors may have adjusted their pricing to reflect these developments however inadequate. Therefore, we assess investors' perception of complex deals and how these deals performed in terms of rating transitions. Finally, we measure the predictive potency of launch spreads after conditioning on ratings. Thus we investigate the ability of yield spreads, especially on bonds issued during the boom period, to predict bonds performance.

1.4. Data and Methodology

In carrying out our empirical analysis, we employ a unique dataset on European mortgage backed securities issued from 1999 to the first half of 2007 in order to preclude the changing attitudes towards securitisations as the crisis unfolded. Mortgages are the most common collateral used in European securitisation hence we focus on MBSs to obtain a more homogenous sample. In addition, we focus on the European market as it is the second largest and unlike the US, the rapid growth of securitisation was solely due to private market forces rather than governmental agencies. We compile the data on deal and tranche characteristics including pricing date, deal type, asset origin, deal value, collateral type and issuers' identity from Dealogic. Additional data on weighted average life, constituent credit ratings and the identity of deal trustees were collected from Bloomberg. We also collect issuing banks' financial data from Bankscope. Our key

[7] Frankel and Jin (2015) show that despite the relative informational disadvantage of foreign banks, securitization enhances competition for borrowers with strong observables (favourable hard information – e.g. credit score, loan-to-value ratio). Thus, these banks tend to make worse lending decisions because they lack or possess relatively limited soft information (e.g. borrower's job, income stability).

variable of interest, reputation, is measured based on the issuer and trustee market share accordingly.

The study employs pooled cross-sectional data on all European MBSs issued from 1999-June 2007. We focus on MBSs as they form the largest percentage of issuance and outstanding levels. The June 2007 cut-off is chosen to avoid the disruption in the securitisation markets as investors fled to quality when the crisis ensued. Also, the retention of issuances became common practice as the demand for mortgage backed securities declined significantly from the summer of 2007. Securitising banks do not necessarily close transactions in every consecutive period. Pooling thus yields a larger sample and allows us to measure temporal variation in our key variable of interest – reputation. We use ordinary least square regressions with fixed effects where time (year) dummies are used to allow for some variation over time and also to capture unobserved systematic period effects. Also, ***issuer*** and ***trustee*** (entity) effects are conditioned out using entity dummies in order to account for issuer and trustee specific attributes. In the first empirical chapter, we use yield spreads – in excess of the relevant benchmark – as the dependent variable and our main explanatory variable is issuer reputation proxied by market share. The second empirical chapter follows a similar approach but here, trustee reputation – measured by trustee market share – is the key explanatory variable of interest. Since trustees are chosen by issuers, we also use a two stage estimation procedure to address the potential for selection bias. Finally, the third empirical chapter separately examines the predictive potency of reputation and pricing as disciplining mechanisms. In the first part, we use logistic and ordinary least squares regressions to examine the extent to which securities originated by reputable issuers account for future performance – proxied by rating transitions and average delinquency rates. The second part employs a logistic model to explore the predictive ability of yield spreads. In this setup, the dependent variable is still performance (rating transition) however the independent variable of interest is yield spreads on AAA and non-AAA rated bonds, prior to and during the growth period (2005-2007).

1.5. Contributions to the Literature

Chapter 4 (the first empirical chapter) investigates the pricing of European MBSs to determine whether investors account for the reputation of the issuer and how this effect varied during the boom period (2005-2007). The motivation for this research emerges from the asymmetry of information between the issuer and the ultimate investor (Gorton and Pennacchi, 1995). Securitisation follows a repeated game structure, therefore, we

argue that issuers are mindful of building and maintaining a good reputation, especially if they intend to access the securitisation market over the long-term. Consequently, we hypothesise that investors may have considered the reputation of issuers as a mechanism to address information asymmetries when assessing MBS risks.

In Chapter 4, in addition to examining investor perception of issuer reputation, we make three key contributions to the securitisation literature. These contributions are based on factors that investors may have considered to address perceived information asymmetries inherent in securitisation transactions. First, we investigate whether yield spreads reflect the possibility of rating shopping and the questionable relationship between rating agencies and issuers (Efing and Hau, 2015; He et al., 2012). Second, foreign banks have an informational disadvantage in comparison to their domestic counterparts due to the distance to the origination market (Stein, 2002; Mian, 2006; Detragiache et al., 2008; Berger et al., 2008). Consequently, we examine investors' perception of securitised bonds sold by foreign issuers. Third, due to relaxed lending standards and reduced monitoring incentives shown in the literature, we investigate investor interpretation of rapid loan growth preceding securitisation (Keys et al., 2010; Dell'Ariccia et al., 2012; Nadauld and Sherlund, 2013). We find that investors account for the issuer's reputation by demanding lower spreads on MBSs sold by reputable issuers. Also, MBSs originated by foreign issuers were perceived to be more risky, possibly due to information asymmetries created by bank-borrower distance. Issuer reputation does not seem to mitigate the risk arising from distance. We also find that investors require higher yields on tranches with a higher probability of issuer rating shopping. Finally, investors perceive excessive loan growth by issuers prior to securitisation as risky and require higher returns as origination standards may have declined to fuel this loan growth. Issuer reputation does not seem to alleviate investors' concerns due to possible issuer opportunistic behaviour and moral hazard indicated by excessive loan growth.

In Chapter 5, we contribute to the literature by examining the role of trustees, who are nominated to safeguard the interests of investors, in securitisation pricing and whether investors rely on them to mitigate risks. To achieve this, we examine the effect of trustee reputation on primary spreads of European MBSs. Trustees act as intermediaries between the issuer and investors. They are tasked with enforcing repurchase clauses and enforcing security in the event of default. Due to the complexity of securitisations, it is expected that experienced trustees can make a difference. Experienced trustees are expected to leverage their expertise and seek workable solutions in the best interest of investors,

especially in the event of default. We find that investors demand lower spreads when the issuer engages reputable trustees and this effect intensified as issuance levels surged during the credit boom. To the best of our knowledge, this is the first attempt to establish the association between trustees' reputation and securitised bond prices. Once more, we find that spreads indicate that investors preferred MBSs collateralised by domestic assets. Finally, investors demanded lower spreads on tranches with more than one rating, but this finding is restricted to the non-AAA sample.

Chapter 6 contributes to the literature by assessing the impact of issuer reputation, functional distance and ratings shopping on the performance of mortgage backed securities. The literature confirms that yield spreads can predict performance however a key contribution of this chapter is to examine the extent to which the predictive ability of spreads varies with issuance levels. On the one hand, this chapter analyses the effect of reputation as a disciplining mechanism on MBS performance. MBS performance in this context is measured using rating transitions and average delinquencies reported for the underlying pool of assets. Using logistic regression analyses, our results show that bonds issued by reputable banks were generally less likely to be downgraded and typically had higher quality asset pools. However, the quality of these asset pools declined significantly relative to the quality of collateral backing issuances by less frequent securitisers during the credit boom. This may have been due to reduced issuer monitoring efforts as issuers increasingly focused on satisfying loan demand at the expense of investing in monitoring. Nevertheless, bonds sold by reputable issuers were less likely to be downgraded during this period, probably due to the compensating features of structuring techniques. On the other hand, in regards to price, we are not aware of any other studies establishing the loss predictive ability of European MBS spreads. After controlling for initial credit ratings, we show that launch spreads can predict the probability of a downgrade. However, this predictive power is only evident in our non-AAA sample during the boom period as spreads on the highest rated tranches had nil value in predicting credit performance. This is consistent with the distinction between differentially informed investors as per various standard models on security design. Also, it is evident that investors refined their risk calibration over time especially, from 2005 onwards as issuance levels increased.

Other contributions to the literature include the examination of investors' perception of risk associated with collateral, complexity and effective maturity. Also, Chapter 6 assesses the relevance of these factors in predicting performance. Overall, our analyses provide a novel finding that investors attached more value to the reputation of issuers and

trustees as the European credit markets boomed and information asymmetries intensified. Evidently, investors were also sceptical regarding the quality of deals issued by banks reporting rapid loan growth, fewer credit ratings and deals issued by foreign banks. Additionally, spreads had predictive value, however, this was only evident for non-AAA tranches issued during periods of increased market activity.

1.6. Structure of the Thesis

Chapter 2 provides a background on the mechanics of securitisation, and chronicles the development of the securitisation markets. Chapter 3 reviews the literature in relation to security design, the determinants and effects of securitisation, and the pricing of asset backed securities.

The empirical analyses are presented in Chapters 4, 5 and 6. On the one hand, Chapter 4, examines investor perception of issuer reputation and Chapter 5 explores the effect of trustee reputation on primary spreads. On the other hand, Chapter 6 evaluates the impact of issuer reputation on mortgage backed securities and the predictive potency of yield spreads. Chapter 7 summarises the main findings and highlights avenues for further research.

Chapter 2. Background

2.1. Introduction

Asset backed securitisation involves the transformation of financial assets such as loans and other receivables into tradeable securities – generally known as asset backed securities (ABS). In practice, however, securities backed by mortgages are termed mortgage backed securities (MBS) while securities backed by any other underlying assets are known as ABS in a narrow sense. The future cash proceeds of these underlying financial assets are then channelled to support payments to ABS investors. This mechanism can be used by both financial and non-financial institutions as a funding and a risk management tool. Securitisation is essentially a bridge between balance sheets and capital markets.

2.2. What is Securitisation?

Securitisation is widely defined as the transformation of illiquid assets into marketable securities. However, this definition is incomplete at best. Prior to the emergence of securitisation, there was a growing secondary market for loans. The loan sale process was expensive and complicated due to the lack of standardisation of loan contracts and information asymmetry. In the absence of explicit contract features safeguarding loan buyers, loan sellers may have incentives of selling low quality loans while retaining their best loans (Caprio et al., 2010).

Modern securitisation involves aggregating cash flow generating assets as opposed to the sale of individual assets. Mortgages were the traditional collateral used in securitisations, however, as the market evolved, a wider array of assets have been securitised. The most common of which include auto loans, credit card receivables, student loans, corporate loans and negotiable financial instruments – bonds and other debt contracts. Therefore, even existing ABS could also be recursively securitised to create additional ABSs. According to Fender and Mitchell (2009), securitisations tend to involve:

1. creating a pool of eligible assets either cash based or synthetically
2. isolating the credit risk of this pool from the originator's estate by transfer to a bankruptcy remote special purpose vehicle (SPV)[8]
3. issuing tranched claims –with varying levels of seniority – backed by the underlying assets

[8] The SPV is a trust whose only function is hold the assets to be securitised (collateral). This trust is unwound when all the assets are retired.

More succinctly, securitisation is the transformation of a portfolio of financial assets (contractual debt) into marketable securities that have differing risk profiles from the original underlying assets (Saleuddin, 2015).

2.3. Originate-to-Distribute

In perfect markets, the choice between deposit funding and securitisation should be irrelevant. However, the development of the ABS markets suggests that securitisation may produce some relative advantages.

Traditionally, loans originated by depository institutions were primarily deposit funded hence a fall in deposits was likely to result in a fall in loan supply. These loans were typically held until maturity or default while monitoring the borrower's performance on behalf of depositors, and portfolio diversification was the primary risk management tool. Therefore, these institutions performed both the origination and investing functions. This model of banking – known as the *originate-to-hold* model, was the predominant banking model prior to the 1980s.

The advent of securitisation initiated a paradigm shift in the financial system. Securitisation allowed depositary financial institutions to aggregate loans and sell interests in this pool to a wide array of investors. The default risk of the underlying assets was allocated differentially into multiple tranches by subordination. Subordination ensured that senior tranches were collectively insulated from losses by mezzanine and equity tranches, and mezzanine tranches were protected by equity tranches (or the *first loss piece*). Multiclass tranches were designed to minimise costs while meeting the risk and maturity preferences of diverse investors. The most sophisticated and informed investors tend to invest in the subordinated tranches with higher loss probabilities in return for higher yields to compensate for their higher risk positions. The subordination of tranches also defines the loss distribution sequence among investors.

The emergence of securitisation engendered the *originate-to-distribute* model where financial assets were originated for the purpose of securitisation. This model provides lenders with an alternative form of financing to moderate their reliance on retail deposit funding.

2.4. Securitisation Process

The process of securitisation can be defined in five phases (Gorton and Souleles, 2007):

1. The originator establishes the SPV, aggregates the collateral pool and conveys the assets to the SPV via an assignment.

2. Bonds (ABS) backed by the asset pool are tranched into classes, rated and then sold to investors.
3. The SPV funds the purchase of the underlying assets with the proceeds of the sale.
4. Repayments from the underlying assets are used to make coupon payments to investors.
5. All cash flows from the underlying assets are used to redeem the tranches by making principal payments during the final amortisation period.

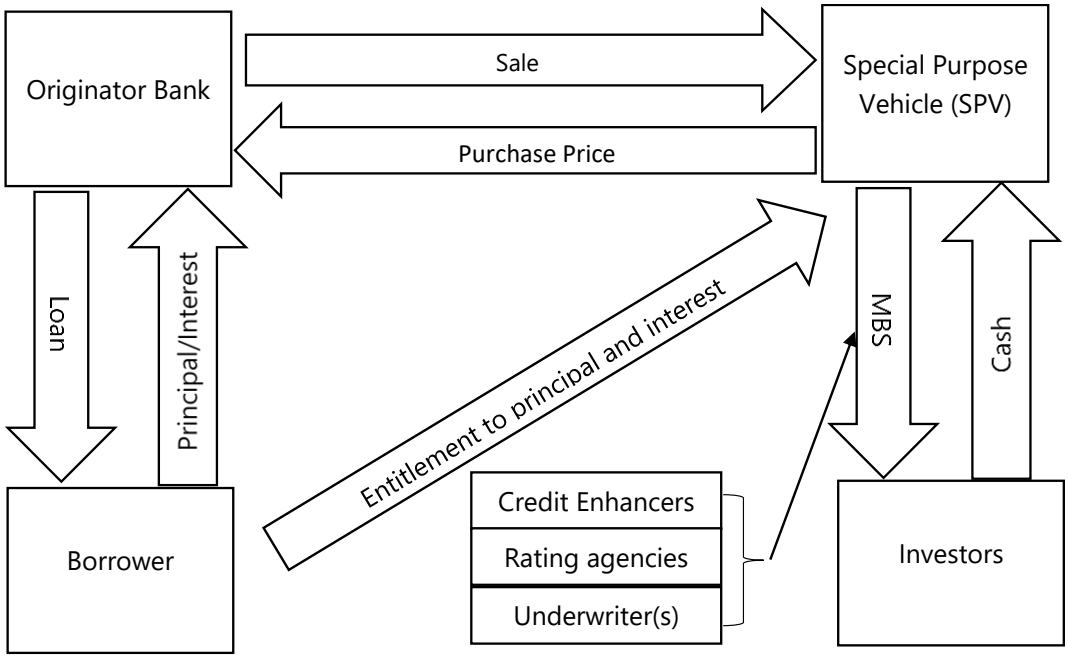

Figure 2-1 The securitisation process

As illustrated in Figure 2-1, the securitisation process involves a number of parties however the key roles are dominated by banks (Cetorelli and Peristiani, 2012). The main actors in a typical transaction include the originator, underwriters, rating agencies, servicers, and trustees.

2.4.1. Originator

The originator (also known as the sponsor, issuer or seller) is responsible for generating the assets required for the transaction. This is likely to be a bank or a specialty lender as securitisation is an avenue to dispose of their assets. This institution advances loans or mortgages to borrowers (obligors).

Securitisations are typically done to isolate the credit risk of the underlying asset pool from the credit risk of the issuer. In order to achieve this, the assets are sold on to a bankruptcy-remote legal entity known as a Special Purpose Vehicle (SPV). The SPV is established for the sole purpose of purchasing the asset pool based on certain pre-specified characteristics such as loan-to-value (LTV) and debt-to-income (DTI) ratios. This sale

must achieve an absolute transfer or a true sale legal opinion to guarantee that the transfer cannot be unwound if the originator is declared bankrupt. Also, if done appropriately, the assets of the originator should be insulated, if the SPV is declared insolvent. Investors only have recourse to the cash flows generated by the asset pool and not the originator. The SPV's balance sheet reflects the assets purchased and the liabilities issued.

2.4.2. Servicer

Servicers are tasked with administering the credit and collection policy as stipulated in the pooling and servicing agreements. They are also responsible for loss recoveries. The servicer reports on the performance of the portfolio as well as the status of collections on a regular basis to the issuer. Lenders tend to retain the servicing rights to the loans they originate, therefore the issuer and servicer is usually the same institution. These lenders prefer to maintain their relationship with borrowers, regardless of the fee income.

2.4.3. Trustee

An independent firm, a trustee, is appointed by the issuer to administer the SPV and represent the collective interest of investors. The trustee is also responsible for disbursing payments to investors and verifying the performance of the asset pool based on information provided by the issuer and servicer.

2.4.4. Underwriter

The underwriter, typically an investment bank, is charged with analysing investor demand, structuring and marketing the issue. The underwriter advises on a cost-effective and efficient approach to structure the deal. Structuring in this context largely involves tranching, where cash flows and risk are redistributed across tranches to match investor demand and risk profiles. Tranching involves dividing the issue into several classes in order to tailor the risk profile of the securities to match the preferences of a wide range of investors. Tranches are typically structured to achieve specific ratings hence underwriters consult rating agencies on the minimum level of credit enhancement required to obtain the desired rating. The issue is subsequently rated by a credit rating agency. The senior tranches are less risky and hence usually rated AAA while the riskiest subordinate tranche –first loss piece – is normally the least rated, if rated at all, and typically retained by the originator to mitigate moral hazard concerns. The rated bonds are then sold to investors in the capital markets (Choudhry et al., 2014; ESF, 1999).

2.4.5. Credit Rating Agencies

Rating agencies advise underwriters on how cash flows should be structured in order to achieve the desired credit rating. The ultimate rating decisions are made by a rating committee based on the evaluation of tranche specific documentation and additional information on the underlying assets supplied by analysts. The committee's judgement is converted into the standard alphanumeric scale indexed to the historical performance of corporate bonds. The rating agencies assess five key aspects of securitisation transactions as i) underlying asset risks, ii) legal and regulatory risks, iii) structural analysis, iv) operational and administrative risks and v) counterparty risk (Fabozzi and Vink, 2012b).

2.4.6. Investors

Investors in securitisations are mostly banks, however, other typical investors include insurance companies, pension funds, private equity investors and hedge funds. Investors effect discipline on deal parties through the price mechanism however the efficacy of this channel is largely dependent on the quality of available information and their capacity to evaluate the issued bonds. The senior tranches tend to be patronised by less sophisticated investors while lower rated tranches typically appeal to sophisticated investors as these investors possess relatively superior information (Fender and Mitchell, 2009).

The precision of investor decision making is dependent on the quality of information available. A recent survey on the use of loan level and collateral performance data in the management of ABSs, MBSs and CDOs revealed that 90% of European and US Securitisation investors encountered difficulties in using or managing loan level data because disclosures are not standardised. 80% of respondents also indicate that normalisation of data from multiple sources was a challenging task. More importantly, 80% of EU investors indicated that they encountered difficulties in accessing pre-crisis loan level data (Principia, 2013).

2.5. Credit Enhancement (Credit Support)

The securities undergo credit enhancement in order to boost their credit quality beyond the intrinsic quality of the underlying pool and thereby augment the credit rating as well as the attractiveness of the issue to investors. The provision of credit support is also assumed to extend the security's credit quality beyond the credit quality of the sponsor or the collateral. The most common credit enhancements are subordination and excess spread (ESF, 1999).

2.5.1. Internal credit enhancement

Internal credit enhancements could be provided by the originator or could be built into the structure. A key distinction is that originator credit support tends to be pool-wide while structural support is distinct to each tranche. Subordination is the most common structural credit enhancement, while examples of credit enhancements provided by the originator include excess spread and over-collateralisation.

2.5.1.1. Subordination

Subordination is the most common form of credit support in securitisation transactions. This support is achieved by tranching the securities according to a senior/subordinate structure. Thus, losses are allocated to junior tranches first, so senior tranches are unaffected unless losses exceed the value of junior tranches. Conversely, repayments are made to senior tranches first and then to junior tranches. The upper classes are highly rated (low yielding), and the subordinate tranches either receive lower ratings or are unrated and pay higher yields. The topmost tranche/higher rated class tends to the thickest as a way of minimising borrowing costs.

2.5.1.2. Excess spread

This generally refers to the surplus cash flows from the underlying assets over payments to the bondholders, charge-offs, servicing fees, and any other trust expenses. The monthly excess spread could either be retained (trapped) to offset current period losses or be paid into a reserve fund[9] to boost credit enhancement. This excess interest can also be used to support the most senior tranche if necessary. Thus, these funds may be used to redeem the highest rated tranche(s) or to purchase additional assets to reconfigure the pool. A positive excess spread is a good indicator that the SPV can cover all its costs, thus this is a proximate measure of an SPV's profitability. This is a form of credit enhancement as it serves to absorb expected as well as unexpected losses.

2.5.1.3. Over-collateralisation

A securitisation deal is over-collateralised if the issuer transfers assets with nominal values in excess of the consideration paid by the SPV. Therefore, the face value of the pool exceeds the value of the ABS. This difference is transferred to a reserve fund as a cushion for delinquencies and pool losses.

[9] A reserve fund is a fund designed to recompense the SPV for losses arising from non-payments of the underlying receivables

2.5.2. External credit enhancement

External credit enhancement mechanism includes surety bonds and third party guarantees such as letters of credit, cash collateral account and collateral invested amount. Securitisations employing external credit enhancement devices are susceptible to third party risks, therefore, the credit rating of the ABS tends to track the credit quality of the relevant third party.

2.5.2.1. Surety bonds (insurance)

A rated third party such as a monoline insurer or the parent company of the originator can also guarantee payments to bondholders in the event that the SPV is unable to do so. The insurance company typically requires another pre-existing form of credit enhancement before insuring the investment grade tranches. Since the insurance firm guarantees timely repayments to bondholders, the rating of the ABS typically tracks the ratings of the insurer, typically AAA.

2.5.2.2. Third party (related party) guarantees

An insurance company or the parent of the issuer could also pledge to indemnify the SPV for losses incurred to a pre-specified value limit.

2.5.2.3. Letter of credit

A letter of credit, secured from a bank for a fee, ensures that a cash pledge is available to compensate SPV is compensated for losses incurred to the limit of the required credit enhancement threshold. Thus, the bank promises to make payments, up to an agreed limit, to bondholders in case the SPV lacks sufficient funds to do so.

2.5.2.4. Cash collateral account

In this case, the SPV borrows the required credit enhancement funding and invests this cash in the highest quality short-term commercial paper. This account is designed to neutralise any shortfalls in cash flows from the underlying assets. Unlike the other third party credit enhancements, the cash collateral account secures cash, rather than a guarantee, therefore the ABS rating should not be dependent on the creditworthiness of the collateral account provider.

2.5.2.5. Collateral invested amount

A collateral invested amount is funded by the sale of the subordinate or equity tranche via private placement to specific investors. This class is typically tailored to the unique requirements of the investors.

2.6. Tranching

Tranches in securitisation are equivalent to multiple classes of debt in the context of the firm. Some securitisation deals are structured such that tranches receive a pro rata share of principal payments despite their ranking in the structure. More commonly, however, most deals tend to follow a relatively strict priority of payments waterfall structure. Therefore principal collections are used to retire senior notes, then mezzanine notes and finally subordinate notes. It is however possible to switch from pro rata distributions to sequential payments when a credit event occurs such that senior tranches may not be repaid.

Tranches are delimited by attachment and detachment points. Following this loss allocation mechanism, a given tranche is unaffected by collateral losses below its attachment point. The tranche absorbs all losses above its attachment point but below its detachment point. The attachment point also determines when the tranche begins to sustain losses. More importantly, the tranche is wiped out (absorbs its maximum loss) if the losses exceed the detachment point (See Table 2-1). The goal of tranching is to redistribute losses of the reference pool to match the desired risk profile of the prospective investors (Hussain, 2006).

Table 2-1 An example of tranching

Tranche	Attachment Point	Detachment Point	Expected Loss	Spread (over benchmark)	Implied Rating
Equity	0%	1%	35.75%	987	Unrated
Class C	1%	6%	19.20%	450	B3
Class B	6%	10%	7.43%	150	Ba2
Class A	10%	18%	3.36%	78	Baa3
Senior	18%	100%	0.05%	28	AAA

Adapted from (Hussain, 2006)

2.7. Securitisation Structures

Securitisation structures are usually classified according to the method of risk transfer. Thus risks could be transferred either by the actual sale of assets or synthetically. The former structure is known as *cash securitisation*, and the latter is referred to as *synthetic securitisation*.

2.7.1. Cash securitisation

In cash securitisation structures, the legal title, risks and rewards of the subject assets are transferred from the originator to the SPV in return for cash. The SPV issues securities backed by this pool of assets to fund the purchase. The cash flows from the underlying assets are then used to repay investors periodically. This structure is known as a cash

securitisation because the originator receives an upfront payment from the SPV after the assets are transferred. Most transactions use the cash based structure however synthetic transactions have become increasingly popular.

2.7.2. Synthetic securitisation

Synthetic securitisations are designed to transfer asset risks/rewards to investors using derivatives such as credit default swaps, while the collateral remains on the originator's balance sheet. In a credit default swap transaction, the originator buys protection by paying a regular premium to a credit protection seller (i.e. SPV) in return for indemnification contingent on a credit default event on the collateral. The originator makes regular premium payments to the SPV, the SPV issues securities to investors and holds a pool of credit default swaps that reference the collateral. These securities can either be funded or unfunded. Investors make upfront payments for funded securities, which are then invested high quality assets. In unfunded synthetic transactions, the investors do not make any immediate cash payment so issuers face the risk of investors not making payments when assets in the reference pool default. In practice, the majority of synthetic transactions are partially funded: the super senior tranche is unfunded while all other subordinated tranches are funded (ECB, 2008).

In synthetic transactions, the originator essentially buys credit protection from investors. The originator (protection buyer) takes a short position on the credit risk of the reference assets while credit protection sellers (investors) take long positions. Synthetic transactions may be relevant especially if the originator is likely to incur losses from selling the asset possibly because the book value of an asset exceeds its market value (ECB, 2008). The economic motive for these structures is to achieve risk reduction and capital management as risk is transferred while the associated assets are retained on the balance sheet. Hence the integrity of customer relationships is maintained as loans are not conveyed to another entity.

2.8. Securitisation Instruments

In theory, any financial asset with current or future cash flows can be securitised. Mortgages were the first assets to be securitised however because of financial innovation and flexibility in financial engineering, a wide range of assets has been securitised. Securitised instruments can be classified based on tenure or collateral. From the tenure perspective, *term paper* refers to ABS expected to be redeemed after 12 months while

securities that are expected to be paid off within 12 months are usually known as commercial paper –Asset Backed Commercial Paper (ABCP).

All securitisation instruments are invariably asset backed securities, however, securities backed by mortgages are termed Mortgage Backed Securities (MBS) while securities backed by non-mortgage assets are generally known as Asset Backed Securities (ABS). ABS can further be classified into instruments backed by retail assets/consumer credit (e.g. credit card ABS) and those backed by wholesale portfolios (i.e. Collateral Debt Obligations, CDO).

2.8.1. Asset backed commercial paper (ABCP)

These are short term instruments backed by a reference pool of high quality medium to long term assets[10] with maturities of three to five years. Due to this maturity mismatch, the liabilities (ABCP) are constantly rolled over such that the proceeds of the new ABCP issuances are used to retire the maturing ABCP. More importantly, most ABCP programmes typically secure at least 100% liquidity backstop from a liquidity provider, usually the sponsor. A Structured Investment Vehicle (conduit), usually sponsored/managed by a large commercial bank, acquires these assets either through traditional asset purchase or through secured lending transactions from a single or variety of sellers, mostly banks. This purchase is funded by issuing commercial paper, with tenors usually limited to 270 days for US ABCP and 365 days for European ABCP but can extend to 397 days. However, the tenor of most ABCP is less than 90 days. The repayment of ABCP depends on cash flows from the reference portfolio and the conduit's capacity to issue new ABCP (DBRS, 2015).

2.8.1.1. ABCP market background

ABCP issuance exhibited strong growth in the 1990s and early 2000s.[11] However, the markets peaked in 2007 with approximately US ABCP USD 1.2 trillion and European ABCP USD 250 billion outstanding (Wells Fargo, 2015). Systemic deleveraging and low economic activity after the financial crisis stunted ABCP issuances as the supply of receivables that typically made up ABCP portfolios shrank. Furthermore, regulatory changes and rising costs have eroded the appeal of ABCP programmes to sponsors.

[10] Trade receivables, credit card receivables, auto loans and equipment leases/loans, commercial loans, asset and mortgage backed securities, collateralized debt obligations and government bonds.
[11] Citibank issued the first ABCP in 1983, and Barclays set up the first European conduit to issue ABCP in 1992.

ABCP issuances experienced significant growth as issuances increased from EUR 195.1 billion in 2005 to a peak of EUR 450.2 billion in 2007 (See Figure 2-2). Due to the conditions described above issuances steeply declined by approximately 67% to EUR 145.4 billion in 2010. Subsequent issuances between 2010 and 2016 have been volatile. As at 2016, total European ABCP outstanding amounted to EUR 16.9 billion compared to EUR 216.7 billion US ABCP outstanding (See Figure 2-3).

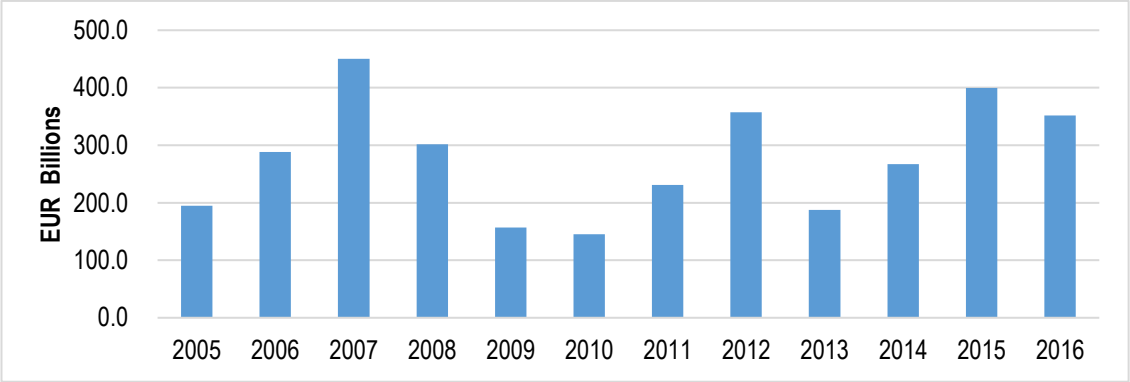

Figure 2-2 Historical European ABCP issuance (billion EUR)
Source: https://www.afme.eu/en/reports/Statistics/

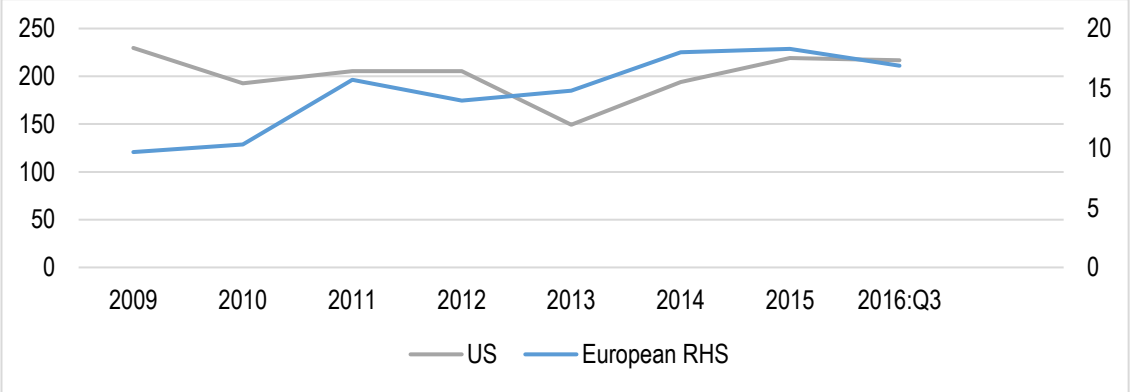

Figure 2-3 Historical US & European ABCP outstanding (billion EUR)
Source: https://www.afme.eu/en/reports/Statistics/

2.8.1.2. The basics of an ABCP programme

ABCP programmes usually follow the following steps:

1. The sponsor, typically a highly rated large commercial bank, sets up an ABCP programme as a bankruptcy remote conduit (SPV)
2. The conduit acquires receivables and other assets for the portfolio
3. The portfolio is structured to meet the credit and diversification requirements of the issuer and the rating agencies
4. The sale of commercial paper to investors
5. The retirement of matured commercial paper is financed by issuing additional commercial paper

ABCP programmes tend to hold relatively more diverse and fluctuating portfolios while the reference pool for ABS is typically homogeneous and fixed. Also, most ABCP

programmes do not have scheduled amortisations as additional investment can be financed by issuing new commercial paper. These securities incorporate credit and liquidity enhancement to make them appealing to investors. In fact, the sponsoring bank tends to provide a guarantee to repay investors in case the conduit is unable to do so. Thus, the conduits' rollover risk is passed off to the sponsoring bank (DBRS, 2015).

2.8.2. Mortgage backed securities (MBS)

Mortgage backed securities are securitisation instruments backed by mortgage loans. These could be backed by residential mortgages (RMBS) or commercial mortgages (CMBS). Furthermore, the reference pool of RMBS could either consist of prime or subprime residential mortgages. Prime mortgages are typically offered by high street lenders to high quality borrowers. Subprime mortgages are mortgage loans granted to less creditworthy borrowers who would not qualify for regular mortgages. In the UK, these mortgages that do not meet the strict high street lending criteria, probably due to poor credit histories, mortgage arrears or county court judgements, are known as nonconforming, non-status or adverse credit mortgages.

2.8.3. Asset backed securities (ABS)

Broadly speaking all securitisation instruments are some form of asset backed security. However, in practice asset backed securities (narrowly defined) tend to refer to non-mortgage backed securities. According to tenure, asset backed securities could be short term –ABCP or term ABS backed by consumer and commercial credit.

According to (Dub, 1987), assets with predictable cash flows readily lend themselves to securitisation. It is much straightforward to create fixed income instruments with:

1. Predictable cash flows,
2. High quality assets with low delinquency and high liquidity value (e.g. vehicles),
3. Total principal amortising over asset's life without balloon payment and
4. Average life of one year or more as it takes about 3 to 6 months to structure an ABS deal

2.8.4. Collateralized debt obligations (CDOs)

CDOs are fundamentally structured asset-backed securities. Similar to generic ABS, they are asset backed securities collateralised by cash generating assets (debt obligations). The reference pool tends to comprise assets that may be overly illiquid and complex for individual investor analysis. The pool can contain a variety of assets including but not limited to commercial loans, corporate bonds, MBS, ABS and even tranches of other

CDOs. Relative to conventional securitisations described above, the reference pool is quite heterogeneous and tends to contain fewer assets. Therefore, these are more difficult for investors to analyse, as they have to assess the default risk of the collateral and the correlation between the various assets within the pool. In practice, however, the models behind ratings play a significant role in guiding investors' opinion about the quality of these instruments. CDOs vary with choices made regarding the underlying assets, tranche structure, purpose and credit structure (ECB, 2008).

Just like a corporation, CDOs issue equity and multiple classes of debt. The debt securities are tranched according to cash flow and loss distribution priorities. The equity tranche is designed to be the first line of defence against credit losses and payment delays. Similar to equity holders in a company, these tranches are paid with any excess cash flows remaining after settling claims on other tranches. These subordinate tranches protect senior tranches from credit losses and receive higher yields in return. Tranches are designed to minimise funding costs subject to meeting investor requirements. Consequently, the most senior tranche is typically the largest while the equity tranche ranges between 2% and 15% of the capital structure (Lucas, 2001).

2.8.4.1. Motivation and purpose for CDOs

CDOs can also be differentiated based on their purpose, which could either be for balance sheet management or arbitrage purposes (Newman et al., 2008). On the one hand, balance sheet CDOs could be utilised to contract the size of the balance sheet, circumvent regulatory capital requirements or minimise funding costs. The sponsor/originator's assets are used as collateral for the CDO. Balance sheet CDOs allow for the replacement of amortised assets, but underlying assets are often not traded. These assets may be transferred either via a cash sale or synthetically using credit default swaps. Although balance sheet CDOs created with synthetic asset transfers can reduce capital requirements, the size of the balance sheet is not reduced, as there is no asset sale.

On the other hand, arbitrage CDOs purchase underpriced assets, securitise these assets and exploit the yield differential/funding gap between the yield on the underlying assets and the cost of funding the debt tranches. This yield differential is the arbitrage sought and asset managers charge a management fee for monitoring and trading the CDO's assets (Choudhry and Fabozzi, 2003). From Figure 2-4, it is evident that majority of US CDOs are arbitrage CDOs.

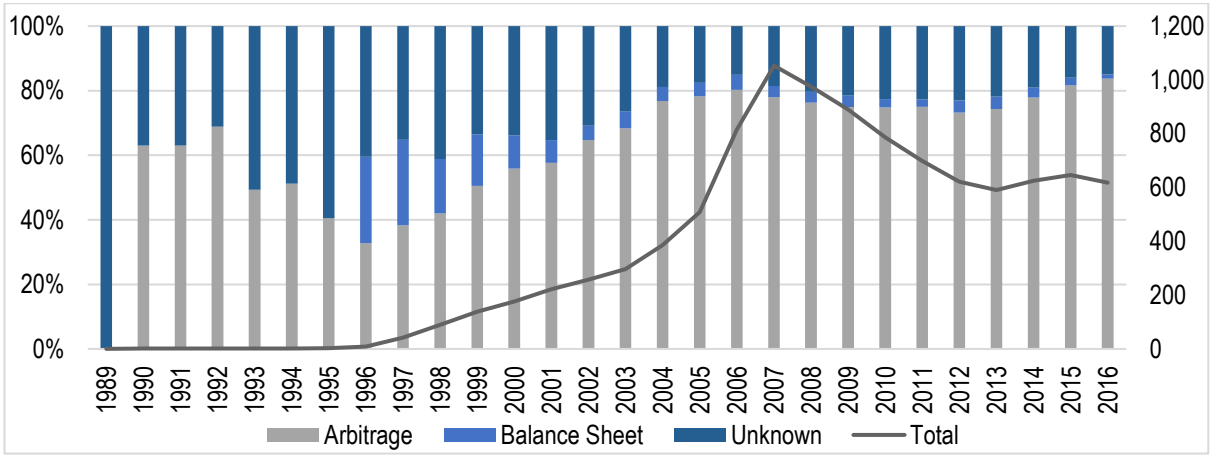

Figure 2-4 US CDOs outstanding by purpose (billion USD)
Source: http://www.sifma.org/research/statistics

2.8.4.2. Funding of CDOs

As described earlier, CDOs could be classified based on the method of risk transfer; CDOs do not necessarily have to own assets to gain exposure to credit risk. The risk from reference assets could be transferred to a CDO via credit default swaps in synthetic CDOs. The more common CDO, cash CDOs, actually involve the purchase of assets to collateralise the debt tranches. Traditional (cash) CDOs hold the reference asset pool while synthetic CDOs hold credit default swaps on a reference pool of assets. Furthermore, a CDO can combine some of the features of a cash CDO and a synthetic CDO to create a hybrid CDO. The cash flows in this structure are generated from the underlying assets as well as the CDS premiums.

2.8.4.3. Underlying assets in CDOs

CDOs can also be distinguished based on the underlying assets. For instance, the collateral could consist of loans, e.g. corporate loans (Collateralised Loan Obligations – CLOs), bonds (Collateralised Bond Obligations – CBOs) or structured products (structured finance CDOs, e.g. CDOs of ABS, CDO^2). The Basel II Accord published in June 2004 modified banks incentives in relation to tranching[12]. Thus, banks' incentive to hold senior tranches – lower capital requirement – was a significant driver of CDO growth as most of the other key investors such as hedge funds preferred to hold riskier subordinated tranches (Shivdasani and Wang, 2011).

[12] "Under Basel II, the weight on some AAA investments in securitized assets is only 7%.With an 8% capital requirement, an investment in an AAA security requires banks to put up only 0.56% (7% x 8%) capital for the invested asset, an implicit leverage of 178 (1/0.56%)" (Shivdasani and Wang, 2011:1296).

2.8.4.4. Credit Structures in CDOs

The mechanism for loss protection afforded to the debt tranches determines whether a CDO has a cash flow or a market value credit structure. Under the market value structure, the underlying assets are actively traded at market value to ensure that the market value of the collateral is adequate to fulfil interest and principal claims on the debt tranches. The asset pool is marked to market regularly and then haircut to incorporate potential market value volatility, consequently, the pool value fluctuates over time. These CDOs rely on the manager's capacity to generate liquidity by selling assets when the market collateral pool falls below the value of the outstanding debt tranches (Lucas, 2001).

In contrast, the assets underlying cash flow CDOs are not often actively traded unless specific credit triggers are activated. Thus, the collateral is designed to generate adequate cash flow to settle the specified coupon and principal obligations of the debt tranches. If there are any credit losses, cash flows are redirected from junior tranches to honour obligations on senior tranches. Cash flow CDOs rely on income from matured assets, prepaid principal and interest (cash flow from the static collateral assets) to settle their liabilities. Market value CDOs are quite rare, as the cash flow structure is considered to be superior because it allows higher leverage (Lucas, 2001) (See Figure 2-5).

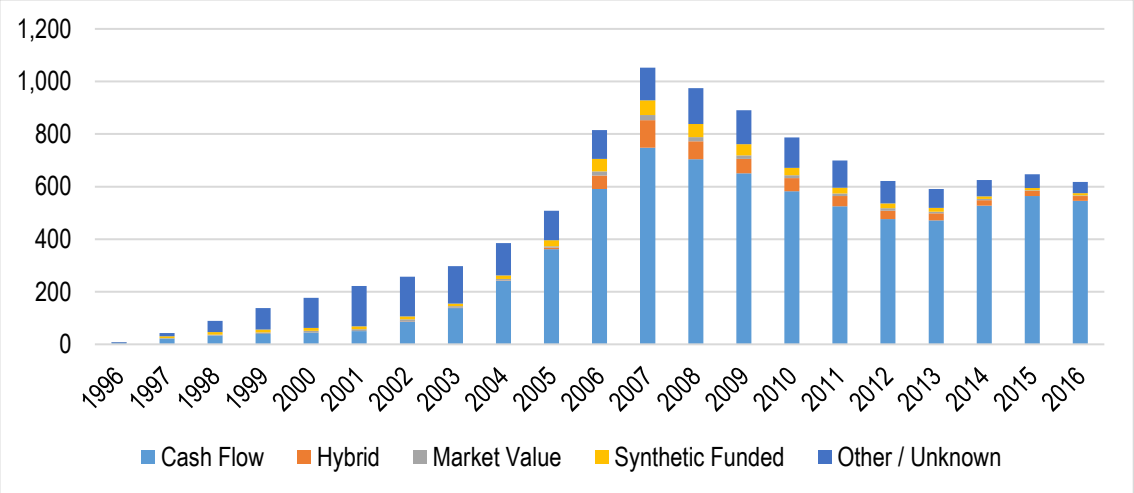

Figure 2-5 US CDOs outstanding by type (billion USD)
Source: http://www.sifma.org/research/statistics

2.9. A Historical and Regional Overview of Securitisation

Earlier examples of securitisation include the farm railroad mortgage bonds in the 1860s, the mortgage-backed debentures of the 1880s and publicly sponsored securitisation of mortgages in 1920s. However, modern securitisation owes its origin to the Government Sponsored Enterprises (GSEs) established by the US government to encourage mortgage lending and home ownership in the late 1960s. The GSEs closed the first securitisation in

1970, and private enterprises started to securitise assets in the late 1970s. The market experienced immense growth in the 2000s prior to the 2007-2009 financial crisis and came to a halt after the crisis.

2.9.1. Origins of the market in the 1970s

Historically, many financial innovations have been reactions to structural events, and the novel securitisation technology is no exception. During the Great Depression, high unemployment rates led to widespread defaults and foreclosures that resulted in a housing crisis as several private lenders collapsed. Private lenders – commercial banks, life insurers, and thrifts, who were hitherto the predominant mortgage financiers, grew reluctant to offer mortgage loans. Consequently, the US government launched the Federal Housing Administration (FHA) mortgage insurance program in 1934 to revive the housing market by insuring mortgage loans offered by approved lenders[13]. Thus, lenders were encouraged to increase lending as the default risk of conforming mortgage loans was now borne by the FHA.

The Federal National Mortgage Association (FNMA – Fannie Mae) was set up in 1938 under the New Deal legislation to serve as a constant source of mortgage funding to increase affordable housing and sustainable homeownership. Fannie Mae was established to create a secondary mortgage market by buying FHA insured loans from lenders thereby releasing funds for onward lending. This increase in liquidity should increase loanable funds and consequently decrease mortgage lending rates. Due to fiscal pressures, Fannie Mae was converted into a shareholder-owned company in 1968. The reorganisation ring-fenced Fannie Mae from the federal budget such that requisite funds were sourced from the capital markets. Fannie Mae's mandate, as a private corporation, was to acquire conventional (non-government insured) mortgages that meet prescribed underwriting criteria – known as conforming mortgages. In the same year, the Government National Mortgage Association (GNMA) was created as a government owned corporation. In 1970, GNMA created the first modern securitisation by explicitly guaranteeing repayments on pass-through mortgage backed securities (MBS) collateralised by mortgage loans insured or guaranteed by government agencies.[14]

[13] For further detail on this chronology, see https://www.fhfaoig.gov/LearnMore/History

[14] Federal Housing Administration (FHA), the U.S. Department of Housing and Urban Development's (HUD), Office of Public and Indian Housing (PIH), the U.S. Department of Veterans Affairs' (VA) Home Loan Program for Veterans, the U.S. Department of Agriculture's (USDA) Rural Development Housing,

In 1970, Federal Home Loan Mortgage Corporation (Freddie Mac) was established as part of the US government's initiative to address interest rate risk faced by thrifts as these institutions mainly issued fixed rate mortgages. More specifically, thrifts sold their long term loans to Freddie Mac thereby increasing their loanable funds and reducing their exposure to adverse movements in interest rates. Freddie Mac was set up with the directive of deepening expanding the secondary mortgage markets thereby creating competition for Fannie Mae. Both institutions were authorised to buy and sell conventional conforming mortgages.

Freddie Mac issued its first MBS in 1971, and Fannie Mae later began issuing its MBS in 1981. The MBS issued by the three agencies are collectively termed Agency MBS. These MBSs were simple pass-through securities where investors received pro rata principal and interest cash flows generated from the underlying cash flows until the mortgage loans were paid off.

As GNMA is government owned, its MBS enjoyed explicit federal backing against losses from borrower default. Freddie Mac and Fannie Mae are both publicly listed companies owned by private investors. However, it was widely believed that MBSs issued by Freddie Mac and Fannie Mae had implicit US Treasury guarantee, therefore, credit enhancements were not essential. This perception was confirmed by the financial assistance provided by the US government during the 2007-2009 financial crisis.

2.9.2. Savings and Loans crisis of the 1980s

The introduction of commercial mortgage backed securitisation can be traced to the Savings and Loans (thrifts) crisis of the mid-1980s. Savings and Loans institutions (thrifts) financed long term mortgages with retail deposits. As inflation and market interest rates rose, they had to offer higher interest rates to maintain deposit funding. Also, the long term mortgage loans they offered were predominantly fixed rate loans hence they began to incur large losses. In an attempt to exploit the rising interest rates, they engaged in high risk commercial real estate lending to offset their losses however they sustained even larger losses. The Resolution Trust Corporation (RTC) was established in 1989 to resolve the crisis by acquiring assets from S&Ls and selling them to investors. The RTC securitised the acquired commercial mortgages to prevent a systemic collapse of the banking sector. Therefore, the RTC created a prototype of commercial mortgage

and Community Facilities Programs and Rural Development Guaranteed Rural Rental Housing Program (RD).

securitisation that has been used and developed by private enterprises (Valdez and Molyneux, 2010).

2.9.3. Private enterprises entering the market

In the late 1970s[15], private enterprises began issuing MBSs backed by assets beyond the remit of GSEs, however, private institutions faced a relative cost disadvantage relative to GSEs. Since investors assumed that the US government guaranteed all Agency MBSs, credit enhancement was not essential. Furthermore, GSEs are not subject to some federal, state and local taxes as well as securities regulations. Furthermore, GSEs are exempt from reserve and capital adequacy requirements. Consequently, the GSEs were the dominant players in the secondary mortgage market for conforming mortgages[16], however, the availability of nonconforming loans created an avenue for private lenders. For instance, the GSEs imposed a size threshold for conforming loans; securitisation of mortgages exceeding the size threshold (jumbo mortgages) generally supported the creation of mortgages to high income borrowers (Hu, 2011).

Furthermore, private issuers moved beyond non-conforming mortgages (jumbo mortgages, adjustable rate mortgages, subprime mortgages, and commercial mortgages) and began securitising equipment leases, auto loans, credit card receivables and student loans. Furthermore, banks developed asset-backed commercial paper conduits (ABCPs) in the early 1980s. More importantly, private label MBS issuance gradually became a global phenomenon. In Europe, the first MBS was issued in the UK in 1985 and subsequently spread across the rest of continental Europe.

2.9.4. Basel I and Securitisation for regulatory capital arbitrage in the 1990s

The Basel Accord (Basel I) was introduced in 1988 and adopted in 1992 in response to the Less Development Countries' Debt Crisis in the 1980s. This initiative advocated standards and best practices for international banks to enhance the efficiency and soundness of the global financial system. In simple terms, Basel I was designed to strengthen banks' balance sheets and increase the capacity of banks to absorb unexpected losses by retaining earnings or holding more capital. More specifically, the imposed risk-based capital measure was designed to serve as a cushion against bank losses, protect

[15] Bank of America issued the first non-agency (private-label) mortgage pass-through in 1977

[16] Mortgages that do not meet the criteria set by the GSEs are known as non-conforming loans.

creditors during bankruptcy and to discourage excessive risk taking behaviour (Hill, 1996).

The Basel I set the minimum capital adequacy ratio at 8% of risk-weighted assets. At least half of the capital held must be Tier 1 capital (equity plus retained earnings). In summary, the credit risk weighting for government bonds was 0%, 20% for government agency bonds (e.g. Agency MBS), 50% for residential mortgages and 100% for corporate credit. Therefore, 4% (50% x 8%) of a mortgage portfolio must be funded with capital and 96% can be financed with other sources. However, for a corporate loan portfolio, 8% (100% x 8%) of the portfolio must be financed with capital while 92% can be funded using other means.

Prior to Basel I, the intense competition for deposit funding motivated banks to undertake asset securitisation. However, after the adoption of Basel I, banks increasingly used securitisation and risk unbundling technologies to circumvent capital requirements – regulatory capital arbitrage. The Basel Accord has been hailed for compelling commercial banks to increase their capital holdings but it also created room for regulatory capital arbitrage. Thus, banks began using synthetic adjustments to inflate their capital ratios without necessarily reducing their overall economic risk exposures (Jones, 2000).

2.9.5. European Securitisation

Except for the US, Europe is the largest securitisation market. Furthermore, much of this market is dominated by issuances form the United Kingdom (UK).

2.9.5.1. Developments in the UK

Prior to the 1980s, building societies were the principal issuers of owner occupied mortgages and faced little competition in the UK mortgage markets. However, subsequent deregulation of the banking sector (abolition of the corset –restrictions on interest-bearing eligible liabilities) in the 1980s granted banks access to the mortgage markets. The 1986 Building Society Act also enabled building societies to compete in markets that were previously dominated by banks. Due to increased competition, mortgage lending rates gravitated towards the cost of wholesale finance and later became benchmarked to the London Interbank Offered Rate (LIBOR). This increased competition allowed other market participants such as centralised lenders[17], mainly US based, to make inroads into the mortgage market. This trend rendered the mortgage markets more

[17] Centralised lenders are credit institutions which lend from a single office – without branch networks.

appealing to domestic and foreign banks as well as specialist mortgage lenders[18]. Specialist mortgage lenders emerged due to the positive differential between mortgage rates and LIBOR in the 1980s (Pryke and Whitehead, 1994).

These lenders solely relied on a continuous supply of wholesale funding to finance their mortgage business. Unlike banks, centralised lenders were non-depository financial institutions that did not require branch networks as mortgages could be issued via estate agents, and later the internet. Centralised lending was a common feature of the US mortgage market however, this practice was increasingly being used in the UK mortgage markets. These lenders offered mortgages, typically subprime mortgages, funded by warehouse lending facilities which were then refinanced by disintermediation – originate and distribute. These lenders were established with the primary goal of originating and securitising their mortgage portfolios. They emerged to fill a gap in the market that was unserved by the traditional building societies and banks (Wainwright, 2010).

The first European mortgage backed security was issued in the UK in January 1985. These securities were backed by mortgages originated by Bank of America however, the deal was relatively unsuccessful due to the complexity and small size of the issue (GBP 50 million). In 1987, the National Home Loans Corporation, a specialised lender, issued the next Sterling mortgage backed securities. By the close of the year, this market grew rapidly as 7 additional issues in excess of GBP 900 million, all by centralised lenders, had been made. The common forms of credit enhancement were subordination, excess spread, reserve fund and third party insurance. They profited from origination and servicing fees as well as interest charges on subordinated loans made to SPVs for liquidity support. Key investors included building societies, banks and other financial institutions based in Europe, Asia and the Middle East (Pryke and Freeman, 1994).

Throughout the 1980s, centralised lenders – mainly US based, were the primary issuers of MBS. As a result of demutualisation, a number of building societies converted to banks however due to their limited branch network, they encountered difficulties in maintaining their profitability levels, primarily because they had to compete with banks to increase their lending and deposit volumes. Consequently, demutualised banks also resorted to securitisation as an alternative source of funding.

[18] Specialist lenders include non-bank, non-building society UK credit grantors whose applicants are mainly those with complex income or historic credit problems

By 1991, the UK mortgage markets stalled due to a recession. High unemployment resulted in widespread defaults and foreclosures. A number of pool insurers also sustained losses from the commercial real estate sector, therefore the relevant MBSs they insured were also downgraded to reflect the claim paying ability of the insurers. Consequently, investor confidence was eroded even though there were no defaults (Stone and Zissu, 2000). Total issuances in 1992 amounted to USD 1.38 billion representing a 76% decline from the previous year (See Figure 2-6)

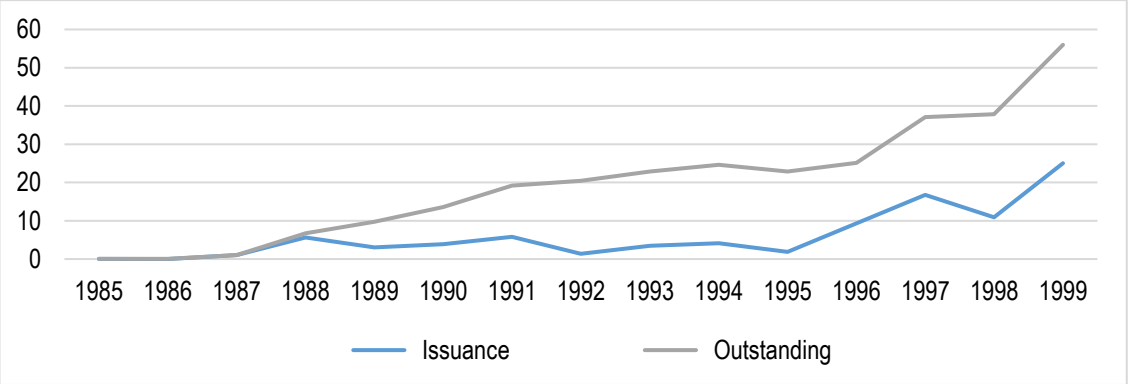

Figure 2-6 UK Securitisation issuances (1985-1999) (billion USD)

Source: http://www.sifma.org/research/statistics

Centralised lenders returned to the markets in the late 1990s, and although securitisation was their primary source of funding, high street prime lenders were the major actors in the securitisation market in the 2000s. Banks were well capitalised at the time hence it is more likely that their motivation for securitisation was to exploit an alternative form of financing. The diversity of instruments and investors made this funding source even more appealing to banks. Most issuers, especially new entrants also, entered the markets to gain learning benefits. These institutions wanted to build their capacity to securitise in periods where they were not constrained such that the template could be used when they face funding constraints such as contraction of retail deposits. They also wanted to develop a reputation in securitisation to minimise their funding costs. More importantly, the intention was that if the market experienced any shocks, the decline would not be as severe as it was in the 1990s. The increased diversity of lenders, increased innovation and increased competition for mortgage lending demanded a cost effective means of funding (Karley and Whitehead, 2002). The above factors led to the growth of in securitisation in the 2000s. Total issuances (outstanding) increased by about 560% (632%) between 2000 and 2005 (See Figure 2-7).

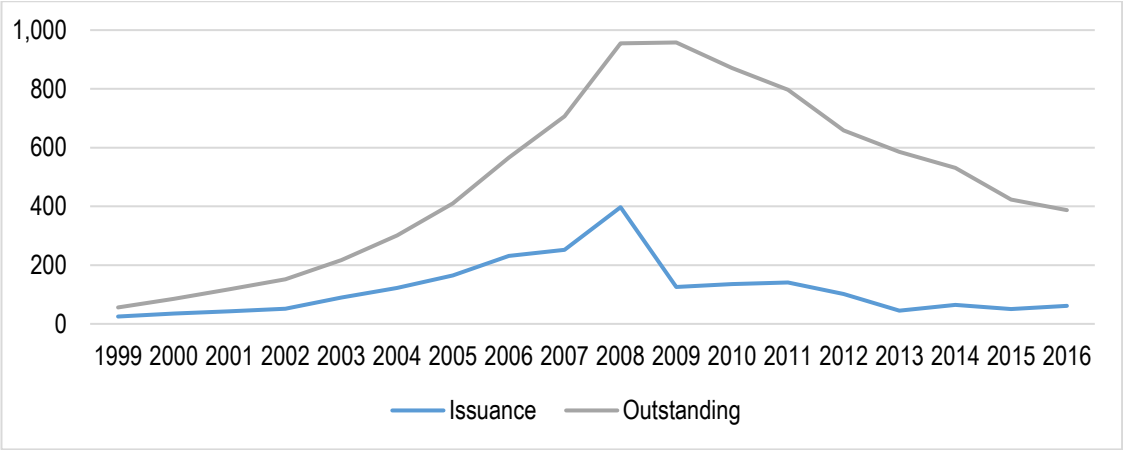

Figure 2-7 UK Securitisation issuances (1999-2016) (billion USD)
Source: http://www.sifma.org/research/statistics

Despite the advances in the UK markets, the European markets were slow to develop initially due to legal complexities. Nonetheless, European issuances gained momentum in the 1990s as a result of the enactment of suitable legal frameworks (Stone and Zissu, 2000).[19] In the early 2000s, issuance levels increased significantly as a result of the introduction of the Euro and technological developments (Altunbas et al., 2009). Ahn and Breton (2014) also contend that securitisation was an adaptive response to the liberalisation of the financial sector and an increase in interbank competition.[20]

2.9.6. A comparison of the US and European market

Securitisation in its modern form originated from the US mortgage markets however, it has evolved into a global phenomenon. The size of the US securitisation market is unrivalled, and the European market is the second largest. Securitisation in both markets is mainly driven by the mortgage market. Mortgage backed securities constituted 87% of outstanding volumes compared to 62% in Europe. On the supply side, the growth of European securitisation has been relatively limited primarily due to the institutional differences between the US and European mortgage markets. On the demand side, the investor base in the US is relatively diversified while the non-bank investor in European securitisations is practically non-existent (Segoviano et al., 2015).

[19] In France, the Securitisation Law was passed in 1988 to create a specific type of securitisation vehicle (Fonds Commun de Creances or FCC) which is a collective investment scheme or debt mutual funds. The first securitisation in Spain was issued in 1993 after laws were passed in 1992 through Law 19/1992 to create a dedicated SPV, Spanish Mortgage Backed Securitisation Fund (fondos de titulizacion hipotecaria – FTH). The German Federal Banking Supervisory Authority issued requirements for securitised assets to be considered as off-balance sheet in 1997. Other countries where laws had to be passed to formalise securitisation include Belgium, Portugal and Italy. A specific legal framework governing securitisation transactions was introduced into the Italian legal system in 1999 – Law no. 130/99

[20] The single banking license was introduced by the EU in 1993 hence banks with this license did not require further permissions to establish in other member nations

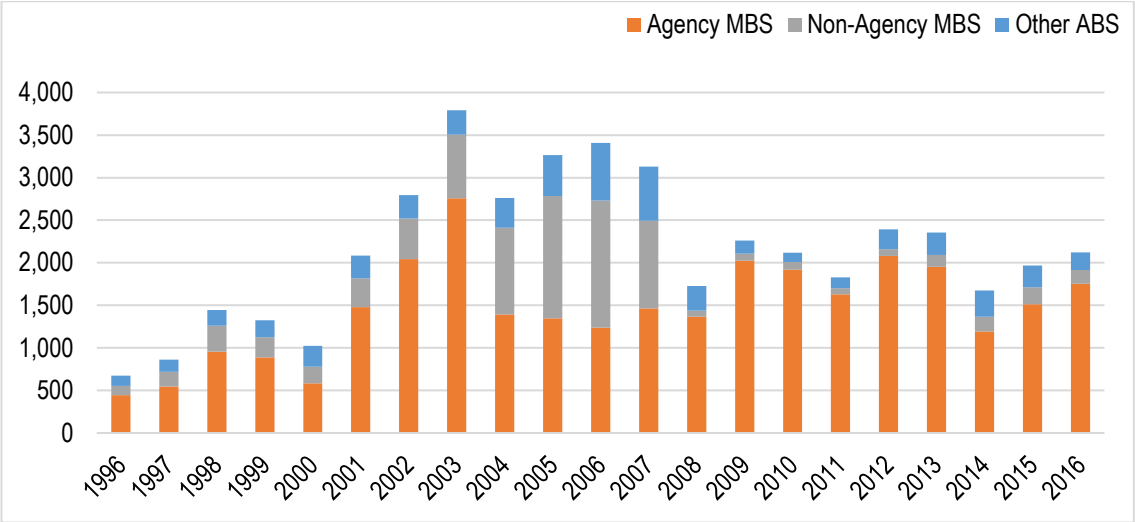

Figure 2-8 US issuance (billion USD)
Source: https://www.afme.eu/en/reports/Statistics/

The growth in US securitisation is driven by issuances by the Government Sponsored Enterprises (GSEs) (See Figure 2-8). Approximately 85% of all MBS outstanding by year-end 2016 were issued by GSEs. Private label (non-agency) issuance began in the late 1970s, but the heaviest issuance of private label securitisations occurred between 2003 and 2007. Post-crisis issuances have declined significantly, as investor confidence has waned in both markets (See Figure 2-9 and Figure 2-10). The losses suffered by MBSs were as a result of low quality mortgages originated in the subprime US mortgage segment rather than the securitisation mechanism per se as similar mortgages that were not securitised sustained large losses as well.

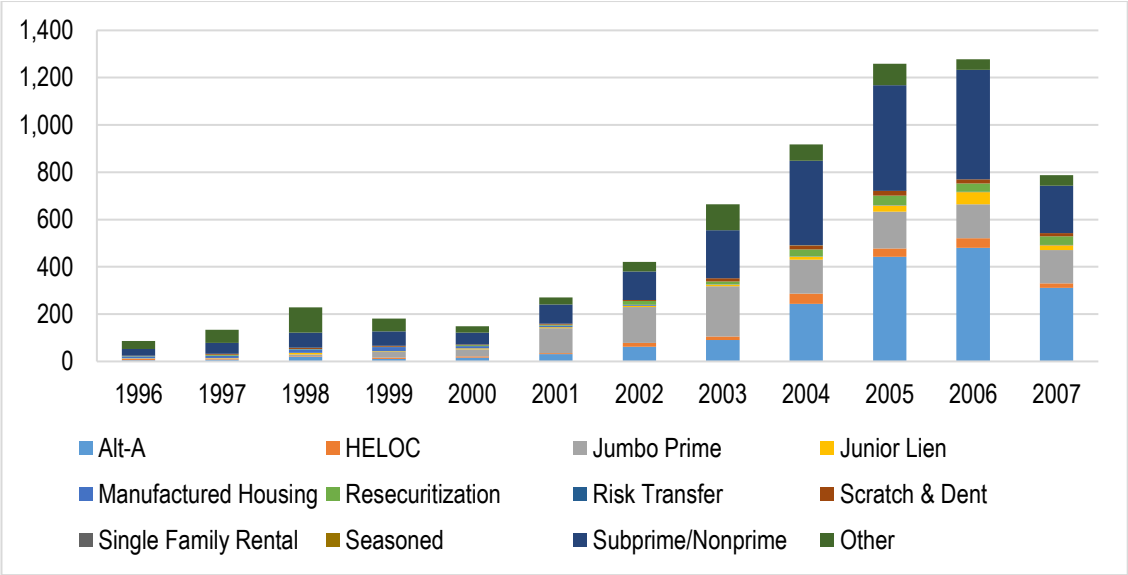

Figure 2-9 US RMBS issuances before the financial crisis (billion USD)
Source: https://www.afme.eu/en/reports/Statistics/

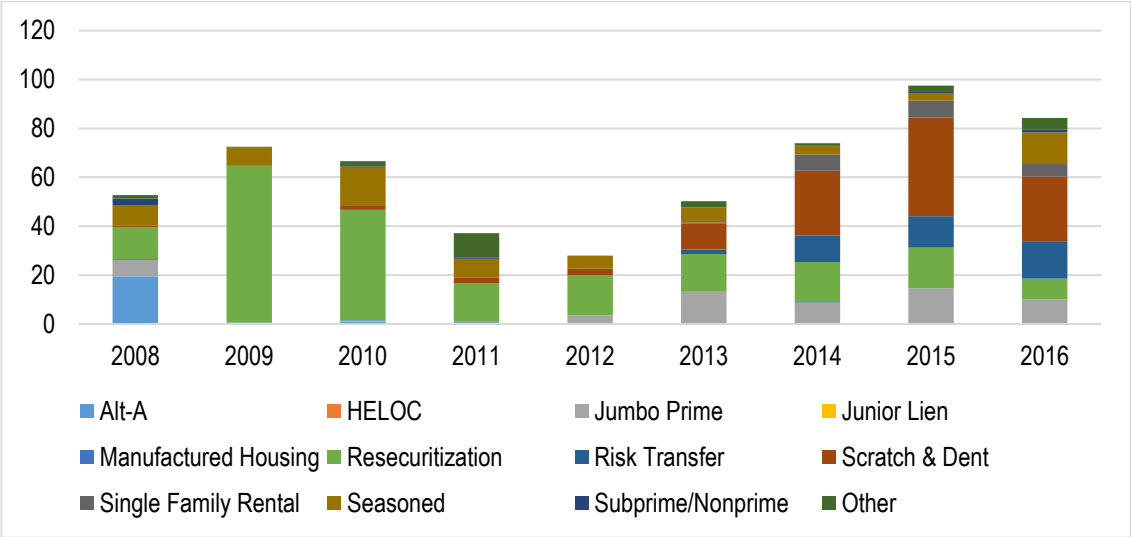

Figure 2-10 US RMBS issuances after the financial crisis (billion USD)
Source: https://www.afme.eu/en/reports/Statistics/

The institutional differences between the mortgage markets in both regions explain the differences in household indebtedness and the relative importance of securitisation. These differences include government support, mortgage contracts, and insolvency and foreclosure procedures (ECB, 2009). These differences are detailed below.

2.9.6.1. Government support

The Savings and Loans (S&L) crisis in the 1980s resulted in key structural changes. Until the late 1970s, S&Ls funded long term mortgages primarily with short term deposits in periods of stable interest rates. However, due to the deposit rate ceilings, customers withdrew funding en masse as nominal interest rates increased. Consequently, the capital of the S&Ls declined, furthermore their plight was worsened by their risk taking behaviour due to deregulation. Nevertheless, these institutions were still able to offer mortgages as they were able to sell these loans to FNMA and FREDDIE MAC. The S&Ls were able to circumvent risks of rising interest rates by selling fixed rate loans to the GSEs. The GSEs were able to securitise mortgages at a relatively lower cost than private issuers due to the implicit guarantee associated with agency bonds. These events led to increased liquidity in the secondary mortgage markets (Valdez and Molyneux, 2010; ECB, 2009).

In Europe, however, there is limited government intervention in the mortgage markets as institutions with similar intents to those of the GSEs do not exist. Thus, there is no implicit government guarantee, therefore, banks tend to securitisations at relatively higher costs. In fact, EU member states are prohibited from creating agencies similar to the GSEs in the US as this may result in unfair competition (Coles and Hardt, 2000). Furthermore,

European household debt is largely funded by retail deposits. This funding is supplemented by market-based funding from the issuance of MBS and covered bonds. Covered bonds are close substitutes to ABS however, the former receive preferential regulatory treatment as mortgages and hence the associated risk remains on the bank's balance sheet.

2.9.6.2. Mortgage Contracts

The prevalence of fixed rate mortgages in the US was engendered by the importance of securitisation and the role of the GSEs. Also, these loans appealed to banks as, by securitising long term loans, they effectively did not have to bear the risk of funding long term assets with short term deposit funding. The fixed mortgage is more dominant in the US while variable mortgage loans are the main contract of choice in many European countries. In addition, in the run up to the crisis, an increased variety of mortgage contracts with non-standard features such as teaser rates, negative amortisation rates and high loan-to-value ratios were offered, primarily to subprime borrowers in the US. These new contracts were riskier; however, the embedded risk was essentially transferred to ABS investors.

In Europe however, these unusual mortgage contracts were not commonplace. In most European countries, lenders levy a prepayment penalty of early repayment on fixed rate loans while prepayment on variable rate loans in the US is rarely penalised. Furthermore, the lack of standardisation and consistent data across Europe complicated securitisation (Coles and Hardt, 2000).

2.9.6.3. Insolvency and foreclosure procedures

The legal system in the US is based on common law where borrowers are not deemed personally liable for secured debts –non-recourse debt. The legal framework in most European countries is governed by civil law where the procedures for borrowers to obtain debt relief can be costly and protracted. Lenders tend to have full recourse to defaulting borrowers' assets as well as income flows. Judiciary settlements are more common in these countries while non-judiciary settlements are favoured in the US (ECB, 2009).

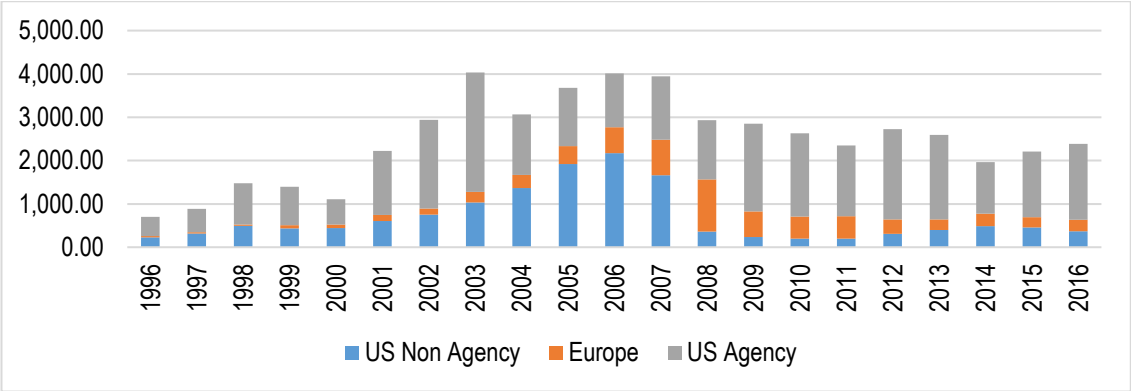

Figure 2-11 US and European issuances (billion USD)
Source: https://www.afme.eu/en/reports/Statistics/

2.9.6.4. Demand for securitisation

From the demand side, US securitisation markets have a relatively more diverse investor base where non-bank financial institutions hold a relatively larger share of securitised instruments. However, banks dominate the European markets while non-bank financial institutions such as pension and insurance funds are at the periphery of the investor base. Also, the structural composition of Europe's pension systems has limited the demand from pension funds. European pension systems are mostly of the defined benefit nature hence these funds constantly require long term assets with lower prepayment risks to avoid duration mismatches. However, ABSs typically tend to amortise within two to five years while RMBSs, although relatively long term, face higher prepayment risks (Segoviano et al., 2015).

2.9.6.5. Covered bonds

European banks tend to issue covered bonds (on balance sheet securitisation) due to favourable regulatory treatments. The US, however, does not have an active covered bond market. Also, relative to mortgage backed securities, yields on covered bonds are much lower. Covered bonds are dual recourse and single class obligations while MBSs are usually structured with multiple classes. Therefore, MBSs are more efficient risk allocation devices. Also, capital requirements are higher for MBS compared to covered bonds (EBA, 2014).

2.9.7. The US versus European market – Graphical Overview

Securitisation facilitated the dispersion of risk across the globe by attracting investors such as global insurers and hedge funds, hence securitisation transcended geographic borders and became a global phenomenon. European banks' and their subsidiaries held a sizeable fraction of assets originated in the US (Franke and Krahnen, 2008). European banks have historically preferred issuing covered bonds as the annual issuance of covered

bond fell by only 15% in 2009 compared to a 51% decline in securitisation issuances. Hence BoE and ECB (2014) and Pengelly (2012) suggest that this may have made up for the slump in ABS issuance after the crisis. The corresponding evidence presented in Figure 2-12. It is evident that the growth in covered bond issuances exceeded that of securitisation issuances between 2010 and 2012.

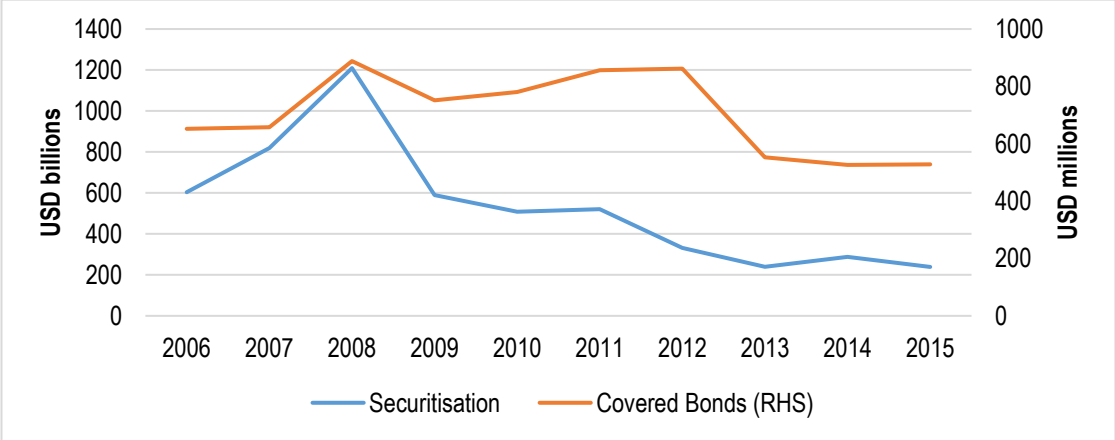

Figure 2-12 European Covered bond and Securitisation issuance
Source: http://www.sifma.org/research/statistics, European Covered Bond Fact Book 2016

The securitisation markets, gaining momentum upon the introduction of the Euro in 1999, developed significantly between 2002 and 2008 with an average annual growth rate in MBS (ABS) issuance of 49% (32%). The dramatic increase in the use of this technique was partly due to a global trend and somewhat due to the financial integration of the European financial system and the transition towards a market based system (Acharya et al., 2013).

Notwithstanding the above observations, European securitisation has not developed like that of the US due to institutional differences in both regions. As per Figure 2-13, the US securitisation markets grew considerably with annual growth rates ranging from 8% to 18% between 2003 and 2007 and eventually stagnating in 2008 with zero growth. The outstanding stock of US MBS (ABS) expanded significantly from USD 5.29 trillion (USD 905 billion) in 2002 to USD 9.46 trillion (USD 1.82 trillion) by the end of 2008. In contrast, European MBS (ABS) outstanding increased from USD 229.94 billion (USD 189.66 billion) to USD 2.02 trillion (USD 931.08 billion) over the same period. Total US securitisation outstanding peaked at USD 11 trillion in 2007 and 2008 as against a peak of USD 3.1 trillion in Europe at the end of 2009.

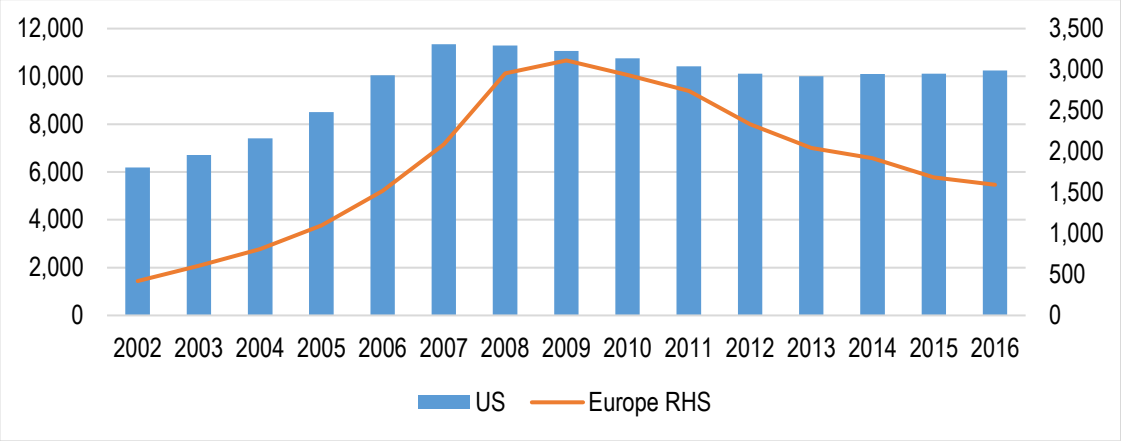

Figure 2-13 European & US Securitisation outstanding (billion USD)
Source: http://www.sifma.org/research/statistics

By the end of 2016, total amounts outstanding in Europe fell by 49% to USD1.6 trillion, equivalent to approximately 15% of the US outstanding stock (USD10.2 trillion). From the distribution of securitisation instruments outstanding in Figure 2-14, it is evident that residential mortgages have remained the predominant asset class. CDOs accounted for 10% and SME loans accounted for 7%. By the end of 2016, US mortgage backed (ABS) securities outstanding amounted to USD 8.92 trillion (USD 1.32 trillion) while European MBS (ABS) reached USD 996.26 billion (USD 599.19 billion).

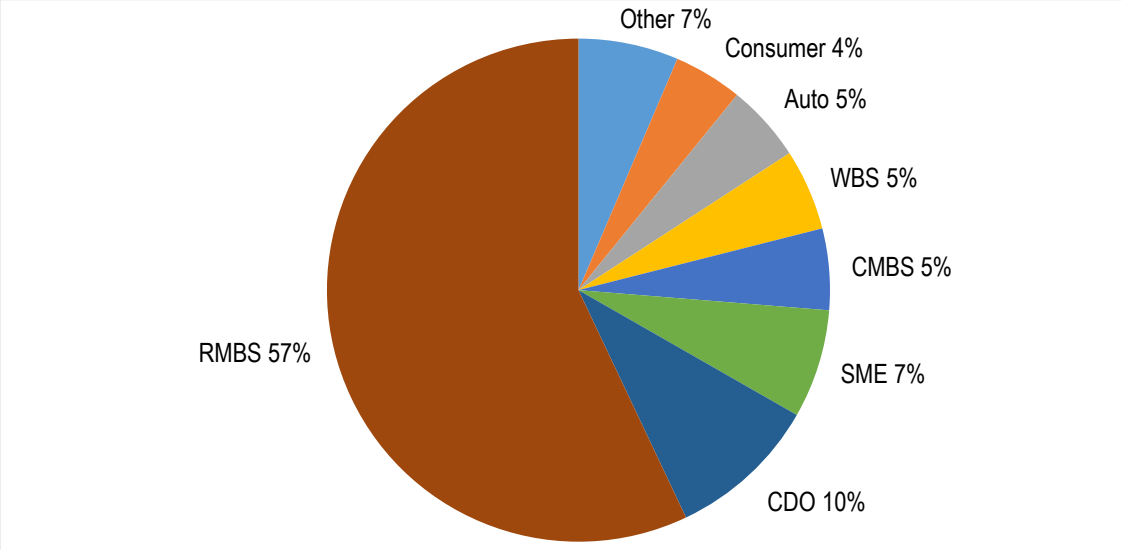

Figure 2-14 2016 European Securitisation outstanding by collateral
Source: http://www.sifma.org/research/statistics

According to Figure 2-15, aggregate post-crisis European issuances have been subdued significantly. This is evident by a decline from a peak of USD1.2 trillion in 2008 to USD 262.87 billion compared to total US issuance of USD2.12 trillion (2008: USD1.7 trillion) at the end of 2016. Furthermore, the aggregate European issuance is currently driven by the European Central Banks' liquidity program where ABS are accepted as collateral for

repo operations. Prior to 2007, all securitisation issuances were successfully placed with end investors however, public issuances dried up in 2009 as only 6% of gross issuances were placed. Thus retained issuance as a percentage of gross issuance started at 31% in 2007, climaxed at 94% in 2009 and has remained at an average of 66% between 2010 and 2016. This trend has been attributed to the loss of investor confidence (Fender and Mitchell, 2009).

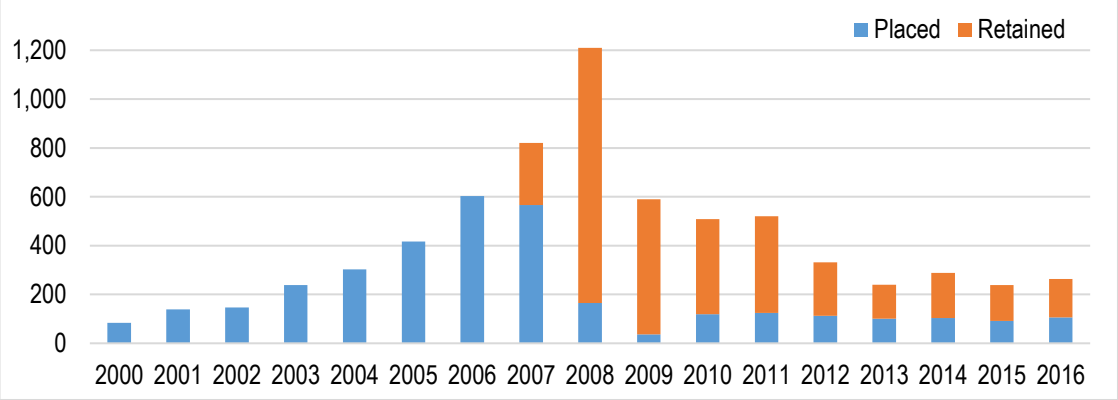

Figure 2-15 European issuance (billion USD)
Source: http://www.sifma.org/research/statistics

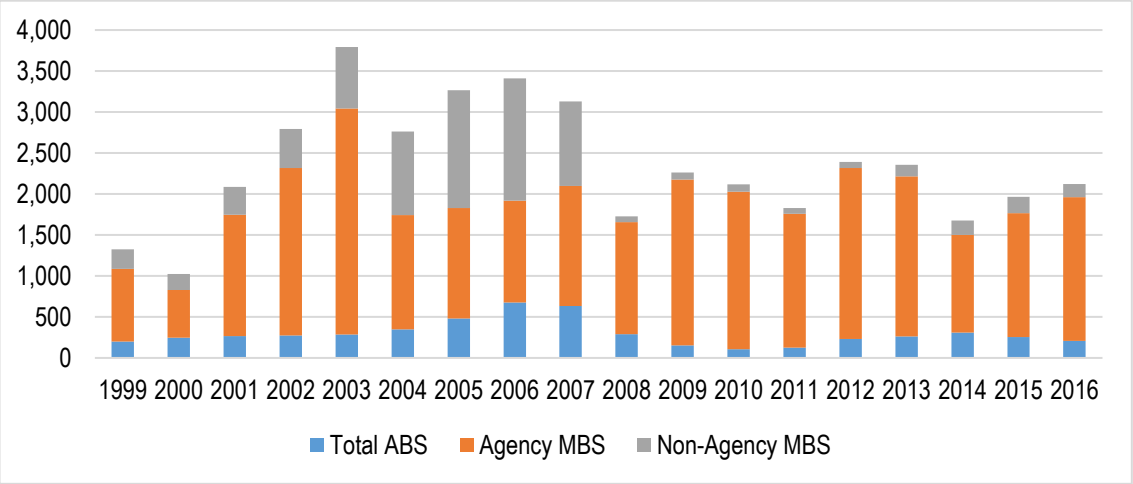

Figure 2-16 US issuance (billion USD)
Source: http://www.sifma.org/research/statistics

As presented in Figure 2-16, guaranteed agency issuances have constituted no less than 70% of annual US issuance since 2008. More specifically, with an average proportion of 72% between 2008 and 2014, total US issuance is largely dominated by Agency MBS. The high levels of Agency MBS issuance in the US explain the vast difference in the amounts of MBS issuance in the US and Europe. These securities are backed by conforming loans that are guaranteed by GSEs to minimise investors' credit risk exposure. Total non-agency issuance in the US amounted to USD 368.28 billion compared to an aggregate European issuance of USD 262.87 billion at the end of 2016:Q3

(see Figures 2-16 and 2-17). Figure 2-18 shows that the largest contributors to aggregate European issuance and outstanding stock were the United Kingdom, Netherlands, Spain and Italy.

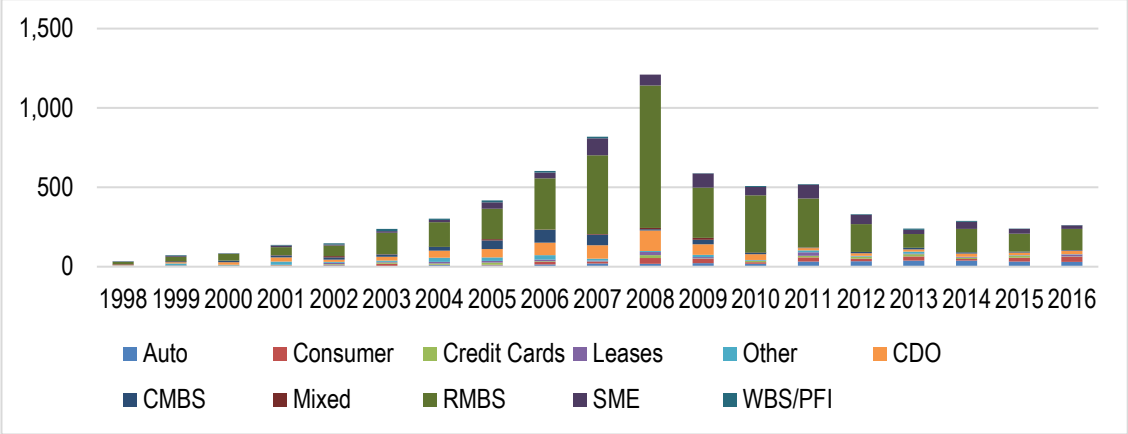

Figure 2-17 European issuance by collateral
Source: http://www.sifma.org/research/statistics

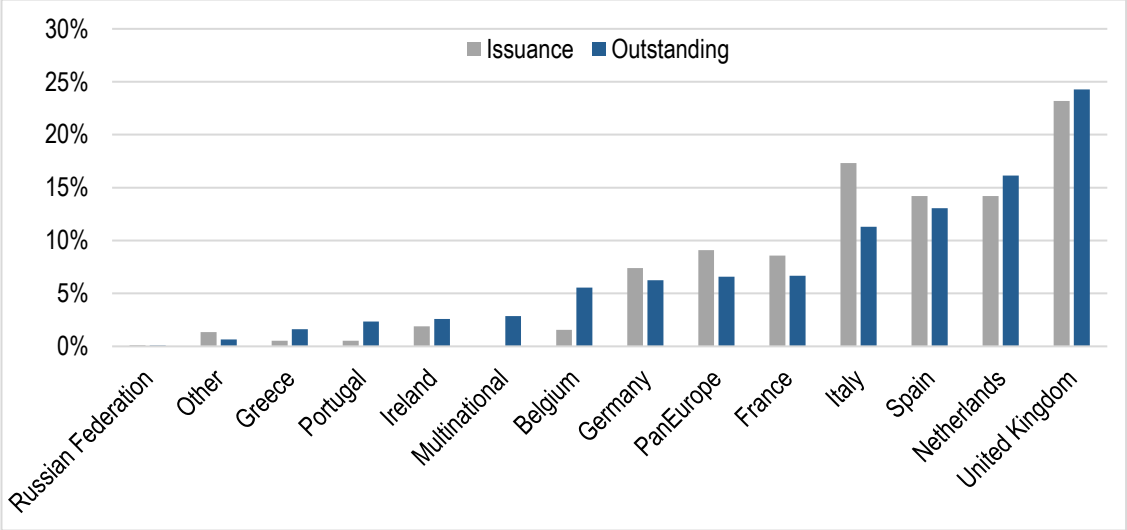

Figure 2-18 2016 European issuance and outstanding by region
Source: http://www.sifma.org/research/statistics

The variation in the issuance patterns of the US and Europe can be attributed to a number of factors. In comparison to the IFRS adopted by most European Banks, the US GAAP sanctions the off-balance sheet treatment of a large number of structured financial transactions like leveraged CLOs and SIVs designed to obtain regulatory capital relief. This may have motivated US banks to securitise more hence the large difference in issuance levels. Unlike the US, Europe has quite an active market for covered bonds hence this may have countervailed the decline in ABS issues. Similar to securitisation, covered bonds are backed by a pool of assets however the end investor has dual recourse to these assets and the issuing bank if the underlying assets deteriorate hence there is no

true sale. Banks may also be motivated to invest in covered bonds as these bonds receive comparatively lenient regulatory treatment in contrast to securitisation (BoE and ECB, 2014).

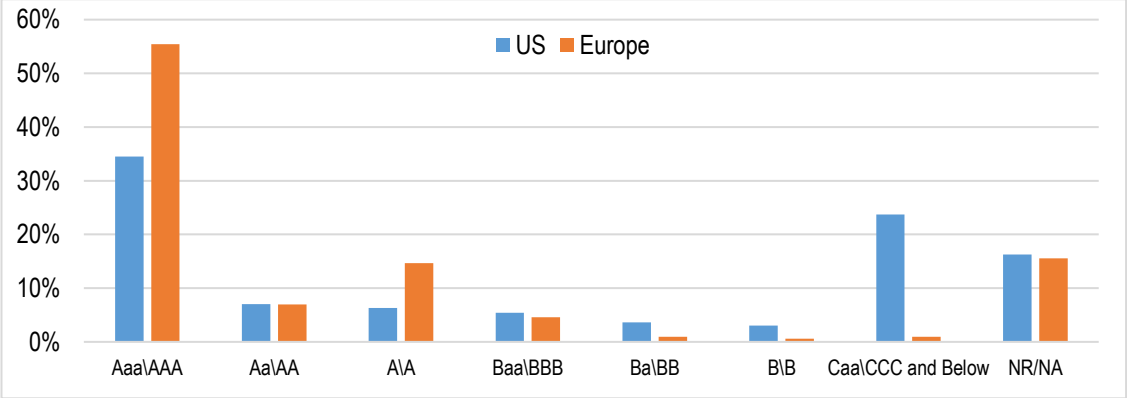

Figure 2-19 Securitisation outstanding by rating
Source: http://www.sifma.org/research/statistics

As presented in Figure 2-19 although the outstanding amount of securitisations in 2016 was markedly lower in Europe than the US, 62% of the European volume was rated A/A and above while 0.98% was rated Caa\CCC and below. In comparison, 41% of the current US volume was rated A\A and above while 23.70% was rated Caa\CCC and below. Consequently, Blommestein et al. (2011) suggest that in comparison with the American banking system, the European banking system was characterised by more robust regulation and superior underwriting standards. The authors further show that risks were grossly mispriced throughout the markets however, it was apparent that unlike liquidity risks, credit risks were priced with relative precision as only 0.95% of mortgages securitised in Europe defaulted between 2007 and 2010. This stands in stark contrast to a default rate of 7.71% for US securitised mortgages and 6.34% for corporate bonds globally.

2.9.8. Growth in the 2000s prior to the 2007-2009 financial crisis

In the 1990s, the GSEs had little exposure to subprime mortgages however in 2000, they began including Alt-A, A-minus and subprime mortgages as well as non-agency backed securities in their portfolios.[21] The GSEs were already dominant players in the mortgage markets nonetheless, their portfolios expanded further as the scope of eligible assets widened. Between 2000 and 2003, the GSEs exploited accounting rules to obscure the volatility of their earnings. By 2004, the GSEs began to face additional scrutiny upon the

[21] Alt-A mortgages required little/no documentation on income or assets. A-minus borrowers had adverse credit but typically had better credit scores than subprime borrowers.

disclosure of the accounting irregularities and earnings management practices that transpired in the early 2000s (Elul, 2015a). The market share of GSE MBS as a proportion of all issuances declined from 73% to approximately 50% in 2004. This trend continued until 2006 (36%) as private lenders securitisation volumes grew remarkably (See Figure 2-20). Private lenders attained this growth by offering riskier loans to subprime borrowers and borrowers with poor credit histories. Some of these loans required little or no documentation as proof of income or assets (Elul, 2015a).

The capital requirements for holding highly rated non-agency MBS were reduced under the recourse rule in 2001. The consequent capital relief and low interest rates drove the demand for private securitisations, especially from Banks (Financial Crisis Inquiry Commission, 2011). Consequently, the demand for private label MBSs increased significantly, as investors received higher yields on these bonds in a low interest rate environment. This growth came with complexity however, investors mostly relied on the credit ratings to appraise the risks associated with these increasingly complex and opaque investments.

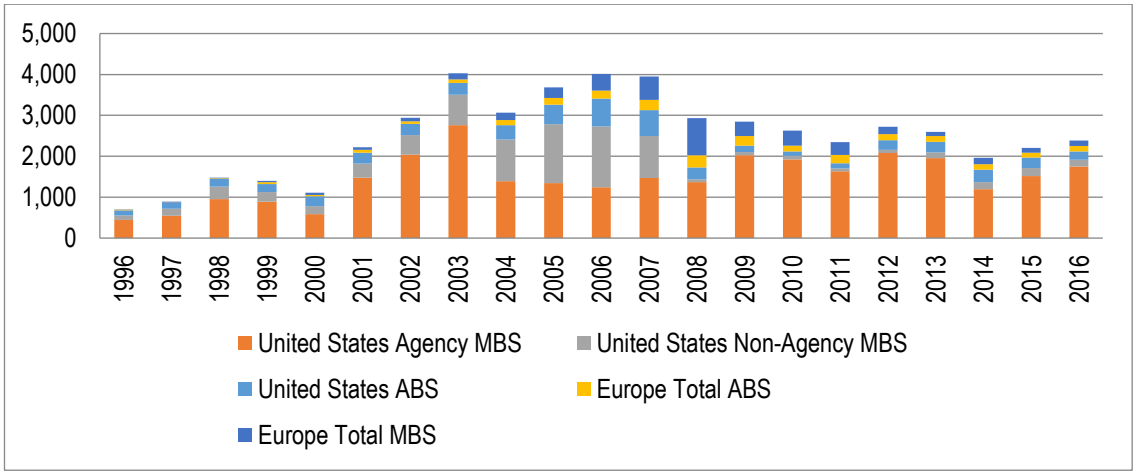

Figure 2-20 US and European Securitisation issuances (billion USD)
Source: Authors own figure. Data source: http://www.sifma.org/research/statistics

On the supply side, the lucrative commissions and fee income earned on securitisation supported the continuous supply. All parties earned a fee for playing their relevant roles in securitisations. Commercial and investment banks tied their reward systems and remuneration packages to short term profits. Similarly, rating agencies earn sizeable fee incomes from rating securitisations, hence they may have inflated ratings to retain business. The growth of securitisation and by extension regulatory capital arbitrage led to the introduction of the Basel II regulatory framework in 2004. The revision was proposed to counter the weaknesses of Basel I, however, the arbitrary capital adequacy ratios

remained at 8%. The new regime allowed risk weights to be determined based on either credit ratings or internal ratings as a measure of credit risk. Internal ratings, however, failed to capture the inherent risks of securitisation and also rating agencies are fee driven hence incorporating ratings into regulation might have facilitated rating inflation (Caprio et al., 2010).

2.9.9. Securitisation and the Financial Crisis

As the demand for private label MBS grew, underwriting standards in US mortgage markets declined. Securitisation removed originators' incentives to monitor mortgages after they had been moved off balance sheet (Wang and Xia, 2014). Several lenders did not require deposits, and others offered mortgages without verification of income, assets or employment. Subprime mortgages were offered with features such as teaser rates, negative amortisation and interest-only rates. Subprime mortgages with adjustable rate mortgages were often offered at artificially low introductory (teaser) rates which are expected to reset to a higher rate after a short period, typically 12-36 months. For instance, a 2/28 ARM was designed to be refinanced or default within 2 years. These mortgages were typically offered to borrowers with poor credit histories or unsubstantiated incomes. Homeowners were expected to refinance the mortgage before the reset date, provided house prices continue rising. Indeed house prices, underpinned by low interest rates, had risen continuously for 10 years peaking at a record high in 2006.

However, in the first quarter of 2006 house prices started declining and lenders tightened their lending criteria and mortgage rates increased, thereby making it difficult for subprime borrowers to obtain new mortgages or refinance existing mortgages before the reset dates. Consequently, the monthly mortgage payments increased significantly while property values depreciated. By mid-2006, the wave of defaults escalated thereby eroding the value of mortgage assets in bank balance sheets as well as securitisation portfolios. Securitisation transactions were plagued with increasing levels of complexity and multiple layers of misaligned incentives. The demand for the mezzanine subprime tranches declined, therefore banks began using these tranches to create relatively complicated instruments such as ABS CDOs, which were largely financed by AAA rated tranches.

As chronicled by Acharya et al. (2009), it became evident that these subprime and Alt-A loans were quite risky by mid-2007. Consequently, non-bank subprime lenders encountered difficulties in raising wholesale finance. Several of them either collapsed or

were acquired by larger banking institutions. Structured Investment Vehicles (SIVs) also faced difficulties in raising ABCP finance as investors noted that these vehicles were holding very illiquid and risky portfolios containing subprime mortgages. SIVs were usually structured with credit and liquidity support from the sponsoring banks. Therefore, as a result of the run on ABCP financing, sponsors had to assume liabilities of their SIVs.

This episode introduced investor panic and concerns about counterparty risk into the investor community. Afterward, the major US independent broker-dealers also failed to refinance their liabilities due to a run on the sale and repurchase market (repo market). Dealers predominantly finance fixed income securities including mortgage backed securities with short term wholesale finance (repo). Therefore, these institutions experienced significant funding problems as investors such as money market funds suddenly withdrew short term repo funding from broker-dealers. Consequently, Bear Stearns and Lehman Brothers collapsed while Merrill Lynch merged with Bank of America.

Investing in money market funds is usually considered to be as safe as deposits even though, investments are not covered by deposit insurance. These funds invested in asset backed securities and offered higher yields on investors' savings. Investors grew anxious as the net asset value of Reserve Fund, the oldest money market fund, fell below USD 1 because it had written off its debt to Lehman Brothers. In early August 2007, BNP Paribas, France's largest publicly listed bank, froze funds worth EUR 1.6 billion as the value of three of its money market funds had declined due to exposure to securitised US subprime mortgages. The Federal Reserve was compelled to offer a temporary guarantee program to all money market funds to stem another run that would have crippled the corporate commercial paper market. Monoline insurers and other insurance companies such as AIG also faced financial distress as they provided insurance on asset backed securities and risky credit derivatives such as credit default swaps. Their AAA credit ratings were downgraded therefore they had to post substantial collateral on existing contracts (Acharya et al., 2009).

To sum up, in the years leading to the financial crisis, lending standards and credit quality declined, as banks failed to diligently screen and monitor borrowers. Credit rating agencies failed to perform their role adequately due to their questionable relationship with issuers and unsuitable rating methodologies. Also, issuers exploited loopholes in regulation to achieve capital arbitrage by cosmetically decreasing their capital holdings

without necessarily reducing their economic risks. Securitisation has been stigmatised due to the role it played in the financial crisis. The post-2008 securitisation markets have been depressed as issuance levels and investor participation are yet to recover. On the demand side, investor interest has waned significantly due to anxiety and increased regulatory requirements. A large fraction of European issuances are retained on balance sheet and used as collateral for central bank repo transactions (See Figure 2-21). This trend began with a 30% retention rate in 2007. By 2009, 93% of all issuances were retained however, this declined to an average of 61% between 2012 and 2016 (Q3). On the supply side, issuances have been suppressed due to stringent regulations especially, in terms of risk retention requirements.

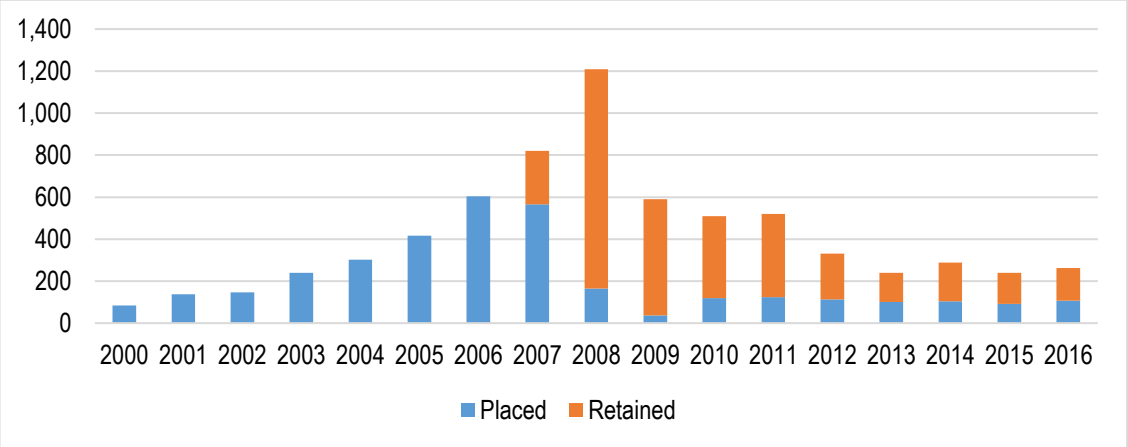

Figure 2-21 European Securitisation issuance (billion USD)
Source: http://www.sifma.org/research/statistics

2.9.10. Post-crisis Regulation of the securitisation market

Policymakers reacted to the financial crisis with bailouts and a torrent of regulatory reforms. In response to the multiple failings in the intermediation chain, regulators have attempted to realign incentives and address the apparent structural weaknesses in order to revive the securitisation markets with varying degrees of success. Regulatory changes in the US are mainly covered in the Dodd-Frank Act and partially in the Basel III capital requirements. In simple terms, these regulatory initiatives aim to increase disclosure, mandate risk retention (skin in the game), reform rating agencies, and impose higher capital requirements.

European regulators propose similar initiatives as well as a due diligence requirement. In 2015, as part of the Capital Markets Union (CMU) action plan, the European Commission proposed a legislative framework for simple, transparent and standardised (STS) securitisations to revive the subdued European securitisation markets. This is to address the complexity and opacity of issuances in the years leading to the financial crisis. The

draft legislation[22] issued in May 2017, comprises a Securitisation Regulation[23] and a Regulation Amending the Capital Requirements Regulation (CRR).[24] The Securitisation Regulation will establish a framework for the STS securitisations including risk-retention, due diligence and transparency provisions for involved parties. The Regulation Amending the CRR outlines the varying capital treatments of compliant and non-compliant STS securitisations. At the global level, the Basel Committee on Banking Supervision (BCBS) published *Revisions to the Securitisation Framework* in July 2016, to establish a global regulatory framework for Simple, Transparent and Comparable (STC) securitisation to be implemented from 01 January 2018. The STS and STC frameworks are not identical but largely similar (McCaw, 2017).

Although securitisation has been stigmatised due to the financial crisis, regulators are intent on reviving securitisation to facilitate the diversification of risk and funding sources. The ultimate goal is to boost lending by promoting soundly structured transactions that do not endanger financial stability.

2.9.10.1. Disclosure

In the years leading to the crisis, securitisation transactions grew rather complex and opaque such that it may have been difficult for investors to perform adequate risk appraisal. Therefore, the Dodd-Frank Act (Section 942b) requires all ABS issuers to disclose asset-level or loan-level data required by investors to perform the necessary due diligence. The Securities and Exchange Commission (SEC) has been charged with enacting rules consistent with this requirement such as the degree and standardisation of data disclosure. According to Section 945, issuers are also tasked with conducting regular reviews of the collateral to provide reasonable assurance that underlying loans are consistent with required underwriting criteria and that disclosed data and information remains accurate.

[22] The trialogue of the European Commission, Council and Parliament negotiated and agreed the draft regulations in May 2017 however the official implementation date is 01 January 2019.

[23] 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.

[24] Proposal for a Regulation of the European Parliament and of the Council amending Regulation No 575/2013 on prudential requirements for credit institutions and investment firms

According to the EU proposals, originators must ensure that underlying documentation[25] and information necessary to understand transactions is freely available to investors and relevant authorities via standardised templates. Originators must also provide monthly investor reports on the performance of the underlying assets throughout the life of the issue.

The risks of complex pre-crisis securitisations were typically disclosed using arcane language in voluminous prospectuses. Thus, disclosure on complex securities as a box ticking exercise may be fundamentally inconsequential. Disclosure may do little to attenuate the opacity of complex securitisations. Therefore, even if the disclosure requirement is fulfilled, investors may still delegate risk assessments to rating agencies, as the disclosed information can still be very difficult for sophisticated investors to comprehend. In this regard, the European push for STS securitisations is laudable as it implicitly encourages disclosure and attempts to simplify securitisations and rewards basic securitisations.

2.9.10.2. Due Diligence

Tentative EU regulations require investors to conduct standard due diligence[26] prior to and after deal closure, and demonstrate to regulators that they clearly understand their positions. Investors must confirm the soundness of the collateral criteria as well as the structural soundness of the securitisation. Finally, investors are tasked with verifying whether securitisations fulfil the Simple Transparent and Standardised criteria.

2.9.10.3. Risk Retention

To address the potential incentive misalignment between issuers and investors, Section 941 of the Dodd-Frank Act requires that, originators or sponsors must retain some credit risk exposure to any financial asset they issue. A minimum of 5% retained interest is required on the issuance of private label residential mortgage backed securities.[27] Furthermore, these minimum retained exposures must not be hedged or transferred. Similarly, the EU proposals require originators to retain a minimum of 5% unhedged economic exposure to securitisations on an ongoing basis. Also, EU credit institutions

[25] These include the prospectus and pooling and servicing agreements, asset transfer agreements, derivatives and guarantees agreements, liquidity facility agreements and the trust deed

[26] These include verifying that the originator complies with the risk retention requirements, verifying underwriting practices, assessing the risk characteristics of the underlying exposures and structural features of the securitisation; and conduct stress tests on the collateral cash flows on an ongoing basis.

[27] These rules were proposed in March 2011 and adopted in October 2014. Agency MBS are exempt from this requirement as GSEs effectively retain 100% of the credit risk.

can only assume securitisation exposures if the originator discloses that it has retained a minimum of 5% of the transaction.

Both regulations largely allow originators to retain a vertical cross-section, horizontal tranches or a combination of both, in the case of the Dodd-Frank Act. The economic interest retained is measured in terms of fair value (Europe: nominal value) of the tranches. Consequently, this requirement is susceptible to arbitrage as tranche size does not necessarily correlate with loss distribution. Krahnen and Wilde (2017) provide evidence showing that the actual risk retention varies significantly across the various options. More importantly, retaining the most subordinate tranche achieves the most risk retention compared to the other options available. Therefore, any option that does not require the full retention of the first loss piece creates room for arbitrage. Also, the non-disclosure of the retention option selected by originations undermines the effectiveness of this requirement as the originator's behaviour is likely to vary with the chosen option and hence the economic risk retained.

2.9.10.4. Reforming the Rating Agencies

Section 932 of the Dodd-Frank Act requires that credit rating agencies conduct look back reviews to determine whether a credit analyst role in issuing a credit rating was influenced the prospect of future employment by the relevant issuer. Rating agencies must also publish rating transitions to facilitate the comparison of ratings issued by various agencies. Agencies must file annual reports on the effectiveness of their internal control systems to the SEC. A subsequent amendment (The Franken Amendment – Section 943) requires that pre-sale or credit rating reports accompanying a credit rating must detail representations, warranties and enforcement mechanisms to investors and how these contrast with similar securities.

The European Credit Rating Agency regulation (CRAIII)[28] requires the following:

1. Rating agencies must publish the fee income earned from rating transactions.
2. All structured finance issuers must solicit ratings from at least two independent credit rating agencies.[29]

[28] Credit Rating Agency (CRA I) Regulation, originally issued in December 2009, amended by CRA II in December 2010 and CRA III in May 2013 – Regulation (EU) No 462/2013 of the European Parliament and of the Council of 21 May 2013 amending Regulation (EC) No 1060/2009 on credit rating agencies (CRA III)

[29] CRA III – Article 8c

3. Also, credit ratings agencies and issuers must jointly publish credit ratings and any information on the structure, credit quality and performance of the underlying assets on a central database accessible to investors.[30]
4. With the view of stimulating competition, issuers intending to appoint multiple agencies must ensure that at least one of the agencies controls no more than 10% of the total market share.[31] As of December 2016, 23 out of 26 registered credit agencies controlled no more than 10% of the market share.

The EU CRA Regulations aim to address the overreliance on credit ratings by requiring investors to conduct their own risk assessments. The CRA III has directed the European Commission to review all references to credit ratings in EU law with the intention of deleting all such references by January 2020.

Both regulations do not necessarily address the conflicting interests associated with the remuneration structure in the rating industry. Also, efforts have been misdirected towards reliance on ratings as opposed to increasing their reliability.

2.9.10.5. Basel III – Capital and Liquidity Requirements

In response to the financial crisis, the Basel Committee on Banking Supervision (BCBS) published issued the final Basel III securitisation framework in July 2016[32] to reduce mechanistic reliance on ratings and enhance risk sensitivity. The Basel II framework prioritised the External Ratings Based Approach (SEC-ERBA), however, the Basel III framework revised the hierarchy such that banks apply the Internal Ratings Based Approach (SEC-IRBA) first.

The European policy makers recently published a compromise text of Regulation Amending the CRR in May 2017. This regulation establishes varying capital treatments of compliant and non-compliant STS securitisations. The new framework revised the hierarchy of capital treatment of securitisation exposures as per the Basel III securitisation framework. In order to mitigate the mechanistic reliance on credit ratings, banks must use their own internal computation of regulatory capital requirements, provided the bank is permitted to use the SEC-IRBA. If the SEC-IRBA is not applicable, then the Securitisation Standardised Approach (SEC-SA) should be used. This method uses a

[30] CRA III – Article 8b

[31] CRA III – Article 8d

[32] This revised framework is expected to come into effect in 2018

supervisory-provided formula to obtain the required capital levels. If both methods, are not available, then banks can use the SEC-ERBA where capital requirements are determined based on the external ratings of the relevant securitisation tranches. All securitisations and re-securitisations are now subject to 15% and 100% risk weight floors respectively. However, this regulation recommends that senior (non-senior) STS securitisation tranches are subject to a 10% risk weight floor. The divergent capital treatments are highlighted in Table 2-2 below. If any of the three approaches are not applicable, then the securitisation exposure is subject to a 1,250% risk weight.

Table 2-2 STS vs Non-STS risk weights

Long-term rating	Non-STS Securitisation				STS Securitisation			
	Senior tranche		Non-senior tranche		Senior tranche		Non-senior tranche	
	Tranche maturity		Tranche maturity		Tranche maturity		Tranche maturity	
	1 year	5 years	1 year	5 years	1 year	5 years	1 year	5 years
AAA	15%	20%	15%	70%	10%	10%	15%	40%
AA+	15%	30%	15%	90%	10%	15%	15%	55%
AA	25%	40%	30%	120%	15%	20%	15%	70%
AA-	30%	45%	40%	140%	15%	25%	25%	80%
A+	40%	50%	60%	160%	20%	30%	35%	95%
A	50%	65%	80%	180%	30%	40%	60%	135%
A-	60%	70%	120%	210%	35%	40%	95%	170%
BBB+	75%	90%	170%	260%	45%	55%	150%	225%
BBB	90%	105%	220%	310%	55%	65%	180%	255%
BBB-	120%	140%	330%	420%	70%	85%	270%	345%
BB+	140%	160%	470%	580%	120%	135%	405%	500%
BB	160%	180%	620%	760%	135%	155%	535%	655%
BB-	200%	225%	750%	860%	170%	195%	645%	740%
B+	250%	280%	900%	950%	225%	250%	810%	855%
B	310%	340%	1050%	1050%	280%	305%	945%	945%
B-	380%	420%	1130%	1130%	340%	380%	1015%	1015%
CCC+/CCC/CCC-	460%	505%	1250%	1250%	415%	455%	1250%	1250%
Below CCC-	1250%	1250%	1250%	1250%	1250%	1250%	1250%	1250%

During the financial crisis, banks experienced liquidity difficulties despite holding adequate capital levels. Consequently, to reinforce its liquidity framework, the Basel Committee proposed two standards: the Liquidity Coverage Ratio (LCR) and the Net

Stable Funding Ratio (NSFR) from 2015 and 2018 onwards respectively.[33] The LCR is intended to ensure that banks hold enough High-Quality Liquid Assets (HQLA)[34] to withstand severe liquidity stress in the short term (30 days) while the NSFR was introduced to increase banks' long term resilience.

The US has adopted an amended version of the Liquidity Coverage Ratio (LCR) requirements proposed by Basel III where investments in ABS now attract higher capital surcharges. The total HQLA holdings should be equivalent to a minimum of 100% of total net cash outflows during the 30-day stress period. The US version of this rule is more stringent as common instruments like residential MBS and covered bonds do not qualify as HQLA (Schwarcz, 2015).

In the European version, eligible securitised assets can make up no more than 15% of the HQLA stock. More specifically, only RMBS rated AA and above qualify as HQLA hence this might have an adverse effect on the demand for securitisation as banks are the largest investors in securitisations (JFSC, 2017).

According to a monitoring exercise by the European Banking Authority (EBA) as of June 2016, the average LCR was 133.7% and 95.4% of the sampled banks exceeded the minimum requirement. Similarly, the exercise reported an average NSFR of 107.8% with 80.6% of the participating banks meeting the minimum threshold of 100% (EBA, 2017).

2.9.11. STS Framework

The STS framework was also intended to address some of the key weaknesses of securitisation in the run up to the financial crisis. For instance, synthetic transactions augment the counterparty risk and deal complexity due to the contents of relevant derivative contracts. Also, re-securitisations are more likely to be correlated with systemic risk relative to regular securitisations. Moreover, re-securitisations symbolise the nature of opacity that this framework seeks to mitigate. Consequently, the framework aims to revive the securitisation market by promoting simple, transparent and standardised securitisations that receive favourable capital treatment relative to synthetic transactions and re-securitisations.

[33] $LCR = \frac{Stock\ of\ HQLA}{TOtal\ Net\ Cash\ Outflows} \geq 100\%$

[34] These are assets can easily and quickly be liquidated with little or no loss of value

2.9.11.1. Simplicity – Article 20

A simple securitisation in this context involves a true sale (not synthetic) of a homogenous asset pool[35] to a bankruptcy-remote vehicle that is insulated from the credit standing of the originator. The assets in the underlying portfolio must have been originated in the normal course of business and also not be actively managed. In addition, at the date of transfer, none of the underlying assets must be delinquent.

2.9.11.2. Transparency – Article 22

The transparency dimension of the STS framework requires that the originator provides investors with historical default and loss performance data, such as delinquency and default data, for exposures significantly similar to those being securitised. Originators are also required to provide investors with access to a liability cash flow model prior to the prior to pricing and on an ongoing basis. Prior to issuance, a sample of the underlying assets shall be verified by an independent third party to attest that the disclosed data on the underlying assets are reliable.

2.9.11.3. Standardisation – Article 21

The standardisation dimension demands that the risk retention requirement has been complied with, and currency and interest rate risks must be hedged and disclosed accordingly. Also, the transaction documentation must clearly indicate the obligations of all deal parties, stipulate course of action to be taken regarding delinquencies or defaults, and provide guidance on the efficient settlement of conflicts among investors.

2.10. Conclusion

This chapter covered the fundamental elements of securitisation transactions and the developments in the securitisation market from a historical and regional perspective. Although, securitisation originated in the US in the 1970s, the European market grew significantly in the pre-crisis period owing to the relaxation of legal barriers, the introduction of the Euro and technological advancements. Subsequently, securitisation played a significant role in the financial crisis as the growth in this market was attained with increased complexity, opacity and a decline in credit underwriting standards.

The issuance levels and investor participation in the securitisation markets are still subdued significantly. Although well intentioned, regulatory tightening through additional capital and liquidity requirements have rendered issuing and holding asset

[35] The assets must be homogenous in terms of cash flows, credit and prepayment risk characteristics. Also, this pool cannot comprise securitisation positions. Thus, re-securitisations are do not qualify as STS securitisations.

backed securities costly. The European Credit Rating Agency Regulation has also been passed to address the conflicts of interest between ratings agencies and issuers, and increase transparency. In Europe, the Securitisation Regulation has been proposed to introduce the STS framework. The drive disfavours the issuance of complex and opaque securities while promoting simplicity and transparency which was largely lacking in the years preceding the financial crisis. Risk retention requirements have been proposed to mitigate the conflict of interest between issuers and investors. The due diligence requirements have also been put in place to minimise the reliance on credit ratings and indirectly enforce risk retention. STS compliant securitisations receive favourable capital treatment relative to non-qualifying securitisations such as synthetic transactions, CMBSs and re-securitisations due to their increased levels of complexity. Currently, the enforcement of the STS framework relies on self-certification however this may be counterproductive due to the potential for conflicts of interest. It would be more prudent if an independent party issues certification for qualifying securitisations. Also, requiring investors to solely determine compliance places undue burdens on investors especially small investors, hence sharing this responsibility between investors and issuers would be a welcome amendment. Another key outcome of the latest deliberations is that the STS framework is not applicable to securitisations from non-EU member states. Consequently, Britain's exit from the European Union is certain to have significant consequences for securitisation. The UK has the largest securitisation activity in Europe hence, in the absence of STS equivalence, the attractiveness of UK securitisations might decline which might fragment the European market further.

Chapter 3. Literature Review

3.1. Introduction

The role of securitisation in the financial crisis drew significant academic interest. As a result, the post-crisis research on this innovation has grown significantly. Many argue that the information frictions in securitisation chains and consequent distorted incentives amplified the losses incurred during the financial crisis. Although the pre-crisis literature vehemently accentuates the conflicts of interests in the securitisation chain, the efficacy of incentive aligning mechanisms such as pricing, reputation, and risk retention remains an open avenue for research.

There are four broad strands of the modern securitisation literature. The first strand discusses theoretical aspects of securitisation such as security design in the face of information asymmetry. The second strand reviews the ex-ante determinants of securitisation while the third strand assesses the ex-post effects of securitisation. Finally, the fourth strand is a relatively new dimension of the literature that focuses on pricing. This literature aims to establish whether investors priced certain factors into the yields of securitised bonds and whether these yields had any predictive value.

3.2. Security Design and Information Asymmetry

Although securitisation can improve the efficiency of financial intermediation, this arrangement is susceptible to the common asymmetric information problems of adverse selection and moral hazard, where the originator has more information than investors, about the quality of the securitised assets. Consequently, the securitisation contract must include incentive-aligning and signalling features to mitigate these problems.[36] Greenbaum and Thakor (1987) provide the first theoretical analysis of the securitisation decision. Under perfect information assumptions, they show that the choice between retaining loans (deposit funding) and loan securitisation was irrelevant. However, where substantial information asymmetries exist, high quality loans will be securitised to signal loan quality.

The security design features of securitisation mainly hinge on pooling and tranching to address adverse selection. DeMarzo and Duffie (1999) present a model of security design

[36] In this context, adverse selection refers to the tendency of the originator to securitise loans of lower quality based on private information. Moral hazard occurs when the originator's monitoring incentive is diminished after the securitisation transaction. With respect to adverse selection, the issuer may have an incentive to securitize risky assets while the moral hazard problem emerges due to the decreased incentive to monitor securitized loans.

demonstrating that an issuer with superior information naturally faces a lemons problem –a downward sloping demand curve. For this reason, asset pooling is considered to be more efficient relative to individual asset sales. According to Hartman-Glaser et al. (2012), pooling yields an information enhancement effect because investors are able to obtain information on originators efforts more quickly. On the contrary, DeMarzo (2005) show that although informed issuers can benefit by pooling assets,[37] pooling and tranching is more optimal. Tranching allows the issuer to exploit the information destruction effect of pooling to issue low risk and liquid derivative securities from a large asset pool. More importantly, all three models predict that issuers can signal private information by retaining a significant fraction of the securitisation issue that is sensitive to that information.

Tranching can also boost the issue proceeds to the issuer. A number of other theoretical works on security design (Boot and Thakor, 1993; Gorton and Pennacchi, 1990) concur that tranching maximises the issuers revenue when investors are differentially informed. In the context of securitisation, Riddiough (1997) predicts that an issuer with private information can maximise securitisation proceeds by issuing tranched securities with varying degrees of exposure to this information. Similarly, Guo et al. (2014) demonstrate that tranching enhances the issuers revenue when investors hold diverse beliefs.

In regards to moral hazard, Fender and Mitchell (2009) examine the efficacy of three retention mechanisms on the originator's screening incentives: retention of the equity tranche, mezzanine tranche or a vertical slice of all tranches. These contractual mechanisms yield varying levels of screening owing to differing degrees of sensitivity to a systematic factor. More importantly, the authors show that a high probability of a downturn erodes the incentive inducing objective of equity retention. Thus, depending on the probability of a downturn, equity retention may not be the most effective mechanism. However, Chemla and Hennessy (2014) show that the retention of junior/equity (riskiest) tranches efficiently tackles this moral hazard problem. Additionally, their model predicts that retentions and ABS price informativeness are substitute mechanisms for inducing originator effort incentives such that, in equilibrium, retention induces screening efforts

[37] Pooling pre-empts the benefits of asset-specific private information on the one hand and yields diversification benefits on the other hand. On the contrary, Cortes and Thakor (2015) show that although pooling results in diversification of idiosyncratic risks, as the pool size increases, the value of asset specific information declines. Consequently, the issuer's screening incentives decline thereby decreasing the quality of assets

only when ABS price informativeness is low.[38] Parlour and Plantin (2008) model loan sales with moral hazard and show that in liquid secondary markets, the magnitude of retention needs to be larger than usual to induce monitoring efforts.

Securitisation entails asset and risk transfer without explicit recourse, however, it has been suggested that implicit recourse can also address the information frictions of moral hazard. Similar to the tranche retention device discussed above, implicit recourse is another risk retention mechanism to align the incentives of issuers and investors. Moreover, both devices are not mutually exclusive. Gorton and Pennacchi (1989); Gorton and Pennacchi (1995) examine the value of implicit recourse as an incentive aligning mechanism in loan sale agreements and provide empirical evidence in support of this effect. In fact, Moody's (1997) argue that the favourable pricing of asset backed securities has been attributed to a commonly held belief amongst investors that originators will go beyond their contractual mandate to readily support deals whose performance decline significantly. The empirical evidence, mainly based on credit card securitisations (Higgins and Mason, 2004; Gorton and Souleles, 2007; Chen et al., 2008; Vermilyea et al., 2008) indicates that sponsors tend to honour implicit recourse agreements.

Another subset of this literature focuses on reputational concerns and the originator's screening effort. Gorton and Souleles (2007) model securitisation in a repeat setting and show that an originator with reputational concerns has an incentive to provide implicit recourse. Thus the ability to securitise is dependent on a relational agreement between the originators and investors. Reneging on this implicit contract will result in a sanctioning mechanism – the avoidance of the originator's future issues – hence the issuer will be committed if the present value of the loss exceeds the one-off gain from not honouring the implicit agreement. Consequently, the only factor that motivates banks to provide and honour implicit recourse agreements is their reputation.[39] Similarly, Winton and Yerramilli (2015) examine the extent to which reputation concerns can sustain monitoring efforts in a dynamic securitisation model. They show that in equilibrium, reputation and retention are substitutes where reputable banks maintain monitoring levels and retain lower fractions of issues. More importantly, less reputable banks are more likely to exploit

[38] The corollary of this proposition is that equilibrium with zero retention can only exist if ABS price informativeness is satisfactorily high, where price informativeness is a function of the ability to observe the true quality of the securitised collateral and where prices reflect fundamental value.

[39] Gorton and Metrick (2012) define reputation in this context as present value of the future profits from securitization above the cost of on-balance sheet financing

loan demand at the expense of monitoring as monitoring is harder to sustain during these boom periods. Also, the increased likelihood of competing with other reputable lenders diminishes monitoring incentives. Hartman-Glaser (2011a) also analyses a repeated securitisation game with reputation concerns induced by information frictions regarding issuer type.[40] Similarly, he observes that reputation and retention are substitutes however his model predicts an opposite effect of reputation on monitoring incentives. In this case, as the opportunistic issuer builds reputation capital, the likelihood of asset misreporting increases. In a similar vein, Griffin et al. (2014) propose a model of repeat securitisation issuance. They show that in the context of complex securities (relative to simple securities[41]) where investors cannot reliably conduct counterfactual and scenario analyses, reputable underwriters tend to produce poor quality securities that underperform during economic downturns. In contrast, Cortes and Thakor (2015) argue that an issuer's reputational concerns should counteract the incentive to relax screening efforts. However, they show that this reputation-induced monitoring incentive reduces as the diversification benefit increases for a large pool – this is because diversification counteracts the benefits of prudent screening. In summary, conventional wisdom suggests that reputation can be an effective disciplining device, however, the information destruction and diversification effects of pooling and tranching can undermine the reputation based incentives to avoid perverse bank behaviour. Also, investors' perception of this reputation can be exploited by strategic and opportunistic issuers.

3.3. The Determinants of Securitisation

The modern securitisation literature cites three common reasons for engaging in securitisation: funding (Thomas, 2001), risk transfer (Allen and Carletti, 2006) and regulatory capital arbitrage (Acharya et al., 2013; Calomiris and Mason, 2004). These are explained below

3.3.1. Funding/Liquidity

Banks may securitise to secure funding at lower costs, diversify funding sources or generate fee income. True sale securitisations boost the liquidity position of the issuing banks as they involve immediate cash proceeds compared to holding loans on balance

[40] In this context, the issuer could be an honest or a strategic/opportunistic issuer. This honesty hinges on providing accurate information on asset quality.

[41] Unlike complex securities, investors can establish the performance of simple securities in good and bad states of the economy. For complex securities, the investor only learns of the performance during the observed period.

sheet. In addition, originators tend to retain the right to service securitised loans. Consequently, this generates servicing fee income without increasing their capital positions. Furthermore, since banks can secure higher ratings on securitised bonds relative to conventional corporate bonds, securitisation offers the potential of raising finance at lower costs (Fabozzi and Kothari, 2008).

The literature is generally supportive of the view that securitisation is typically done to augment funding and liquidity positions. Martín-Oliver and Saurina (2007) and Cardone-Riportella et al. (2010) analysed the securitisation activities of Spanish banks between 1999-2006 and 2000-2007 respectively and find that liquidity augmentation is the primary motivation for asset securitisation. Affinito and Tagliaferri (2010) made a similar observation after analysing securitisation by Italian banks between 2000 and 2006. Analysing securitisation transactions between 1999 and 2006, Agostino and Mazzuca (2011) also find that Italian banks primarily securitise in order to diversify and optimise their available sources of finance. Hänsel and Bannier (2008) analyse CLO transactions of European banks between 1997 and 2004 and observe that risky and less liquid banks are more likely to engage in securitisation. More importantly, they do not find evidence of regulatory capital arbitrage driving the securitisation trend.

3.3.2. Credit risk transfer

The link between securitisation and bank risk is ambiguous and inconclusive. There are two main opposing views on the relationship between securitisation and risk. Proponents of securitisation argue that this mechanism is a better and more efficient mechanism for achieving diversification while critics argue that securitisation increases bank risk and endangers bank soundness.

As banks concentrate their lending activities in regions/sectors where they are most capable of absorbing expected losses, their portfolios become concentrated over time. Hence securitisation serves as an avenue to achieve portfolio diversification (Rosenthal and Ocampo, 1988). Also, banks with a higher proportion of risky loans may securitise to attain diversification. According to this diversification hypothesis, banks that fail to achieve diversification internally are more likely to engage in securitisation (Demsetz, 2000). However pre-crisis theoretical models predict that banks are more likely to securitise less risky loans (Gorton and Pennacchi, 1995; Greenbaum and Thakor, 1987) thereby increasing the risk profile of securitising banks. Banks may securitise high quality

assets while retaining riskier assets in response to capital regulations[42] or reputation effects.

Minton et al. (2004) use capital ratios (book value of equity/ book value of assets) as a measure of risk and find that less risky banks are more likely to engage in securitisation. In contrast, Hänsel and Bannier (2008) provide evidence that large banks with high risk exposure (credit provisions/net interest income) are more likely to securitise their assets. This is consistent with the findings of Gorton and Souleles (2007) who show that riskier banks are more likely to securitise their credit card receivables. Affinito and Tagliaferri (2010) also find that Italian banks with a high proportion of bad loans are more likely to engage in securitisation. However, Cardone-Riportella et al. (2010) find no evidence in support of the credit risk transfer hypothesis in the Spanish case.

3.3.3. Regulatory capital arbitrage

The 1988 Basel Accord required banks to hold a minimum capital equivalent to 8% of their risk-weighted assets. The risk weightings were based on asset categories rather than the risk of the underlying assets. For instance, risk weighting was 0% for cash, 50% for mortgages, and 100% for corporate loans regardless of the actual risk of the underlying assets. Consequently, Calem and LaCour-Little (2004) argue that regulatory regimes such as Basel I and the standardised approach of Basel II, that offer very limited differentiation of credit risk creates incentives to engage in regulatory capital arbitrage through off-balance sheet activities. Banks were willing to securitise loans that released the most capital as regulatory capital requirements for mortgages were deemed too high. Assuming that the capital relieved from securitisation is independent of the quality of loans securitised, then it is expected that the highest quality loans will be securitised as they are more expensive to hold on the balance sheet. Also, it is expected that undercapitalised banks would be more active issuers of asset backed securities in order to boost their capital positions. Jones (2000) illustrates how securitisation can be used to obtain capital relief under this framework. The author, however, emphasises that regulatory capital arbitrage is not the sole incentive to securitise as securitisation is commonly used by non-banking firms too.

[42] The Basel I accord failed to align regulatory risk weights with economic capital. Consequently, if high capital levels are required for low risk loans and low capital for high risk loans (as in Basel I), then low risk loans are perceived to require too much capital and hence are more likely to be securitised.

Minton et al. (2004) and Calomiris and Mason (2004) present arguments in favour of the regulatory capital arbitrage hypothesis. Minton et al. (2004) pose a deductive argument that regulatory capital arbitrage is not the main driver of securitisation as unregulated institutions are more likely to engage in securitisation relative to regulated banks. Calomiris and Mason (2004) find evidence of regulatory capital arbitrage, however, they show that this finding is consistent with the efficient contracting view where banks seek to maintain capital levels consistent with the market perception of risk levels. Uzun and Webb (2007) also provide evidence that US banks with low capital ratios were more like to securitise their credit card receivables. However other authors such as Martín-Oliver and Saurina (2007) find no evidence of regulatory capital arbitrage by Spanish banks.

Perhaps the most comprehensive analysis of this sort was conducted by Farruggio and Uhde (2015). These authors provide empirical evidence on the securitisation decision by analysing 75 listed banks in 13 European banks from 1997-2010. First, they find that the decision to securitise is a three dimensional composite decision (bank specific, country specific, and market specific determinants) and more importantly, the influence of these factors varied between the pre-crisis and the crisis period. Second, they note that the determinants of securitisation decision depend on the transaction type, collateral and the regulatory environment. Larger, high performing banks with low credit risk exposure are more likely to engage in securitisation, therefore less risky banks were more likely to engage in credit risk transfer. Evidently, European securitisation is largely driven by liquidity and funding needs. Also, banks operating in countries exhibiting high economic growth and intense banking business competition tend to be more active securitisers.

3.4. Effects of Securitisation

Concerning the effects of securitisation, the existing empirical literature produces polarising and diametrically opposing views. This literature largely discusses the impact of bank securitisation on bank risk taking and the financial system. Nonetheless, securitisation has implications for credit supply, financial stability and shareholder value too. Theoretical literature largely indicates that securitisation is more likely to encourage perverse originator behaviour and destabilise the financial system. However, the empirical literature is inconclusive, probably due to the heterogeneous contexts of the various relevant studies.

3.4.1. Risk

3.4.1.1. Lending Standards

As discussed above, a series of theoretical studies generally agree that, in equilibrium, securitisation weakens screening and monitoring incentives (Gorton and Pennacchi, 1995; Pennacchi, 1988; Parlour and Plantin, 2008; Ahn and Breton, 2014). A well-established stream of empirical literature indeed confirms that increased securitisation reduced lenders' incentives to carefully screen and monitor borrowers. Dell'Ariccia et al. (2012); Keys et al. (2010); Purnanandam (2011) and Keys et al. (2012) also show that securitisation respectively resulted in softening lending standards in the US subprime and prime mortgage markets respectively. Additionally, Maddaloni and Peydro (2011) examined both the Euro-area and the U.S. lending standards, observed that low short term interest rates lead to soft mortgage lending standards and this impact is amplified by securitisation activity. For corporate loans, Wang and Xia (2014) provide evidence indicating that securitisation negatively affects banks' monitoring incentives. Likewise, Berndt and Gupta (2009) find that securitised corporate loans underperform portfolio loans. They argue that this is either due to adverse selection (cherry picking lower quality loans based on unobservable characteristics) or moral hazard (reduced monitoring incentives)

Others consider the role of soft and unobservable information in securitization. Calem et al. (2011) empirically identify the prevalence of cherry picking and adverse selection where the likelihood of securitisation increased along the dimensions of unobservable credit risk characteristics. Anderson et al. (2011) also show that securitisation introduced moral hazard that observable characteristics such as credit scores and loan-to-value (LTV) ratios could not capture. Similarly, Keys et al. (2009) find that as the ease of securitisation increases, lenders are less inclined to collect or process soft information, which is unobservable to investors but might influence performance. Consequently, Rajan et al. (2010) argue that the accuracy of statistical models in predicting defaults declined because of the failure to account for the role of originators to collect soft information[43] as securitisation activity increased.

Thus originators may have securitised their highest quality assets based on observable characteristics however there is convincing evidence that over time lending standards

[43] Such as the probability of future income or expense shocks

declined in the run up to the financial crisis. This decline in lending standards is evident in the unobserved characteristics of securitised loans.

3.4.1.2. Loan Quality

A number of papers assess risk retention via the quality of assets that are securitised relative to the quality of retained assets. The quality of these assets is typically judged based on the observable credit characteristics and the ex-post performance in terms of defaults and delinquency rates. The theoretical literature, e.g.(Greenbaum and Thakor, 1987), generally predicts that banks are more likely to securitise safer assets while retaining riskier assets in order to signal quality. Many empirical studies indeed concur with this prediction. For instance, Ambrose et al. (2005) examine the loan portfolio of a single US lender and find that securitised loans suffered lower ex-post defaults relative to portfolio loans. Thus, lenders securitise their low risk assets while retaining riskier assets.[44] Agarwal et al. (2012) also observe that in the prime mortgage market, banks securitised mortgages with low credit risk while retaining those with higher credit risk. Similarly, Albertazzi et al. (2015) examine the Italian asset securitisation market and find that securitised assets were less risky than portfolio loans hence lenders were more concerned about their reputation than exploiting information asymmetry.

For corporate loans, Benmelech et al. (2012) investigate the link between the CLO securitisations and risk. They find no evidence of adverse selection as securitised loans performed no differently from retained loans. Thus skin in the game for corporate loan syndicates may have resolved the adverse selection problem. Shivdasani and Wang (2011) provide empirical evidence that securitisation increased credit supply at lower costs and fuelled the LBO boom of 2004 and 2007. More importantly, they find no evidence that securitisation was associated with low quality LBO deals. Cebenoyan and Strahan (2004) examine the effect of active engagement in the loan sales market on lending supply, profitability and risk levels. Evidently, loan sales reduce risk levels initially but subsequently, this activity increases the risk appetite as the authors find that banks that improve their credit risk management tend to operate with higher leverage and make riskier loans. Consequently, they conclude that risk transfer innovations may result in increased credit supply for higher profits rather than the intended risk reduction in the banking system. Also, Casu et al. (2011) investigate the impact of securitisation on the

[44] This finding supports the regulatory arbitrage hypothesis where holding safe assets on the balance sheet is costly or the reputation hypotheses where banks securitise their best assets to establish a presence in the securitisation market.

risk taking behaviour of US banks between 2001 and 2007. They find that securitisation active banks tend to hold low risk asset portfolios. This finding was mainly driven by mortgage and consumer loan securitisations while the sale of other assets had no discernible impact on risk levels.

In contrast, other papers find that securitised loans were riskier than portfolio loans indicating the existence of either adverse selection, moral hazard or both. Berndt and Gupta (2009) find that borrowers of securitised corporate loans underperform their peers by about 9% per year. They argue that this is either due to adverse selection (cherry picking lower quality loans based on unobservable characteristics) or moral hazard (reduced monitoring incentives). Krainer and Laderman (2014) compare 1.6 million securitised and retained California mortgage loans originated between 2000 and 2007 along three dimensions: ex ante observable risk characteristics, the default performance, and pricing. They observe that markedly riskier loans are more likely to be securitised. Likewise, Elul (2015b) report that securitised mortgages are relatively riskier. After splitting the sample according to vintage, Elul finds an initial negative relationship between securitised loans and credit risk, however, this relationship deteriorates and subsequently becomes strongly positive. This is consistent with the predictions of Wolfe (2000) and Shin (2009) where high quality loans are initially originated and securitised however as the market of prime borrowers becomes saturated and the risk appetite for risk and complexity increases, then lenders begin to reduce lending standards and originate more subprime and lower quality loans.

3.4.1.3. Equity Retention and Recourse

Theoretical literature also suggests that quality signalling can be achieved by incentive aligning mechanisms and bonding devices such as retention of the junior/equity tranche or provision of implicit recourse (Plantin, 2004; Riddiough, 1997; DeMarzo and Duffie, 1999; DeMarzo, 2005). These devices require the issuer to retain risk in some form as a signal of commitment.

A marginally positive view of securitisation and bank risk proffered by Jiangli et al. (2007) indicate that insolvency risk is reduced if the tail risk in senior tranches transferred exceed default risks in the retained junior tranches. Jiangli and Pritsker (2008) test these predictions using data on US BHCs from 2001-2007 and find that securitisation indeed reduces bank insolvency risk and increases profitability.

However, a formidable antithetic stance suggests that securitisation achieves very limited risk transfer. Theory predicts that the adverse selection and moral hazard problems are largely attenuated if the originator retains a substantial equity piece. However, the size of this piece is positively correlated with the risk embedded in the underlying assets. Consequently, it has been argued that a typical CDO transaction results in only very limited credit risk transfer (Franke and Krahnen, 2005). The authors analyse 73 European securitisation transactions and show empirically that the securitisation proceeds, when used to expand lending, results in increased systematic risk, measured by the stock's beta. It has been argued that securitisation enhances risk sharing on the one hand, but also increases the risk appetite (Instefjord, 2005) and risk capacity (Shin, 2009) of the securitizing banks on the other hand. Thus, banks tend to use securitisation proceeds and the risk reduction attained to assume more risk. Similarly, Krahnen and Wilde (2006) theoretically show that retention of the equity piece and reinvestment of the proceeds into higher risk projects result in the rise in the systematic risk (equity beta) of the issuing bank. From their simulations, the authors find that repeat securitisation coupled with reinvestment increases the bank's exposure to a market risk factor. Furthermore, Haensel and Krahnen (2007) analyse 159 CDOs issued between 1997 and 2004 by 49 listed banks, and also find that credit risk transfer mechanisms tend to increase the securitizing bank's exposure to market risk. This exposure is inversely proportional to the profitability and capital holdings of the securitizing bank. Based on 592 deals issued by European banks between 1997 and 2007, Uhde and Michalak (2010) provide additional empirical evidence that securitisation increases banks' systematic risk. In regards to recourse, Acharya et al. (2013) analyse asset-backed commercial paper conduits established from 2001 to 2009 and find that commercial banks provide credit enhancements for their conduits (largely motivated by regulatory capital arbitrage[45]) using explicit guarantees thereby substantially limiting risk transfer.

3.4.1.4. Diversification

The growth of securitisation improves financial integration and investor diversification. On the one hand, financial integration enhances intermarket capital flows, thereby minimising the impact of liquidity shocks to lenders. On the other hand, although diversification enhances risk sharing, systemic events spread quickly in diversified and

[45] Jones (2000) illustrates how banks use securitisation and other methods to reducing their regulatory capital without necessarily reducing their economic risks. According to Calem and LaCour-Little (2004), the Basel I and II regimes provided limited differentiation between credit risks. Capital requirements for mortgages for instance were considered to be too high hence banks preferred to securitise safer assets to release capital that could be used for other profitable undertakings.

integrated financial systems. Furthermore, diversification may also diminish investor incentives to conduct proper due diligence (Loutskina and Strahan, 2009). Similarly, Cortes and Thakor (2015) argue that diversification may adversely affect investors incentive to acquire more relevant information required to conduct due diligence. In their model, reputation induces banks to increase screening precision, which in turn increases the average quality of asset pools, thereby diminishing investors incentive to conduct due diligence. However, as pool sizes increase, the reputation induced monitoring incentive is now weakened which in turn increases the risk of the asset pool. Therefore securitisation increases systematic risk in the long run.

Although diversification reduces the likelihood of bank failure, it also makes systemic collapse more likely as firms become more similar to each other over time. There a high magnitude of diversification is undesirable and suboptimal for social welfare (Wagner, 2010). Similarly, Ibragimov et al. (2011) show that diversification actions may be optimal for individual intermediaries but suboptimal for social welfare as a result of the interconnectedness of intermediaries' risk portfolios. As banks reduce their idiosyncratic risks through diversification, they tend to increase their vulnerability to systematic risks and liquidity shocks. In their model, securitisation allows banks to transfer idiosyncratic risk through diversification while retaining systematic risk. Thus although securitisation achieves some credit risk transfer, banks tend to retain some substantial residual risk.

3.4.2. Credit Supply

Credit supply is traditionally a function of liquid deposit funding. However, the emergence of securitisation and the originate-to-distribute model tempers the effect of deposit supply and other liquidity shocks on credit supply (Loutskina and Strahan, 2009). Loutskina (2011) also show that securitisation increases banks' lending ability and reduces the sensitivity of bank lending to deposit funding. As an alternative source of funding, securitisation reduces the reliance on deposit funding and hence minimising the exposure to the cost of funding shock. However, this mechanism minimises the efficacy of monetary policies using the bank lending channel. Similarly, Altunbas et al. (2009) examine the securitisation activity of European banks and find that engaging in securitisation insulates bank lending from the effect of monetary policy and increases banks' lending capacity. Furthermore, Bonaccorsi di Patti and Sette (2016) examine an Italian credit register and identify the adverse effect of the immobilised securitisation markets on the aggregate credit supply after the financial crisis.

In regards to the cost of credit, Nadauld and Weisbach (2012) analyse the securitisation of bank loan facilities (CLOs) issued from 2002 to 2007 and find that securitised loans had comparatively lower spreads. Thus, increased securitisation activity resulted in the reduction in the cost of corporate debt. This finding is in line with the view that the demand for CLO collateral reduced the cost of corporate debt. Shivdasani and Wang (2011) provide empirical evidence that securitisation increased credit supply at lower costs and fuelled the LBO boom of 2004 and 2007. However, Kara et al. (2016) analyse the securitisation of European corporate debt but do not find any evidence in favour of this hypothesis.

3.4.3. Shareholder Wealth

Assuming securitisation reduces risk, then the announcement of securitisation transactions should create value for shareholders however the running theme of contradictory empirical evidence is present in this strand of the literature as well. Lockwood et al. (1996) examine issuers of 294 US ABSs between 1985 and 1992 find that well-capitalised banks experience wealth gains while weaker banks lose shareholder value after deal closure. In a study of 236 US transactions that closed during the years 1991–1996, Thomas (1999) reports conflicting results suggesting that although securitisation announcements generally yield positive wealth effects, this value declines with the credit standing of the issuer. The author attributes the difference in the results to the fact Lockwood's sample largely comprised distressed banks. Subsequently, Thomas (2001) perform a similar analysis on 1416 US MBS and ABS issuances between 1983 and 1997. Here, the author finds that issuance announcements yield shareholder gains during less volatile periods. Thomas (1999) and Thomas (2001) observe that securitisation announcements generate significant shareholder value for larger and frequent issuers. All the above research employ event study methodologies however they rely on transaction dates rather than announcement dates hence this may account for the inconsistent results. Martínez-Solano et al. (2009) examine the market reaction to securitisations by Spanish banks from 1993-2004. They observe positive and significant cumulative abnormal returns over multiple event windows. The intensity of the reaction increases with higher equity levels and securitisation experience. On the contrary, Lopez-Penabad et al. (2015) conduct a similar exercise on Spanish market from 1995 to 2010 and find that securitisation announcements generate negative wealth effects, however, these effects are time dependent. Thus, this effect is evident between 2005 and 2007 but not in the 1995-2004 and 2007-2010 subsamples. Similarly, using a relatively modern

cross-sectional sample of 381 European transactions issued between 1997 and 2007 Uhde et al. (2012), find that securitisation announcements yield negative wealth effects. This finding is consistent with Lockwood et al. (1996), Thomas (2001) and Lopez-Penabad et al. (2015). On balance, it seems that the effect of announcements is largely negative, possibly due to the originator's retained interests in the transaction.

3.5. Securitisation Pricing

An emerging strand of the securitisation literature focuses on security pricing. A common criticism levied against investors during the financial crisis, was the overreliance on credit ratings. However, the premise of this literature is that although ratings are the most important determinant of bond prices, the information content of ABS/MBS launch spreads transcended credit ratings. Thus, investors were aware of and incorporated certain information frictions into MBS prices. Theoretically, if investors had relied exclusively on credit ratings then initial yield spreads should hold no additional information value. Fabozzi and Vink (2012a) examines the pricing of UK RMBSs and find that prices accounted for credit factors (asset and structural risks) already considered by rating agencies. Similarly, Fabozzi and Vink (2012b) investigate European ABSs and find that prices account for subordination, external credit enhancements, type of collateral, currency risk, and creditor protection. Fabozzi and Vink (2015) also show that initial spreads account for the dynamics in rating disagreement (risk)[46] when three ratings are reported. Fabozzi et al. (2017) examine the spreads of European AAA RMBS prior to the financial crisis and report evidence inconsistent with the rating shopping hypothesis. Thus, although they find that senior tranches with multiple ratings required higher spreads compared with solely rated tranches, they attribute this finding to tranche complexity.[47] In the US case, He et al. (2012) observe the same relationship between the number of ratings and the corresponding spread. However, they argue that this is consistent with the rating shopping hypothesis as fewer ratings suggest a higher probability of unreported negative ratings. He et al. (2012) observed that during the 2004-2006 securitisation boom, yield spreads on US MBSs were higher on bonds sold by large issuers compared to similar bonds issued by small issuers. They interpret this finding to mean investors account for

[46] There is no impact on spreads if the S&P/Fitch ratings are better or equal to that of Moody's. However, tranches with worse S&P/Fitch ratings relative to Moody's ratings have higher yield spreads.

[47] In this context, complex tranches require more ratings to convince investors of the inherent quality of the relevant tranche/bond

the risk that during this boom period, large issuers were more likely to secure inflated ratings.

Other papers test the reliability of spreads in predicting performance and accounting for information asymmetry. Concerning the performance prediction, Adelino (2009) find evidence that yield spreads predict downgrades and defaults even after conditioning on credit ratings. Similarly, He et al. (2016) show that yields on US MBS predict cumulative losses. In regard to asymmetric information mechanisms, Albertazzi et al. (2015) and Begley and Purnanandam (2017) show that spreads also account for issuers' effort to signal the quality of securitised assets. Gorton and Souleles (2007) also note that investors demand lower spreads on securitisations sponsored by highly rated issuers as they are more likely and suited to provide recourse. Therefore, although credit ratings are considered to be the most important factor in pricing, investors do not ignore additional credit factors in excess of credit ratings.

3.6. Research Gap

The securitisation literature has expanded significantly primarily due to its role in the financial crisis. This literature mainly focuses on the role of information asymmetry and the effects of this mechanism on risk and financial stability, however, there has been very little research on pricing and investor behaviour. Certainly, investors who are largely financial institutions may have observed the securitisation trends before the financial crisis. However, the literature largely fails to empirically or theoretically examine the prices of asset backed securities and what they reflect. Thus, the literature provides very limited insights on securitisation activity from the investor's perspective. Few attempts sought to determine whether prices reflected equity retention, implicit recourse, credit ratings and rating shopping. However, there are other dimensions of securitisation worth exploring.

First, the securitisation markets in other jurisdictions are markedly distinct from the US markets. Hence, conclusions drawn from the US residential mortgage market may not be necessarily applicable to the European markets. For instance, unlike the US, there has been limited evidence of regulatory capital arbitrage in the European Securitisation markets. Also, research on the agency issuances may be of little relevance outside the US as issuances in European markets are solely private label deals. Granted that some findings are applicable to both markets, however, painting all securitisation markets with a broad brush might lead to distorted narratives and inappropriate policies. Evidence on

the US MBS market indicates that due to their questionable relationship with rating agencies, larger issuers incurred higher borrowing costs as the crisis loomed. A number of papers have investigated rating shopping and catering on the European markets however there is limited research on the nuances of the interaction between issuers and investors in the European markets. We attempt to fill this gap by examining investors' perception of issuers especially during the boom period preceding the financial crisis.

Second, issuers – and to a lesser extent, servicers (which are usually the same institution) – have been the predominant focal point of the empirical and theoretical literature while the roles of other parties in the securitisation chain have received very little attention. Certainly, the relationship between issuers and investors was not the sole source of misaligned interests. We foray into this dimension by examining the relationship between investors and trustees, who are appointed as representatives of investors by issuers.

Third, the literature supplies thin evidence that spreads can predict performance, however, there is no evidence on how the link between pricing and performance varied over time. Chapter 6 aims to address this gap by examining the predictive potency of MBS prices, and how this predictive precision varied with investor sophistication and issuance levels. Finally, additional avenues for further research include examining the link between the efficiency of pricing and the business cycle, assessing the influence of industrial and market initiatives such as Prime Collateralised Securitisation and regulatory initiatives like the STS framework on the precision of pricing, and evaluating the costs or benefits of the post-crisis regulation to the securitisation markets.

3.7. Conclusions

Securitisation can be used to release capital for further lending, obtain capital relief and achieve diversification by transferring credit risk. Ideally, this financial innovation should enhance the resilience of the financial system however the literature presents conflicting results on the costs and benefits of securitisation. Theoretical literature largely indicates the negative consequences of securitisation on financial stability. For example, theory predicts that banks are more likely to retain riskier loans while securitising safe assets in order to signal quality to investors. Also, the retention of the first loss piece has been deemed to be a contractual feature that addresses the information problems between issuers and investors. Also, securitisation makes additional risk taking more appealing. Consequently, theoretical literature implies that securitisation yields minimal effective risk transfer.

The empirical literature, however, presents mixed results on the effects of securitisation. This running theme of ambiguity may have emerged because studies tend to narrowly focus on different time periods, homogenous securitised instruments and individual markets. For example, the empirical literature is largely based on the US mortgage market, however, this market is structurally distinct from the European market, therefore, a one-size-fits-all empirical approach may be inappropriate.

A stream of post-crisis literature indicates damning effects of securitisation on bank risk taking behaviour and financial soundness. Evidently, although securitisation increased credit supply, it also reduced the effectiveness of the bank lending channel of monetary policy. Furthermore, lenders relaxed their lending standards and originated poor quality loans which were then securitised and sold to investors. Although a number of papers show that lenders may have securitised their safest assets, the underperformance of securitised assets could either be due to decline in monitoring intensity or unobserved adverse selection where assets meeting favourable observable criteria were securitised although soft information indicators might suggest poor quality.

It is evident that market participants are aware of the information problems associated with securitisation. Market participants tend to address these problems with economic incentive mechanisms such as reputation and risk retention – retaining the riskier loans, retaining the riskiest tranche or recourse governed by relational contracts. In fact, it has been suggested that adverse selection was minimal as issuers mainly securitised to arbitrage regulatory capital while retaining the risks of the securitised assets, mainly through recourse provisions. Also, although the pricing literature is underdeveloped, it is evident that investors were aware of the prevalence of information asymmetry in the securitisation chain and varied their yields depending on the magnitude of the risk retention accordingly. The equity markets, however, react negatively as the announcement of these transactions tends to destroy shareholder value, possibly due to the originators' retained interests in the transaction.

In hindsight, the failure to manage the information frictions in securitisation transactions was a key contributor to the financial crisis. Therefore the efforts of regulators to address these incentive problems for more responsible post-crisis securitisation is a step in the right direction.

Chapter 4. Issuer Reputation in Securitisation Pricing

4.1. Introduction

The international securitisation markets slowed down considerably after the 2007-2009 financial crisis as key investors lost interest after suffering unprecedented losses. Investors have been criticised for being overly reliant on credit ratings to value mortgage-backed securities (MBS) (Mahlmann, 2012). In the pre-crisis period, the extensive incorporation of credit ratings into prudential regulation indirectly created a significant institutional demand for these assets (Benmelech and Dlugosz, 2009) and rating agencies played a central role in the appraisal of MBS.[48] However, the quality of ratings has been questioned due to their failure to accurately assess the risk of these securities (Brennan et al., 2009; Coval et al., 2009a; Coval et al., 2009b).

In this chapter, we examine whether investors looked beyond the informative content of ratings to gauge and mitigate risks of MBS. Investors may have been dependent on credit ratings because the securitisation process is subject to various frictions that complicate the risk assessment of MBS. At the outset, there is the adverse selection problem associated with the lender-borrower relationship. For instance, in the United States (US), borrowers made false declarations in mortgage applications during the pre-crisis period (Jiang et al., 2013; Griffin and Maturana, 2016). Investors also face opportunistic behaviour by banks with regard to relaxed lending standards to fuel further securitisation (Keys et al., 2010; Dell'Ariccia et al., 2012; Nadauld and Sherlund, 2013). Furthermore, originating banks may have less incentive to monitor borrowers post securitisation (Petersen and Rajan, 2002). This is consistent with bank-sponsored asset misreporting, a widespread occurrence within pre-crisis securitisation chains (Piskorski et al., 2015; Griffin and Maturana, 2016).

We hypothesise that investors may have considered the reputation of issuers as a mechanism to reduce information asymmetries when assessing MBS risks. Securitisation follows a repeated game structure, therefore, issuers are mindful of building and maintaining a good reputation, especially if they intend to access the securitisation market over the long-term. Naturally, reputation concerns should mitigate opportunistic bank

[48] Goda et al. (2013) show that the aggregate demand for safe assets significantly surpassed the supply of comparatively traditional (corporate, municipal and treasury) bonds. This trend played an active role in the unrestrained growth of the securitization markets.

behaviour and moral hazard. Therefore, investors may have perceived MBS sold by reputable issuers as less risky.

We identify three main factors that investors may have considered to counteract perceived information asymmetries inherent in securitisation transactions. First, it is argued that issuers shopped for ratings and reported only favourable ones (He et al., 2012). Second, investors may have been wary of the location of the issuer. Foreign banks have an informational disadvantage in comparison to their domestic counterparts due to the distance to the origination market. Literature shows that being geographically distant from borrowers increases bank risks (Berger et al., 2005), decreases bank monitoring competence (Acharya et al., 2002), and creates incentives for making lower quality loans to boost loan growth (DeYoung et al., 2008). Third, investors may have interpreted excessive loan growth preceding securitisation as a signal of potential bank opportunism that may lead to relatively lower quality MBS due to relaxed lending standards and reduced monitoring incentives as shown in the literature (Petersen and Rajan, 2002; Keys et al., 2010; Dell'Ariccia et al., 2012; Nadauld and Sherlund, 2013).

We also investigate how investors perceived the interaction of issuer reputation with possible rating shopping, distance to the origination market and excessive loan growth. Reputation may have had an alleviating effect on possible risks arising from these three factors. In addition, we examine whether the influence of reputable issuers varied during the pre-crisis period when the securitisation markets grew significantly, especially between 2005 and June 2007. Given that structured finance instruments are difficult to price, even during normal periods, the pre-crisis period, characterised by intense information asymmetries made risk assessment more challenging for investors (Leung et al., 2015).

We test our arguments by examining the information content of yield spreads of mortgage backed securities (MBS) at issuance. At the marketing stage, issuers (or underwriters) set a provisional price based on investor sentiment. Investors indicate the price they are willing to pay as well as the corresponding volume. To ensure that the issue is well subscribed to, issuers are very diligent to ensure that the issue is not overpriced (Choudhry, 2013). Recent studies show that investors attempted to incorporate the potential costs of misaligned interests in the primary yields of MBSs by accounting for issuer size, rating bias, creditor protection, collateral, and tranche structure (Fabozzi and Vink, 2012a, b, 2015; He et al., 2012).

We contribute to the securitisation literature in several directions. First, we examine the certification effect of issuer reputation (measured by size) using an international sample from European securitisation market. Previously, He et al. (2012) assessed the impact of large issuers on MBS prices but only for the US market. However, there are significant differences between the US and the European securitisation markets. The growth of the US securitisation market has been progressive and continuous since the early 1970s. On the other hand, the European securitisation market grew rapidly and exponentially in the 2000s after the introduction of the Euro (Altunbas et al., 2009). Furthermore, the advent of securitisation in Europe has been mainly due to private market forces rather than government-sponsored enterprises (GSEs) as seen in the US market. Due to these differences, investors in the European market were probably exposed to higher levels of information asymmetries relative to the US and had limited opportunities to understand these complex instruments better. In such an environment, investors may have relied on certain issuers to mitigate MBS risks. Therefore, it is important to understand what role issuers played and how investors attempt to mitigate risks in securitisation transactions beyond the US market.

We also contribute to the securitisation literature by considering the effect of the distance between the issuer and the origination market on securitisation pricing. This is important because information asymmetry in financial intermediation is exacerbated by bank-borrower distance and domestic banks have a comparative advantage over foreign banks. Domestic banks have geographic-specific knowledge and soft information that makes them better assessors of borrower creditworthiness and the market value of collateral (Hess and Smith, 1988). As the borrower-lender distance increases, lenders increasingly rely on credit scoring based on hard information which leads to lower quality loans (DeYoung et al., 2008) and increases in bank risk (Acharya et al., 2002). For the first time, we examine how investors perceive issuer distance when assessing the risk in MBS.

We further contribute to the literature by studying whether issuer reputation is considered as a mitigating factor for risks arising from possible issuer rating shopping and being distant from the origination market. Another contribution of this chapter is that we investigate whether investors incorporated their perceptions associated with excessive loan growth, possibly linked to relaxed lending standards, in the pricing of securitisation issues.

In the European setting, Fabozzi and Vink (2012a, 2012b) examine the determinants of primary yields of UK residential mortgage backed securities (RMBS) and European ABS. After conditioning on reported ratings, they find that investors considered various factors that were already considered in generating credit ratings. Our study differs from theirs as neither of these papers considers whether investors incorporate factors such as issuer reputation, distance and lending capacity into the pricing decision. Furthermore, we use a larger and relatively more representative sample of 4,201 tranches of residential and commercial mortgage backed securities issued in 14 European countries from 1999 to June 2007.

We find that issuer reputation has a certification value in securitisation especially when investors purchase riskier, difficult to evaluate non-prime MBS. Investors value issuer reputation more when information asymmetries in credit markets intensify. We also find that investors require higher yields if there is an indication of rating shopping. Additionally, MBS originated by subsidiaries of foreign banks are considered to be more risky, due to the perceived value of domestic bank expertise. Excessive loan growth by issuers in the period prior to securitisation is also perceived to be risky, as it signals opportunistic behaviour. However, issuer reputation does not seem to alleviate risk arising from excessive loan growth and issuer distance.

This chapter is structured as follows. The next section reviews the extant literature and section 4.3 describes the data and methodology used. Section 4.4 presents the results, and section 4.5 provides the concluding remarks.

4.2. Literature Review

4.2.1. Opportunistic Issuer Behaviour in Securitisation

It is widely documented that securitisation encouraged banks' opportunism, increased their risk appetite and undermined their screening and monitoring incentives. In the build-up to the financial crisis, securitisation active banks were found to show a sharp decline in lending standards (Mian and Sufi, 2009; Purnanandam, 2011; Dell'Ariccia et al., 2012; Keys et al., 2012; Nadauld and Sherlund, 2013). Banks securitised ex-ante their riskiest loans and securitised loans showed an inferior performance after securitisation (Agarwal et al., 2012; Krainer and Laderman, 2014; Elul, 2015b; Bord and Santos,

2015).[49] Securitisation active banks imposed looser covenants on borrowers at origination, were more likely to grant waivers without changing loan terms (Wang and Xia, 2014) and reduced borrower monitoring after securitisation (Kara et al., 2015). Evidence from the abovementioned studies shows that poor quality ABSs were created primarily because of opportunistic bank behaviour during the pre-crisis credit boom period. From investors' perspective, these perverse incentives are difficult to detect in a highly information asymmetric market. However, one indicator of such behaviour can be a rapid loan portfolio expansion during a period of declining credit standards. Aggressive lending, especially during the credit boom, may have engendered additional adverse selection problems.

Furthermore, banks within the securitisation chain extensively engaged in asset misreporting during the pre-crisis period (Piskorski et al., 2015; Griffin and Maturana, 2016).[50] Originators and underwriters held enough information to confirm that pooled loans were riskier than represented to investors (Griffin and Maturana, 2016) and screening intensity on subprime loan applications decreased as the odds of loan securitisation increased (Keys et al., 2009). Moreover, initial credit ratings failed to account for incomplete disclosures (Piskorski et al., 2015). Despite these tendencies, factors such as reputation and retention may have somewhat remained effective disciplining mechanisms.

Reputation has a certification value in the financial services industry (Fang, 2005; Booth and Smith, 1986; Titman and Trueman, 1986). This is because reputational concerns should motivate intermediaries to avoid misrepresentations in contractual disclosures, mitigate opportunistic bank behaviour and moral hazard to produce high-quality securities in the interest of investors (Chemmanur and Fulghieri, 1994). Issuers, especially prospective long-term players, are mindful of building and preserving a good reputation (Hartman-Glaser, 2011b; Kawai, 2015). In securitisation, issuers' reputation is tied to the quality of the collateral pool; therefore, they should be motivated to ensure the quality of the collateral backing the securities. Evidence shows that during credit booms, when monitoring is difficult to maintain, reputable banks are more likely to continue

[49] On the contrary, a number of recent studies find that securitized corporate loans are no different from non-securitized loans in terms of credit quality (Shivdasani and Wang, 2011; Benmelech et al., 2012; Wang and Xia, 2014; Kara et al., 2015).

[50] For example, in the US misreporting was extensive within the securitization chain, especially by borrowers and vertically integrated intermediaries with levels of misreporting ranging between 10% and 30% in residential mortgage pools (Piskorski et al., 2015; Griffin and Maturana, 2016).

monitoring while less reputable banks are more likely to increase lending at the expense of the monitoring function (Winton and Yerramilli, 2015).

Equity retention is another mechanism used by issuers to mitigate frictions in the securitisation process (Gorton and Pennacchi, 1995). Optimal equity retention is designed to align originators' and investors' interests as originators are incentivised to mitigate default probability (Malekan and Dionne, 2014). Reputational concerns and market discipline should ideally serve as incentives for optimal equity retention. However, evidence shows that retained tranches were usually sold or hedged using credit derivatives (Fender and Mitchell, 2009).

4.2.2. Issuer and Ratings Agency Interaction

The literature on credit ratings underscores a possibility of further misaligned interests as rating agencies are compensated by issuers (Mathis et al., 2009; He et al., 2012; Efing and Hau, 2015). Rating agencies inflated ratings for large and frequent issuers to attract future business (Efing and Hau, 2015). There could also be a systematic bias in disclosed ratings since issuers can shop for ratings (termed "rating shopping") and report only favourable ones (He et al., 2012). This bias is typically aggravated by increasing asset complexity and growing competition amongst rating agencies (Skreta and Veldkamp, 2009).[51] Rating inflation is more likely to occur during booms where mechanistic reliance on ratings is high, and the risk of reputational losses from incorrect ratings are low (Bolton et al., 2012). In the pre-crisis period, investors may have been sceptical about the quality of ratings due to the questionable relationship between rating agencies and issuers. Evidence shows that in the US investors priced the probabilities of rating bias in initial yield spreads of MBSs during the boom period spanning 2004 to 2006. Also, initial spreads on MBS sold by large issuers were much higher than spreads on similarly rated issues by smaller issuers (He et al., 2012).

4.2.3. Distance to the origination market

Foreign firms tend to operate at a disadvantage abroad (termed "liability of foreignness"). Higher costs arise largely due to informational asymmetries about the local economy and discrimination by stakeholders in the host country (Hymer, 1976; Stevens and Shenkar, 2012). Empirical evidence confirms the liability of foreignness hypotheses in the global

[51] This bias intensified with deal complexity, especially during the credit boom, as the high cost of procuring the requisite information for complex transactions may have motivated agencies to simply report inflated ratings.

banking industry and the European Union (Miller and Richards, 2002; Miller and Parkhe, 2002).

Information asymmetry in financial intermediation is exacerbated by bank-borrower distance, where the quality of the borrower creditworthiness signal deteriorates with distance (Hauswald and Marquez, 2006). It is typically assumed that relative to foreign banks, domestic banks have a comparative advantage in the mortgage origination and servicing functions. Thus, domestic banks have geographically specific knowledge and soft information that makes them better assessors of borrower creditworthiness and the market value of collateral (Hess and Smith, 1988). They also tend to incorporate subjective as well as objective information in the credit screening process, thereby providing a more complete profile of borrower quality. These advantages enable them to lend more at higher rates without sustaining significantly higher default rates (Mian, 2003).

In contrast, foreign banks may be restricted to lending based on hard information. This is because costs of collecting and processing geographically specific information, especially soft (private) qualitative information, about borrowers increase with distance (Petersen and Rajan, 2002). As the borrower-lender distance increases, lenders may attempt to circumvent the informational disadvantage by increasing reliance on credit scoring based on hard information. This may result in economies of scale and auxiliary benefits that induce loan growth by making lower quality loans (DeYoung et al., 2008). Evidence shows that loans issued by credit scoring banks are more likely to be riskier (Berger et al., 2005). Moreover, banks expanding into hitherto unserved markets tend to compete at a disadvantage compared with their domestic counterparts. This leads to increase in bank risks and decline in monitoring competence upon expanding into newer and more competitive lending markets (Acharya et al., 2002).

Establishing a subsidiary in a host country may decrease the physical distance to borrowers; however, it increases functional (hierarchical) distance within the bank (De Haas and Van Horen, 2013). The efficient transmission of soft information from local line managers to the headquarters may be complicated in hierarchical banks as senior officials may decide to redirect capital allocations to other projects. Consequently, loan officers are less incentivised to collect private information (Stein, 2002). Thus, banks tend to use more hard than soft information when the functional distance is substantial (Liberti and Mian, 2009).

4.2.4. Information content of yield spreads of MBS

Existing literature shows that the information content of primary yield spreads transcends ratings and show that investors considered other indicators that were already incorporated into credit ratings (Fabozzi and Vink, 2012a, b, 2015). Investors accounted for a variety of other factors such as issuer size, rating bias and creditor protection. The central premise of this strand of literature is that credit rating was not the exclusive driver of investor demand. For instance, Fabozzi and Vink (2015) examined pricing data for tranches of newly issued European RMBS transactions that were rated by all three rating agencies during the pre-crisis era and find that initial funding costs reflected rating risk.[52] Even after conditioning on reported credit ratings, the initial yields on UK RMBS and European ABS issues accounted for the nature of collateral, tranche seniority, and external credit enhancement (Fabozzi and Vink, 2012a, b). Similarly, in the US, initial yield spreads on non-prime tranches of RMBS issued in the pre-crisis period were reliable predictors of future downgrades and defaults (Adelino, 2009).

4.3. Data and Methodology

4.3.1. Data Sources

We collect deal and tranche level data on all European CMBS and RMBS issued between 1999 and June 2007 from Dealogic and Bloomberg. The cut-off date was chosen to preclude the influence of changing attitudes towards structured finance in the latter half of 2007. The key data collected for each deal include pricing date, deal type, asset origin, deal value, collateral type and issuers' identity. Additional tranche level data provided include effective rating, maturity date, and tranche value. The data on weighted average life, constituent credit ratings and the identity of deal trustees were collected from Bloomberg. Issuing banks' financial data is collected from Orbis Bank Focus (formerly Bankscope). The final sample has 4,201 tranches from 730 deals.

4.3.2. Empirical Model

The baseline model for explaining the primary yield spread of tranche *d*, issued by bank *i*, issued at time *t* is specified as follows:

[52] In this context, they define ratings risk as the risk that a tranche was assigned a rating superior to its inherent rating. Thus, concurrently reported S&P and Fitch ratings are not redundant even though both ratings are based on the same approach. Hence, medium grade tranches whose S&P or Fitch ratings are lower than Moody's ratings resulted in significantly higher funding costs. This reflects investors scepticism regarding ratings of non-prime and complex tranches

$$LogSpread_{d,i} = \beta_0 + \beta_1 Top\ Issuer_i + \sum_{d=1}^{D} \beta_d \times CRAs\ Reported_{d,i} + \beta_2 Distance_{i,t} + \beta_3 Retained_{i,t} + \beta_4 \frac{Ratings}{Tranches}_{t,i} + \sum_{h=1}^{H} \beta_h \times Tranche\ Characteristics_{h,i} + \sum_{s=1}^{S-1} \beta_s \times Collateral_{s,i} + \sum_{y=1}^{Y-1} \beta_y \times Year_{y,i} + \sum_{k=1}^{K-1} \beta_k \times Credit\ Rating_{k,i} + \sum_{l=1}^{L-1} \beta_l \times Issuer_{l,i} + \sum_{m=1}^{M-1} \beta_m \times Trustee_{m,i} + \sum_{p=1}^{P-1} \beta_p \times Country_{p,i} + e_{i,d} \quad (1)$$

The dependent and explanatory variables of interest are explained below.

LogSpread represents the natural logarithm of the initial yield spread quoted as a fixed premium in basis points over the relevant benchmark rate (e.g. 3-month LIBOR). The initial spread is a more reliable indicator of the actual offer price and risk premiums demanded by the market at the issuance.[53]

CRA (Credit Rating Agencies) reported is the number of initial ratings reported by credit rating agencies for a tranche and is used to control for rating shopping.[54] Issuers are not required to report all ratings; however, ratings from all three agencies suggest more transparency while ratings from either one or two may indicate suppression of negative ratings. We expect relatively lower spreads on issues rated by the three rating agencies.

Top Issuer accounts for changes in spread due to issuers' market presence and measures reputation. Following the intuition in Fang (2005), we use a binary variable to capture the qualitative difference between large and small issuers. ***Top Issuer*** is a dummy variable that takes the value of 1 if the issuer generated more than 2% in terms of total market volume during this period, and 0 otherwise. There are 12 issuers satisfying this criterion, and they jointly represent 33.78% of the market activity. We do not use a continuous variable (as in He et al. (2012)) because it assumes that reputation has a constant effect on the variables of interest and overestimates the precision of this indicator.

[53] According to (Fabozzi and Vink, 2015), the optionality risk in the price for floating rate tranches is marginal; therefore, the initial spreads reflect surcharges for liquidity risk and credit risk above reference rates. For this reason, we limit our sample to floating rating tranches only. We also exclude tranches that were not issued at par to preclude distortions of discounts or premiums on the actual yield spreads.

[54] He et al. (2012) include the number of initial ratings as well as ratings disagreements in their analyses, however, we find these variables to be highly collinear. More importantly, the influence of ratings disagreements is beyond the scope of this chapter.

Distance is a dummy variable that takes the value 1 if the parent bank is domiciled in a country other than the issuer's country of operation. We expect spreads to be higher on MBS issued by foreign banks.

Retained is a dummy variable indicating deals in which certain tranches of the deal were retained by the originator. Retained tranches are essentially credit enhancement devices to shield investors from the effects of the originator's perverse incentives (Franke et al., 2012). Ideally, equity retention maximises originators' screening effort (Kiff and Kisser, 2014) and minimises information loss (Guo and Wu, 2014).[55]

Ratings/Tranches equals the ratio of the number of uniquely rated tranches in a deal to the number of tranches in a deal. In MBS deals, the number of tranches is driven by information asymmetry (Cuchra and Jenkinson, 2005). The number of unique ratings shows the number of information sensitive categories within a deal. We use this variable to capture deal complexity.

Tranche characteristics include four variables. ***Size,*** the natural logarithm of the tranche value, is used to control for liquidity. Larger tranches can be traded on the secondary market easier than smaller tranches.[56] ***Subordination*** is the value of tranches with an identical or a better rating as a fraction of the total deal value. This is the most common form of credit enhancement, and we use it as a measure of leverage and tranche seniority within a deal. ***Weighted Average Life*** is the natural logarithm of the maturity of the tranche.[57] ***Residential Mortgage*** is a dummy variable that equals to 1 if the security is collateralised by residential mortgages and 0 otherwise.

Credit Rating is coded as a factor variable using the standardised 21 point scale ranging from AAA(1) to C(21) in order to capture as much information conveyed by ratings. We collectively refer to ratings below AAA as non-prime. Credit ratings control for asset and structural risks as well as key third parties to the structure, such as guarantors (Fabozzi and Vink, 2012a). It is expected that yields will be mainly driven by credit ratings. However, rating structured finance issues is a major source of revenue for credit rating

[55] However, Kuncl (2015) show that although retention aligns originator and investor interests, the efficiency of this device is limited especially during economic booms.

[56] Smaller deals have fewer tranches and Cuchra and Jenkinson (2005) attribute this to issuers' goal of fostering liquidity on the secondary market. However, Schaber (2008) argues that this trend is due to the cost inefficiency associated with marketing and research efforts by originators and investors respectively.

[57] Cuchra (2005) argues that nominal maturity is less meaningful for securitization issues because weighted average life incorporates essential modelling factors such as prepayment assumptions, step up structures, embedded options and expected repayment speed of the underlying assets.

agencies, and their compensation framework has raised questions about their independence. Hence, although ratings somewhat cover asset and structural risks, investors may have factored this conflict of interest by incorporating a premium in primary yields while using credit ratings as a foundation for their risk assessment.

We use a fixed effects model to estimate the coefficients as the model is susceptible to an omitted variable bias. We use ***issuer*** and ***trustee*** fixed effects to capture the fixed component of the error term. The entity dummy variables capture the effect of omitted variables that are issuer or trustee specific and are time invariant. Controlling for unobserved heterogeneity allows us to directly estimate the impact of reputation on yield spreads. We also include ***year*** and ***country*** fixed effects in all specifications to capture prevailing macroeconomic conditions and geographically induced variations respectively.

Our model exploits cross-sectional and within-entity time variation. It is unlikely that tranches within a specific deal are independent of each other; for instance, the ratings on multiple tranches tend to be modified around the same time (Adelino, 2009). Therefore the reported standard errors are clustered at the deal level to mitigate correlation of errors within cross-sectional clusters (Cuchra, 2005).

4.3.3. Interacting *Reputation*

We also interact issuer reputation (***Top Issuer***) with ***CRA reported,*** and ***Distance*** to examine whether reputation has an influence on rating shopping behaviour or if the issuer is a foreign bank. ***Top Issuer*** $\times$ ***CRA reported*** captures whether being a reputable issuer lessens the impact of possible rating shopping. Similarly, ***Top Issuer*** $\times$ ***Distance*** captures whether reputation reduces the information asymmetries that arise from a reputable issuer being distant from the origination market. We also examine whether the influence of reputable issuer varied during the pre-crisis period when the securitisation markets grew significantly. We use ***Boom***, a dummy variable that takes a value of 1 if a deal is issued in the years from 2005 to June 2007 and 0 otherwise, to capture this period.

4.3.4. Incorporating Loan Growth into the Model

After running our baseline analysis, we factor issuer loan portfolio growth prior to the year of securitisation into subsequent specifications to ascertain whether primary yields capture possible issuer opportunistic behaviour and moral hazard. Foos et al. (2010) find that historical rapid loan growth eventually increases subsequent loan losses. Similarly, Carbo-Valverde et al. (2012) present Spanish evidence in support of the negative

relationship between loan growth and performance. Portfolio loan performance, in turn, influences the performance of MBS. Therefore, we expect that investors demand higher spreads when collateral is sourced from rapidly expanding loan portfolios. ***Growth of gross loans*** is used to proxy for the pace of loan portfolio growth. We calculate this variable for each issuer as follows:

$$Growth\ of\ gross\ loans_{t-1} = \frac{Gross\ loans_{t-1} - Gross\ loans_{t-2}}{Gross\ loans_{t-2}} \quad (2)$$

We do not employ ***Growth of gross loans*** together with ***Top Issuer*** in our models due to endogeneity issues. Due to this endogenous relationship, it is difficult to distinguish the effect of each of these variables on yield spreads. Prior to the rise of securitisation, loan supply was highly dependent on liquid deposit funding. However the ability to transform illiquid assets to liquid securities augmented loanable funds in the banking sector, and more importantly, securitisation largely insulates credit supply to cost of funds shocks (Loutskina and Strahan, 2009; Loutskina, 2011). This mechanism creates a loop where the loan book expands to maintain the securitisation momentum which in turn creates additional funds to further increase banks' lending ability (Altunbas et al., 2009).[58] After the competition for prime borrowers becomes saturated, lenders are more inclined to loosen their lending standards to attract relatively lower quality borrowers (Shin, 2009).

We run the following model to establish the relationship between ***Growth of gross loans*** and ***LogSpread***:

$$\begin{aligned} LogSpread_{d,i} = {} & \beta_0 + \beta_1 Growth\ of\ Gross\ Loans_{\ i,t-1} + \sum_{d=1}^{D} \beta_d \times CRAs\ Reported_{d,i} + \\ & \beta_2 Distance_{\ i} + \beta_3 Retained_{\ i,t} + \beta_4 Ratings/Tranches_{\ t,i} + \sum_{h=1}^{H} \beta_h \times \\ & Tranche\ Characteristics_{h,i} + \sum_{s=1}^{S-1} \beta_s \times Collateral_{s,i} + \sum_{y=1}^{Y-1} \beta_y \times Year_{y,i} + \\ & \sum_{k=1}^{K-1} \beta_k \times Credit\ Rating_{k,i} + \sum_{l=1}^{L-1} \beta_l \times Issuer_{l,i} + \sum_{m=1}^{M-1} \beta_m \times Trustee_{m,i} + \\ & \sum_{p=1}^{P-1} \beta_p \times Country_{p,i} + e_{d,i} \end{aligned} \quad (3)$$

We first run the model for the whole sample. Subsequently, we divide the tranches into two groups: those issued by a ***Top Issuer*** versus tranches issued by other issuers, and run the model for each subsample.

4.3.5. Descriptive statistics

We present the sample characteristics statistics in Table 4-1. Panel A Shows the

[58] Altunbas et al. (2009) and Perera et al. (2014) provide international evidence indicating that securitisation shields banks' lending capacity from the effects of monetary policy, thereby reducing the efficacy of the bank lending channel.

distribution of the sample according to rating categories and underlying collateral. The collaterals within the data are split into residential (RMBS, 81.81%) and commercial (CMBS, 18.19%) categories. Based on the composite rating, the sample comprises 1,568 (37.32%) prime tranches and 2,633 (62.68%) non-prime tranches. Panel B shows that a large number of tranches receive multiple ratings (51.06% and 42.80% for 3 and 2 ratings, respectively) while only 6.14% of tranches is rated by one agency. Panel C shows the top 12 issuers based on the number of deals.

In Table 4-2 we categorise the tranches according to rating category and country of collateral (country of risk). More than half (54.80%) of all tranches are based on collateral originated in the UK, followed by Spain (13.12%) and Netherlands (8.97%). These three countries account for 76.89% of the tranches in our sample.

Table 4-1 Sample characteristics

Panel A: Tranche distribution by rating categories and underlying collateral

Collateral	Prime	Non-Prime	Total	Percentage
Commercial mortgages	219	545	764	18.19%
Residential mortgages	1,349	2,088	3437	81.81%
Total	1,568	2,633	4,201	100%
Percentage	37.32%	62.68%		

Panel B: Tranche distribution by Number of Ratings Secured

No. of Ratings	RMBS	CMBS	Total	Percentage
1	218	40	258	6.14%
2	1,277	521	1,798	42.80%
3	1,942	203	2,145	51.06%
Total	3,437	764	4,201	100.00%

Panel C: Top issuing banks

Issuing Banks	%
Lehman Brothers Holdings Inc.	4.90%
Ally Financial Inc.	4.39%
Morgan Stanley	3.37%
Barclays Bank Plc	2.96%
Royal Bank of Scotland Group Plc	2.76%
NRAM PLC	2.55%
Kensington Group Plc	2.35%
Credit Suisse AG	2.24%
Commerzbank AG	2.14%
Banco Santander SA	2.04%
Deutsche Bank AG	2.04%
HBOS Plc	2.04%
	33.78%

Table 4-2 Country of risk

	RMBS			CMBS			All Issues	
Country of Risk	Prime	Non-Prime	Total	Prime	Non-Prime	Total	Frequency	Percentage
United Kingdom	757	1092	1849	132	321	453	2,302	54.80%
Spain	213	332	545	2	4	6	551	13.12%
Netherlands	118	250	368	2	7	9	377	8.97%
Germany	48	109	157	54	139	193	350	8.33%
Italy	122	154	276	15	31	46	322	7.66%
Portugal	24	57	81			0	81	1.93%
Ireland	37	34	71	1	3	4	75	1.79%
France	11	9	20	12	34	46	66	1.57%
Greece	8	17	25			0	25	0.60%
Sweden	5	9	14	1	6	7	21	0.50%
Belgium	5	13	18			0	18	0.43%
Russia		9	9			0	9	0.21%
Switzerland	1	1	2			0	2	0.05%
Ukraine		2	2			0	2	0.05%
Total	1349	2088	3437	219	545	764	4,201	100%
Percentage			81.81%			18.19%		100%

Table 4-3 Descriptive statistics

Variable	Type	N	Mean	Median	Std. Dev	p75
Spread (basis points)	RMBS	3,437	62.55	30.00	87.86	65.00
	CMBS	764	82.46	48.00	99.76	86.00
	Total	4,201	66.18	34.00	90.46	72.00
Weighted Average Life (years)	RMBS	3,437	5.33	4.99	3.21	6.90
	CMBS	764	5.99	6.00	1.86	7.00
	Total	4,201	5.45	5.07	3.02	6.95
Credit Rating	RMBS	3,437	4.68	3.00	3.89	9.00
	CMBS	764	4.95	4.00	3.68	9.00
	Total	4,201	4.73	3.00	3.86	9.00
Number of Ratings	RMBS	3,437	4.00	4.00	1.27	5.00
	CMBS	764	5.19	5.00	1.33	6.00
	Total	4,201	4.21	4.00	1.36	5.00
Number of Tranches	RMBS	3,437	9.29	7.00	5.85	14.00
	CMBS	764	6.64	6.00	2.20	8.00
	Total	4,201	8.81	7.00	5.47	13.00
Ratings/Tranches	RMBS	3,437	0.59	0.60	0.30	0.83
	CMBS	764	0.79	0.80	0.17	1.00
	Total	4,201	0.62	0.67	0.29	0.83

Variable	Type	N	Mean	Median	Std. Dev	p75
Subordination	RMBS	3,437	0.06	0.05	0.08	0.09
	CMBS	764	0.16	0.13	0.15	0.23
	Total	4,201	0.08	0.05	0.10	0.10
Tranche Value (€ million)	RMBS	3,437	243.80	45.62	479.00	255.00
	CMBS	764	135.60	53.07	202.30	135.30
	Total	4,201	224.10	47.50	443.70	227.40
Deal Value (€ million)	RMBS	3,437	2,166.00	1,109.00	2,392.00	2,631.00
	CMBS	764	767.80	661.50	439.80	969.60
	Total	4,201	1,912.00	1,005.00	2,238.00	2,000.00
Growth of gross loans	RMBS	1,450	0.26	0.25	0.79	0.37
	CMBS	475	0.28	0.21	0.42	0.47
	Total	1,925	0.26	0.24	0.72	0.38
Distance	RMBS	3,437	0.28	-	0.45	1.00
	CMBS	764	0.63	1.00	0.48	1.00
	Total	4,201	0.35	-	0.48	1.00

In Table 4-3 we present the descriptive statistics for the aggregate sample. The mean spread is 66.18 basis points (bps) for the full sample compared to 62.55 bps for RMBSs and 82.46 bps for CMBSs. RMBS deals, averaging approximately €2.17bn, are almost three times the size of an average CMBS deal (€767.80m). Similarly, RMBS tranches are 1.80 times larger than CMBS tranches suggesting that RMBS issues contain relatively more tranches per deal. RMBS deals have an average of 9.29 tranches per deal and at least 4 distinct rating categories while CMBS deals typically contain 6.64 tranches with 5.19 unique rating groups. The median rating for the whole sample is AA− (4.73), and AAA tranches constitute 37.32% of our sample.

4.4. Regression Results

We estimate the models progressively. First, we present the results for the full MBS sample. Subsequently, we provide estimations for the RMBS sample to test the robustness of our results with a uniform sample. We then split the sample into two groups according to risk categories – prime (AAA) tranches and non-prime (non-AAA) tranches, to examine whether reputational effects differ depending on the level of risk taken by the investors.

4.4.1. MBS Sample

We present the results for the full MBS sample in Table 4-4. Estimations for the baseline model are shown in column 1, and we include the interaction variables (***Top Issuer* × *CRA reported***, ***Top Issuer* × *Distance*** and ***Top Issuer* × *Boom***) separately in columns 2 to 4.

We find that the coefficient of ***Top Issuer*** is negative and statistically significant at 1% level in all models. MBS from reputable issuers carry lower spreads as investors evaluate these notes as relatively less risky. This result shows that the certification value of reputation is relevant in securitisation pricing. Investors consider that reputation concerns of issuers should mitigate opportunistic behaviour.

Coefficients for the number of ***CRA reported*** are positive and highly statistically significant in columns 1 and 2. The coefficients of ***1*** and ***2 CRA reported*** are 0.1400 and 0.0867, respectively (***3 CRA reported*** being the base category). These results show that MBS tranches were priced higher when only one or two credit ratings were reported in comparison to tranches where credit ratings from all three rating agencies are reported. Results also confirm that tranches with only one credit rating reported are perceived to be riskier than tranches with two credit ratings.

Table 4-4 The impact of issuer reputation on initial yield spreads of MBS tranches

This table reports OLS regressions of the logarithm of initial yield spread (logspread) of European MBS tranches on issuer reputation, deal, collateral and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Top Issuer is a dummy variable that takes the value of 1 if the issuer is one of the top thirteen issuers in terms of total market volume during this period, and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. CRA reported is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in Euros. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the collateral is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the issuance periods annually. The omitted categories are tranches rated by 3 agencies, commercial mortgage backed notes, and tranches issued in 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
Top Issuer	-0.3871***	(0.1442)	-0.3836***	(0.1445)	-0.3909***	(0.1418)	-0.3714***	(0.1438)
1 CRA reported	0.1400***	(0.0396)	0.1411***	(0.0395)				
2 CRA reported	0.0867***	(0.0195)	0.0828***	(0.0195)				
3 CRA reported					-0.0072	(0.0274)	-0.0900***	(0.0194)
Distance	0.0775*	(0.0418)	0.0788*	(0.0419)	0.0760*	(0.0404)	0.1510**	(0.0731)
Top Issuer x Boom			-0.0571*	(0.0325)				
Top Issuer x 3 CRA reported					-0.1436***	(0.0367)		
Top Issuer x Distance							-0.1321	(0.1067)
Retained	0.0115	(0.0202)	0.0088	(0.0200)	0.0122	(0.0200)	0.0137	(0.0204)
Ratings/Tranches	0.0632	(0.0527)	0.0670	(0.0526)	0.0472	(0.0507)	0.0547	(0.0519)
Subordination	0.1860**	(0.0789)	0.1929**	(0.0791)	0.1859**	(0.0802)	0.1868**	(0.0785)
Weighted Average Life	0.2828***	(0.0129)	0.2825***	(0.0129)	0.2827***	(0.0129)	0.2828***	(0.0129)
Size	0.0034	(0.0055)	0.0032	(0.0055)	0.0028	(0.0054)	0.0041	(0.0054)

	(1)		(2)		(3)		(4)	
Residential Mortgages	-0.1731***	(0.0481)	-0.1722***	(0.0480)	-0.1596***	(0.0468)	-0.1769***	(0.0482)
Years								
2000	-0.0449	(0.0630)	-0.0487	(0.0618)	-0.0426	(0.0571)	-0.0401	(0.0632)
2001	-0.0423	(0.0593)	-0.0456	(0.0586)	-0.0366	(0.0542)	-0.0379	(0.0595)
2002	-0.0868	(0.0625)	-0.0914	(0.0616)	-0.0811	(0.0572)	-0.0805	(0.0626)
2003	0.0389	(0.0587)	0.0341	(0.0579)	0.0372	(0.0535)	0.0383	(0.0589)
2004	-0.4389***	(0.0601)	-0.4447***	(0.0592)	-0.4377***	(0.0550)	-0.4381***	(0.0605)
2005	-0.7641***	(0.0582)	-0.7365***	(0.0597)	-0.7566***	(0.0528)	-0.7617***	(0.0585)
2006	-0.8292***	(0.0586)	-0.8010***	(0.0603)	-0.8274***	(0.0534)	-0.8310***	(0.0589)
2007	-0.8472***	(0.0623)	-0.8197***	(0.0640)	-0.8489***	(0.0570)	-0.8490***	(0.0630)
Controlled for								
Tranche credit rating	Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes	
N	4201		4201		4201		4159	
Adjusted R^2	0.937		0.938		0.938		0.937	

These results are in-line with evidence provided by He et al., (2012) in support of the rating shopping hypothesis where issuers that select and report only favourable credit ratings while suppressing unfavourable ratings are deemed to be riskier. We do not find a significant coefficient for ***3 CRA reported*** in columns 3 possibly due to employing the interaction variable ***Top Issuer* × *CRA reported*** in that model. ***3 CRA reported*** is significant and has a negative sign in column 4 as expected. It is worth noting that one limitation of our analysis is that reporting ratings from two agencies does not necessarily mean that the unfavourable ratings from a third agency have been suppressed.

Distance is statistically significant at 10% level and has a positive sign. MBS issued by foreign banks carry a higher spread when compared to issuances by domestic banks. Therefore, investors consider MBS issued by foreign banks to be riskier. They value local issuer expertise, where it is expected that domestic banks would be more specialised due to their familiarity with the local market. Thus, domestic banks are more likely to detect borrower misrepresentation and, therefore, extend safer loans. MBS originated by foreign banks are deemed to be relatively less creditworthy possibly due to information asymmetries created by bank-borrower distance.

In columns 2 to 4, we interact ***Top Issuer*** with ***Boom***, ***3 CRA reported*** and ***Distance***, respectively. ***Top Issuer* × *Boom*** is significant at 10% level and has a negative sign (column 2). MBS sold by reputable issuers during the credit boom period (2005 – June 2007) in the run up to the financial crisis were regarded relatively less risky compared to MBS sold by other issuers. This indicates that investors perceived reputable issuers to be more reliable and trustworthy originators of high quality MBS during the progressive phase of the expansionary period when information asymmetries in the markets increased. Assuming securitisation follows a repeated game structure, frequent issuers are more likely to be concerned about improving their reputation as competition for market share increases during the expansion of the credit cycle. Consequently, they are likely to be more diligent at the credit underwriting stage during these periods. Reputable issuers are also more likely to provide effective monitoring in an intensely competitive environment while smaller issuers would be more concerned with maintaining or increasing market share (Winton and Yerramilli, 2015).

We also find a negative and highly significant coefficient for ***Top Issuer* × *3 CRA reported***. MBS tranches where a reputable issuer reports ratings from three credit agencies are regarded as less risky. This shows that the combination of issuer reputation

with a clear indication of transparency by reporting three ratings is valued highly by investors. We do not find ***Top Issuer*** × ***Distance*** to be significant. It seems issuer reputation does not have a mitigating effect on the information asymmetries caused by distance to the origination market.

Retained is not significant in any of the specifications. Retention as an alignment device seems to have lost its importance since it does not affect issuers' borrowing costs. This result may also reflect that investors cannot rely on this indicator as retained tranches could be sold afterwards by the issuer. ***Ratings/Tranches*** is not significant in any of the models while ***Subordination*** is significant in all of the models. It seems that credit ratings do not completely capture the leverage effects within deals and subordination signals generally higher risk deals. ***Weighted Average Life*** is a key determinant of initial spreads as this variable is significant and consistently positive in all specifications in Table 4-4. This finding is consistent with Cuchra (2005) where initial launch spreads were persistently positively related to effective maturity. Liquidity, proxied by ***Size,*** is not significant in any of the models. With regards to collateral, spreads on RMBS notes were lower than initial funding costs associated with CMBS notes. This is because commercial mortgages are larger, less regulated and attract more risk weighting. There is comparatively less competition in the commercial mortgage market hence the prices of these mortgages are higher compared with the prices of residential mortgages.

One significant observation on yield spreads in Table 4-4 is the behaviour of the ***Year*** coefficients over time. Compared to 1999 levels, yields declined aggressively during the credit boom in the pre-crisis period of 2004 to 2007. This implies that the complex nature of structured finance issuances was largely underpriced in the run up to the financial crisis. We also observed that the decline in spreads coincided with an acceleration in the activity level in the securitisation market.

4.4.2. RMBS Sample

RMBS constitutes 81.8% of our sample. We run estimations on the RMBS subsample as it is more homogenous and can help to check the robustness of our reported results for the whole sample. The results are presented in Table 4-5. On the one hand, we find that almost all of the relationships established above for our main variables are consistent in the RMBS sample. In addition, for most of the exogenous variables, we report larger coefficients. We still find that issuer reputation leads to lower spreads and the possibility of rating shopping is deemed risky by investors. The statistical significance of the

Distance variable gets stronger. This is unsurprising as residential mortgage lending requires more local presence and expertise by the lenders and, as the literature argues, foreign banks may be perceived to be at a disadvantage relative to local banks. The direction of the signs and significance of the interaction variables –***Top Issuer*** × ***Boom***, ***Top Issuer*** × ***3 CRA reported*** and ***Top Issuer*** × ***Distance***– do not change. On the other hand, there are some differences in the results from the RMBS sample. We find that ***Retained*** is significant with a positive sign. This shows that retention of tranches by the issuer does not reduce the perception of risk by investors but rather signals the riskiness of the tranches. ***Subordination*** is not significant in the RMBS subsample. We also find that larger RMBS tranches carry higher spreads.

4.4.3. Prime versus Non-Prime Tranches

We split the sample into two groups according to risk categories – prime (AAA) tranches and non-prime (non-AAA) tranches – to examine whether reputational effects differ depending on investors' risk preference. Results for the prime sample are presented in Table 4-6. Broadly, we find different results for the AAA tranches, which are deemed to be least risky. Our main variables ***Top Issuer*** and ***Distance*** are not significant. Regarding the rating shopping argument, only ***1 CRA rating*** is significant at 10% level. ***2 CRA rating*** and ***3 CRA rating*** (in column 4) are not significant. We also do not find any significance for ***Top Issuer*** × ***Boom***. We still find ***Top Issuer*** × ***3 CRA reported*** to be significant and negatively related to spread. This confirms that MBS tranches – including prime ones, with three reported ratings from a reputable issuer, are regarded as the safest. Furthermore, estimations for the prime RMBS subsample are presented in Table 4-7. We find that the coefficient of Top Issuer is not significant. Similar to the results from the prime MBS sample above, ***1 CRA rating*** is significant, albeit at a stronger level of 1%. Even for the notes of the highest quality, the possibility of issuer rating shopping is regarded as relatively risky by investors. However, this is only evident when a single credit rating is reported. For the RMBS sample, we find ***Distance*** to be significant and still positively related to the spread. This supports our earlier interpretation that domestic banks are at an advantage in residential mortgage lending due to their local knowledge. In Table 4-6 and Table 4-7, we observe that variables capturing tranche characteristics are the main determinants in the AAA subsample. In particular, we find that ***Size*** is now statistically significant and has a negative sign. This shows that investors in prime securities require lower liquidity premiums as the AAA stamp is regarded as a sign of quality.

Table 4-5 The impact of issuer reputation on initial yield spreads of RMBS tranches

This table reports OLS regressions of the logarithm of initial yield spread (logspread) of European RMBS tranches on issuer reputation, deal and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Top Issuer is a dummy variable that takes the value of 1 if the issuer is one of the top thirteen issuers in terms of total market volume during this period, and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. CRA reported is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in Euros. Rating dummy variables indicate initial effective tranche credit rating. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the collateral is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the issuance periods annually. The omitted categories are tranches rated by 3 agencies, and tranches issued in 1999. Standard errors in parentheses are clustered at the deal level. ∗∗∗, ∗∗, and ∗ represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
Top Issuer	-0.4253**	(0.1722)	-0.4499***	(0.1726)	-0.4213**	(0.1694)	-0.3668**	(0.1740)
1 CRA reported	0.0784*	(0.0419)	0.0779*	(0.0415)				
2 CRA reported	0.1053***	(0.0210)	0.0976***	(0.0209)				
3 CRA reported					-0.0359	(0.0277)	-0.1023***	(0.0211)
Distance	0.1387**	(0.0577)	0.1524***	(0.0579)	0.1290**	(0.0551)	-0.0392	(0.1315)
Top Issuer x Boom			-0.0666**	(0.0337)				
Top Issuer x 3 CRA reported					-0.1338***	(0.0394)		
Top Issuer x Distance							0.2783	(0.1712)
Retained	0.0465**	(0.0191)	0.0415**	(0.0191)	0.0535***	(0.0191)	0.0435**	(0.0190)
Ratings/Tranches	0.0326	(0.0534)	0.0389	(0.0531)	0.0376	(0.0528)	0.0382	(0.0538)
Subordination	-0.0689	(0.1109)	-0.0507	(0.1116)	-0.0717	(0.1098)	-0.0622	(0.1109)
Weighted Average Life	0.2842***	(0.0124)	0.2839***	(0.0124)	0.2847***	(0.0124)	0.2847***	(0.0124)
Size	0.0107**	(0.0054)	0.0107**	(0.0054)	0.0095*	(0.0053)	0.0108**	(0.0054)

	(1)		(2)		(3)		(4)	
Years								
2000	-0.0637	(0.0603)	-0.0669	(0.0594)	-0.0674	(0.0565)	-0.0638	(0.0592)
2001	-0.0589	(0.0559)	-0.0621	(0.0554)	-0.0559	(0.0532)	-0.0632	(0.0548)
2002	-0.1184**	(0.0588)	-0.1241**	(0.0583)	-0.1161**	(0.0558)	-0.1207**	(0.0576)
2003	0.0249	(0.0555)	0.0189	(0.0551)	0.0253	(0.0527)	0.0239	(0.0547)
2004	-0.4706***	(0.0572)	-0.4779***	(0.0569)	-0.4682***	(0.0543)	-0.4725***	(0.0561)
2005	-0.8211***	(0.0545)	-0.7917***	(0.0556)	-0.8118***	(0.0514)	-0.8224***	(0.0536)
2006	-0.9026***	(0.0548)	-0.8729***	(0.0562)	-0.8932***	(0.0518)	-0.9043***	(0.0539)
2007	-0.9454***	(0.0571)	-0.9158***	(0.0591)	-0.9388***	(0.0544)	-0.9469***	(0.0563)
Controlled for								
Tranche credit rating	Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes	
N	3437		3437		3437		3437	
Adjusted R^2	0.947		0.947		0.948		0.947	

Table 4-6 The impact of issuer reputation on initial yield spreads of prime MBS tranches

This table reports OLS regressions of the logarithm of initial yield spread (logspread) of prime European MBS tranches on issuer reputation, deal, collateral and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Top Issuer is a dummy variable that takes the value of 1 if the issuer is one of the top thirteen issuers in terms of total market volume during this period, and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. CRA reported is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in Euros. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the collateral is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the issuance periods annually. The omitted categories are tranches rated by 3 agencies, commercial mortgage backed notes, and tranches issued in 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
Top Issuer	0.0437	(0.1801)	0.0395	(0.1820)	-0.0347	(0.1948)	-0.0297	(0.1949)
1 CRA reported	0.1333*	(0.0747)	0.1321*	(0.0748)				
2 CRA reported	0.0429	(0.0266)	0.0394	(0.0269)				
3 CRA reported					0.0408	(0.0359)	-0.0284	(0.0284)
Distance	0.0594	(0.0525)	0.0601	(0.0526)	0.0531	(0.0523)	0.1098	(0.0896)
Top Issuer x Boom			-0.0465	(0.0355)				
Top Issuer x 3 CRA reported					-0.1232**	(0.0516)		
Top Issuer x Distance							-0.0856	(0.1402)
Retained	0.0374	(0.0245)	0.0352	(0.0242)	0.0490*	(0.0257)	0.0481*	(0.0253)
Ratings/Tranches	0.1586***	(0.0546)	0.1633***	(0.0547)	0.1686***	(0.0569)	0.1740***	(0.0571)
Subordination	0.0939	(0.1073)	0.1036	(0.1078)	0.1108	(0.1040)	0.1154	(0.1037)
Weighted Average Life	0.4017***	(0.0140)	0.4018***	(0.0140)	0.4007***	(0.0139)	0.4001***	(0.0139)
Size	-0.0253***	(0.0071)	-0.0258***	(0.0072)	-0.0248***	(0.0072)	-0.0246***	(0.0073)

	(1)		(2)		(3)		(4)	
Residential Mortgages	-0.2168***	(0.0569)	-0.2140***	(0.0570)	-0.1973***	(0.0559)	-0.2100***	(0.0571)
Years								
2000	0.0053	(0.0681)	0.0009	(0.0676)	-0.0418	(0.0573)	-0.0313	(0.0627)
2001	-0.0489	(0.0667)	-0.0538	(0.0664)	-0.0826	(0.0563)	-0.0773	(0.0610)
2002	-0.0723	(0.0673)	-0.0780	(0.0669)	-0.1094*	(0.0573)	-0.1027*	(0.0620)
2003	0.0361	(0.0663)	0.0305	(0.0662)	0.0016	(0.0563)	0.0096	(0.0611)
2004	-0.4589***	(0.0669)	-0.4653***	(0.0665)	-0.4951***	(0.0570)	-0.4910***	(0.0618)
2005	-0.7326***	(0.0655)	-0.7103***	(0.0673)	-0.7604***	(0.0556)	-0.7587***	(0.0605)
2006	-0.8805***	(0.0661)	-0.8588***	(0.0680)	-0.9100***	(0.0570)	-0.9071***	(0.0614)
2007	-0.8859***	(0.0691)	-0.8653***	(0.0710)	-0.9237***	(0.0598)	-0.9157***	(0.0646)
Controlled for								
Tranche credit rating	Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes	
N	1568		1568		1568		1568	
Adjusted R^2	0.855		0.855		0.854		0.852	

Table 4-7 The impact of issuer reputation on initial yield spreads of prime RMBS tranches

This table reports OLS regressions of the logarithm of initial yield spread (logspread) of prime European RMBS tranches on issuer reputation, deal and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Top Issuer is a dummy variable that takes the value of 1 if the issuer is one of the top thirteen issuers in terms of total market volume during this period, and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. CRA reported is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in Euros. Rating dummy variables indicate initial effective tranche credit rating. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the collateral is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the issuance periods annually. The omitted categories are tranches rated by 3 agencies, and tranches issued in 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
Top Issuer	-0.0858	(0.2152)	-0.1173	(0.2173)	-0.1961	(0.2499)	-0.1114	(0.2280)
1 CRA reported	0.2334***	(0.0640)	0.2333***	(0.0637)				
2 CRA reported	0.0154	(0.0312)	0.0067	(0.0318)				
3 CRA reported					0.0406	(0.0384)	0.0088	(0.0339)
Distance	0.1307*	(0.0720)	0.1405**	(0.0715)	0.1292*	(0.0760)	-0.2420	(0.1483)
Top Issuer x Boom			-0.0717*	(0.0387)				
Top Issuer x 3 CRA reported					-0.0730	(0.0622)		
Top Issuer x Distance							0.0436	(0.0523)
Retained	0.0543**	(0.0262)	0.0500**	(0.0254)	0.0733***	(0.0282)	0.0618**	(0.0270)
Ratings/Tranches	0.1345**	(0.0586)	0.1450**	(0.0586)	0.1670***	(0.0623)	0.1778***	(0.0631)
Subordination	0.2867**	(0.1159)	0.3116***	(0.1160)	0.3120***	(0.1158)	0.3195***	(0.1158)
Weighted Average Life	0.4150***	(0.0138)	0.4152***	(0.0138)	0.4133***	(0.0139)	0.4147***	(0.0139)
Size	-0.0208***	(0.0074)	-0.0214***	(0.0074)	-0.0215***	(0.0074)	-0.0217***	(0.0074)

	(1)		(2)		(3)		(4)	
Years								
2000	-0.0378	(0.0571)	-0.0442	(0.0560)	-0.0825*	(0.0496)	-0.0732	(0.0492)
2001	-0.1136**	(0.0565)	-0.1205**	(0.0557)	-0.1422***	(0.0493)	-0.1431***	(0.0488)
2002	-0.1163**	(0.0570)	-0.1249**	(0.0563)	-0.1495***	(0.0497)	-0.1446***	(0.0492)
2003	-0.0189	(0.0569)	-0.0278	(0.0563)	-0.0409	(0.0504)	-0.0359	(0.0503)
2004	-0.5131***	(0.0573)	-0.5234***	(0.0566)	-0.5399***	(0.0509)	-0.5374***	(0.0504)
2005	-0.7984***	(0.0571)	-0.7660***	(0.0580)	-0.8190***	(0.0508)	-0.8165***	(0.0504)
2006	-0.9701***	(0.0569)	-0.9391***	(0.0584)	-0.9861***	(0.0513)	-0.9860***	(0.0506)
2007	-0.9993***	(0.0585)	-0.9693***	(0.0605)	-1.0192***	(0.0537)	-1.0153***	(0.0530)
Controlled for								
Tranche credit rating	Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes	
N	1349		1349		1349		1349	
Adjusted R^2	0.876		0.877		0.872		0.872	

Table 4-8 The impact of issuer reputation on initial yield spreads of non-prime MBS tranches

This table reports OLS regressions of the logarithm of initial yield spread (logspread) of non-prime European MBS tranches on issuer reputation, deal, collateral and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Top Issuer is a dummy variable that takes the value of 1 if the issuer is one of the top thirteen issuers in terms of total market volume during this period, and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. CRA reported is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in Euros. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the collateral is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the issuance periods annually. The omitted categories are tranches rated by 3 agencies, commercial mortgage backed notes, and tranches issued in 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
Top Issuer	-0.3649**	(0.1581)	-0.3524**	(0.1582)	-0.3711**	(0.1564)	-0.3506**	(0.1582)
1 CRA reported	0.1965***	(0.0404)	0.1975***	(0.0403)				
2 CRA reported	0.0791***	(0.0212)	0.0728***	(0.0212)				
3 CRA reported					-0.0021	(0.0273)	-0.0855***	(0.0211)
Distance	0.0881*	(0.0457)	0.0909**	(0.0462)	0.0927**	(0.0443)	0.1429*	(0.0796)
Top Issuer x Boom			-0.0864**	(0.0372)				
Top Issuer x 3 CRA reported					-0.1444***	(0.0390)		
Top Issuer x Distance							-0.0933	(0.1155)
Retained	0.0068	(0.0220)	0.0032	(0.0222)	0.0094	(0.0218)	0.0097	(0.0222)
Ratings/Tranches	0.0181	(0.0617)	0.0206	(0.0611)	-0.0051	(0.0584)	0.0067	(0.0605)
Subordination	0.5396***	(0.1312)	0.5480***	(0.1307)	0.5367***	(0.1329)	0.5248***	(0.1339)
Weighted Average Life	0.1458***	(0.0248)	0.1439***	(0.0249)	0.1418***	(0.0246)	0.1434***	(0.0248)
Size	0.0028	(0.0097)	0.0020	(0.0097)	0.0002	(0.0095)	0.0030	(0.0098)

	(1)		(2)		(3)		(4)	
Residential Mortgages	-0.1341**	(0.0526)	-0.1347**	(0.0525)	-0.1263**	(0.0505)	-0.1430***	(0.0525)
Years								
2000	-0.0618	(0.0704)	-0.0656	(0.0669)	-0.0460	(0.0651)	-0.0487	(0.0696)
2001	-0.0335	(0.0676)	-0.0352	(0.0650)	-0.0163	(0.0631)	-0.0213	(0.0671)
2002	-0.0907	(0.0710)	-0.0949	(0.0682)	-0.0731	(0.0660)	-0.0769	(0.0703)
2003	0.0362	(0.0679)	0.0320	(0.0648)	0.0433	(0.0629)	0.0415	(0.0672)
2004	-0.4265***	(0.0687)	-0.4324***	(0.0659)	-0.4160***	(0.0638)	-0.4176***	(0.0684)
2005	-0.7889***	(0.0671)	-0.7464***	(0.0678)	-0.7729***	(0.0619)	-0.7805***	(0.0666)
2006	-0.8083***	(0.0667)	-0.7639***	(0.0677)	-0.7994***	(0.0614)	-0.8043***	(0.0663)
2007	-0.8338***	(0.0708)	-0.7897***	(0.0719)	-0.8263***	(0.0656)	-0.8285***	(0.0710)
Controlled for								
Tranche credit rating	Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes	
N	2633		2633		2633		2633	
Adjusted R^2	0.922		0.922		0.922		0.921	

The results for the non-prime MBS sample are presented in Table 4-8. We report substantial differences between the prime and non-prime tranches. Firstly, coefficients of ***Top Issuer*** are larger and statistically significant in all models. Non-prime tranches, which are more difficult for investors to evaluate due to higher information asymmetries, carry lower spreads when they are issued by a reputable originator. Investors seem to rely on the certification effect of reputation of the issuer when evaluating risky securities. We find that all ***CRA rating*** variables are highly statistically significant. This result shows that the possibility of issuer rating shopping has a major effect on investors' perceptions when evaluating riskier, non-prime, tranches.

The coefficient of ***Distance*** is also statistically significant at 1% level for the non-prime sample. As investors face higher information asymmetries when purchasing riskier non-prime tranches, the importance of issuers being closer to the domestic market increases. This puts foreign banks at a disadvantage when issuing securitised assets.

We find the coefficients of the interaction variables ***Top Issuer*** × ***Boom*** and ***Top Issuer*** × ***3 CRA reported*** to be negative and significant at the 5% and 1% levels respectively. These results show that, firstly, investors valued reputation highly during the credit boom prior to the financial crisis and required lower spreads from reputable issuers during this period. Secondly, the combination of reputable issuers with three reported credit ratings seems to be perceived as an important risk mitigation factor.

Subsequently, we estimate the coefficients for the non-prime RMBS sample only. The results of which are presented in Table 4-9. As the RMBS sample is more homogeneous, we find very similar results to the ones reported for non-prime MBS sample. However, the sizes of the coefficients are larger and, in general, have stronger statistical significance.

The results presented in this section may be related to the difference between informed and uninformed investors as described in many theoretical models (Boot and Thakor, 1993; Riddiough, 1997; Plantin, 2004; DeMarzo, 2005). On the one hand, uninformed investors often rely on credit ratings and invest in less risky securities, which corresponds to prime (information insensitive) tranches in our sample. Informed investors, on the other hand, can invest in riskier securities by adjusting their valuation based on their assessment of information asymmetries and, therefore, do not solely rely on ratings.

Table 4-9 The impact of issuer reputation on initial yield spreads of non-prime RMBS tranches

This table reports OLS regressions of the logarithm of initial yield spread (logspread) of non-prime European RMBS tranches on issuer reputation, deal and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Top Issuer is a dummy variable that takes the value of 1 if the issuer is one of the top thirteen issuers in terms of total market volume during this period, and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. CRA reported is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in Euros. Rating dummy variables indicate initial effective tranche credit rating. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the collateral is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the issuance periods annually. The omitted categories are tranches rated by 3 agencies, and tranches issued in 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
Top Issuer	-0.5405***	(0.1862)	-0.5959***	(0.1890)	-0.5396***	(0.1822)	-0.4384**	(0.1852)
1 CRA reported	0.1331***	(0.0450)	0.1295***	(0.0444)				
2 CRA reported	0.0888***	(0.0228)	0.0718***	(0.0227)				
3 CRA reported					-0.0360	(0.0277)	-0.0887***	(0.0227)
Distance	0.2086***	(0.0646)	0.2461***	(0.0667)	0.2083***	(0.0622)	-0.0357	(0.1522)
Top Issuer x Boom			-0.1271***	(0.0382)				
Top Issuer x 3 CRA reported					-0.1108**	(0.0432)		
Top Issuer x Distance							0.1787	(0.2039)
Retained	0.0400*	(0.0223)	0.0299	(0.0241)	0.0439**	(0.0218)	0.0328	(0.0222)
Ratings/Tranches	-0.0685	(0.0641)	-0.0650	(0.0623)	-0.0752	(0.0619)	-0.0726	(0.0630)
Subordination	0.2431	(0.2352)	0.3015	(0.2319)	0.2510	(0.2312)	0.2528	(0.2335)
Weighted Average Life	0.1540***	(0.0249)	0.1496***	(0.0250)	0.1528***	(0.0249)	0.1528***	(0.0249)
Size	-0.0027	(0.0093)	-0.0037	(0.0092)	-0.0045	(0.0091)	-0.0035	(0.0093)

	(1)		(2)		(3)		(4)	
Years								
2000	-0.0863	(0.0809)	-0.0888	(0.0780)	-0.0765	(0.0772)	-0.0735	(0.0801)
2001	-0.0288	(0.0755)	-0.0313	(0.0735)	-0.0147	(0.0730)	-0.0251	(0.0749)
2002	-0.1231	(0.0790)	-0.1317*	(0.0771)	-0.1082	(0.0761)	-0.1157	(0.0781)
2003	0.0430	(0.0756)	0.0345	(0.0732)	0.0516	(0.0727)	0.0482	(0.0749)
2004	-0.4582***	(0.0773)	-0.4703***	(0.0754)	-0.4470***	(0.0743)	-0.4518***	(0.0763)
2005	-0.8556***	(0.0742)	-0.8019***	(0.0741)	-0.8394***	(0.0711)	-0.8521***	(0.0733)
2006	-0.8933***	(0.0741)	-0.8376***	(0.0741)	-0.8782***	(0.0711)	-0.8909***	(0.0733)
2007	-0.9427***	(0.0771)	-0.8859***	(0.0775)	-0.9283***	(0.0742)	-0.9395***	(0.0761)
Controlled for								
Tranche credit rating	Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes	
N	2088		2088		2088		2088	
Adjusted R^2	0.938		0.939		0.939		0.938	

4.4.4. Impact of Loan Growth on MBS spreads

In this section, we examine the impact of loan growth on MBS spreads. We conduct this separately due to two reasons. First, we do not have the data for all issuing banks in our sample so including loan growth leads to data attrition and the sample size reduces by 53% (from 4,201 to 1,968). Secondly, as explained in Section 4.3.4, there is an endogenous relationship between loan growth and securitisation.

Results are presented in Table 4-10. In column 1, we estimate the coefficients for the whole sample. We find that ***Growth of gross loans*** has a positive coefficient, albeit weakly significant at the 10% level. A sudden growth in the issuer's loan portfolio prior to securitisation leads to higher spreads on MBS tranches. This shows that investors perceive excessive loan growth by securitisers as a risk indicator. Collateral backing MBS originated from high growth loan portfolios may be of poor quality. Hence, investors try to account for this risk of opportunistic conduct when pricing MBS.

Next, we examine whether the impact of ***Growth of gross loans*** on spread differs between reputable and non-reputable issuers. First, we estimate the model only for the subsample where the issuer is reputable. Results are presented in columns 2 and 3 in Table 4-10 for the MBS and RMBS samples respectively. We find that ***Growth of gross loans*** is not significant for the MBS sample, however, this variable becomes significant at the 5% level for the more uniform RMBS sample. Our tentative interpretation is that reputation does not alleviate investors' perception of increasing risks due to excessive loan growth prior to securitisation. Second, we run the models only for the non-reputable issuer subsample for MBS (column 4) and RMBS (column 5). In both cases, ***Growth of gross loans*** is significant at 5% level. Similar to our above finding, investors also require a higher premium for MBS tranches sold by non-reputable issuers with rapidly expanding loan portfolios.

Table 4-10 The impact of loan growth on initial yield spreads of MBS tranches

This table reports OLS regressions of the logarithm of initial yield spread (logspread) of European MBS tranches on issuer reputation, deal, collateral and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Top Issuer is a dummy variable that takes the value of 1 if the issuer is one of the top twelve issuers in terms of total market volume during this period, and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. CRA reported is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in Euros. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the collateral is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the issuance periods annually. The omitted categories are tranches rated by 3 agencies, commercial mortgage backed notes, and tranches issued in 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	All Issuers		Top issuer = 1				Top issuer = 0			
	MBS		MBS		RMBS only		MBS		RMBS only	
	(1)		(2)		(3)		(4)		(5)	
Growth of gross loans	0.0135*	(0.0071)	0.0111	(0.0205)	0.0421**	(0.0184)	0.0140**	(0.0068)	0.0145**	(0.0063)
3 CRA reported	-0.0895***	(0.0302)	-0.0693**	(0.0332)	-0.0576*	(0.0320)	-0.0291	(0.0679)	-0.0738	(0.0747)
Distance	0.1286	(0.1037)	0.0671	(0.1214)	0.0388	(0.0799)	0.9811***	(0.3308)	0.5305***	(0.0791)
Retained	0.0238	(0.0378)	0.0021	(0.0506)	-0.0139	(0.0380)	-0.0346	(0.0487)	0.0160	(0.0499)
Ratings/Tranches	0.0838	(0.0984)	-0.2192	(0.1351)	-0.0135	(0.0934)	-0.0649	(0.1408)	0.0833	(0.1540)
Subordination	0.1998*	(0.1097)	0.4659***	(0.1535)	-0.0873	(0.1435)	-0.0544	(0.1296)	-0.7006*	(0.3796)
Weighted Average Life	0.3333***	(0.0197)	0.3505***	(0.0222)	0.3634***	(0.0169)	0.3071***	(0.0382)	0.3263***	(0.0388)
Size	-0.0003	(0.0078)	-0.0060	(0.0114)	0.0111	(0.0129)	0.0116	(0.0085)	-0.0002	(0.0091)
Residential Mortgages	-0.1914**	(0.0851)	-0.4219***	(0.1283)			0.0697	(0.1479)		
Years										
2002	-0.1215	(0.1024)	-0.1537	(0.1728)	-0.0600	(0.1267)	-0.0133	(0.0269)	-0.0088	(0.0343)
2003	-0.0128	(0.0961)	-0.1044	(0.1539)	-0.0239	(0.1214)	0.1962**	(0.0800)	0.2223**	(0.0920)
2004	-0.3854***	(0.0992)	-0.5712***	(0.1569)	-0.4561***	(0.1219)	-0.1160	(0.0933)	-0.0972	(0.1091)
2005	-0.7060***	(0.0914)	-0.8551***	(0.1489)	-0.8217***	(0.1141)	-0.4705***	(0.0892)	-0.4961***	(0.1005)
2006	-0.7295***	(0.0932)	-0.9121***	(0.1498)	-0.9403***	(0.1188)	-0.3714***	(0.1274)	-0.2835*	(0.1590)
2007	-0.7052***	(0.0992)	-0.8972***	(0.1549)	-0.9799***	(0.1194)	-0.3677***	(0.1281)	-0.2994*	(0.1561)

	All Issuers	Top issuer = 1		Top issuer = 0	
	MBS	MBS	RMBS only	MBS	RMBS only
	(1)	(2)	(3)	(4)	(5)
Controlled for					
Tranche credit rating	Yes	Yes	Yes	Yes	Yes
Issuer fixed effects	Yes	Yes	Yes	Yes	Yes
Trustee fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
N	1968	1164	845	804	648
Adjusted R^2	0.940	0.944	0.962	0.947	0.952

It is widely documented that securitisation led to a decline in lending standards (Mian and Sufi, 2009; Purnanandam, 2011; Dell'Ariccia et al., 2012; Nadauld and Sherlund, 2013). Our results show that investors partly anticipated the implications of this behaviour on the credit quality of collateral underlying MBS. They deemed MBS issued by these banks to be riskier and required higher yields for these securities. Moreover, reputation does not seem to alleviate investors' concerns of possible issuer moral hazard indicated by excessive loan growth.

4.5. Conclusion

We examine whether investors considered the reputation of issuers as a mechanism to reduce information asymmetries when assessing MBS risks. Given the certification value of reputation, investors may have perceived securitisation by reputable issuers as less risky. We also study the impact of issuers' possible rating shopping behaviour, distance to the origination market and excessive loan growth on securitisation pricing. We use a large sample of 4,201 MBS tranches issued in 14 European countries from 1999 to June 2007.

We find that issuer reputation has a certification value in securitisation. Investors consider issuer reputation to be valuable when purchasing riskier, difficult to evaluate non-prime MBS. Reputation is also deemed to be important during periods where information asymmetries in credit markets intensify such as the pre-crisis years starting from 2005 to 2007. We find that MBS originated by foreign issuers were perceived to be more risky, possibly due to information asymmetries created by bank-borrower distance. Additionally, Issuer reputation does not seem to mitigate the risk arising from distance. We also find that investors require higher returns when they suspect issuer rating shopping. Finally, investors perceive excessive loan growth by issuers prior to securitisation as risky and require higher returns as collateral backing MBS originated from high growth loan portfolios may be of poor quality. Also, issuer reputation does not seem to alleviate investors' concerns due to possible issuer opportunistic behaviour and moral hazard indicated by excessive loan growth.

The immediate post-crisis rhetoric focused on the limited credit assessments conducted by investors when purchasing MBSs. We show that investors do not exclusively rely on credit ratings and take steps to protect their investments by adjusting the valuations of the structured notes they purchased. From this perspective, it is evident that availability of more information would facilitate the risk assessment of MBS. Recent policy changes in

the European Securitisation market may have remedying implications on some of the issues highlighted above. We expect that the implementation of the EU framework on Simple, Transparent, and Standardised (STS) Securitisations should limit, possibly eliminate, spread variation due to issuer size. The revised EU Credit Rating Regulation requires publishing all available ratings on a European Rating Platform to enhance comparability and transparency. Also, due to the complicated nature of structured finance products, issuers who pay for ratings must secure ratings of structural products from a minimum of two different authorised credit rating agencies. Furthermore, these issuers with re-securitised underlying assets must alternate their credit rating agency every four years according to the mandatory rotation rule.

Chapter 5. Trustee Reputation in Securitisation Pricing

5.1. Introduction

Investors in mortgage-backed securities (MBSs) suffered tremendous losses during the 2007-2009 financial crisis. Stakeholders –issuers, rating agencies, trustees, and investors– across the securitisation chain were blamed for failing to meet expected standards. Issuers relaxed lending criteria for mortgages that underlay the MBSs (Keys et al., 2009; Keys et al., 2012; Jiang et al., 2013; Kara et al., 2016), rating agencies underestimated the risk embedded in these securities (Coval et al., 2009a; Brennan et al., 2009; Richardson and White, 2009), trustees failed to enforce repurchase clauses (Dolmetsch, 2014; Stempel, 2016; Yoon, 2014) and investors were criticised for being overly reliant on credit ratings (Mahlmann, 2012). Modern securitisation has grown significantly since the 1980s. Although the use of securitisation techniques was initially a United States (US) phenomenon, the swift growth of European securitisation in the late 1990s has been attributed to the introduction of the Euro and increased financial market integration. Outstanding volumes climbed by about 1400% from $139 billion in 1999 to $2 trillion in 2007. These volumes were largely driven by the securitisation of mortgages, which accounted for 62% of European securitisation outstanding by mid-2007.

In this chapter, we consider the role of trustees in securitisation pricing and whether investors relied on trustees to mitigate MBS risks. Trustees play an important role in securitisation transactions. They are nominated to protect the interests of investors by managing the special purpose vehicle (SPV) on their behalf. As agents, trustees protect investors' interests by ensuring compliance of issuers and servicers with the agreements governing the securitisation deal (Gorton and Metrick, 2012a). They are also responsible for channelling payments to investors and notifying them of representation and warranty violations. This data intensive role also involves validating the performance of the collateral underlying the MBS on behalf of investors (Cetorelli and Peristiani, 2012). Moreover, investors rely on trustees to enforce repurchase obligations as provisions in the indenture do not allow direct repurchase requests from investors.

We examine whether investors price the efficacy of the trustee mechanism into initial MBS prices. In particular, given the certification value of reputation in the financial services industry (Booth and Smith, 1986; Titman and Trueman, 1986; Fang, 2005), we hypothesise that investors may have attempted to mitigate risks by considering trustee reputation when pricing MBS. We test our arguments by examining the initial yields of

MBS issuances. A number of studies show that investors incorporate the potential costs of misaligned interests in the primary yields of MBSs by accounting for issuer size, rating bias, collateral, and tranche structure (Fabozzi and Vink, 2012a, 2015; He et al., 2012). We contend that larger and more active trustees may be perceived as more efficient in identifying discrepancies and notifying investors of breaches accordingly. They may create value for investors, especially during credit events. Consequently, MBSs with reputable trustees should have lower risk and lower spreads.

We contribute to the literature by factoring trustee reputation into the determination of primary spreads to examine whether investors incorporate potential trustee indiscipline in initial valuations of MBSs. This is a dimension of securitisation pricing that has not been investigated. For example, Andres et al. (2012) study the influence of trustees in pricing but only for high yield US corporate bonds. It is conceivable that investors relied on trustees to detect fraud for multiple reasons. First, except for the servicer, the trustee remains the main party with direct administrative responsibilities from deal closure to the maturity of the MBSs. Second, the trustee performs a fiduciary role in an event of default. Third, trustees tend to be experts in regulatory and compliance issues. In addition, they tend to have marked international presence to tackle collateral liquidation and litigation in various jurisdictions. Finally, trustees typically offer enhanced services in excess of conventional trustee services for additional fees (Colloff, 2005).

We build a unique dataset comprising 4,201 tranches from 730 transactions originated in Europe between 1999 and the first half of 2007. Our focus is on the European market whose growth was mainly due to private market forces rather than government-sponsored enterprises (GSEs) in the US market. The US securitisation markets expanded primarily due to the influence of the GSEs. However, EU law (Articles 87 and 88 of the EC treaty) prohibits state aid in the form of guarantees as this may distort competition in the mortgage markets (Coles and Hardt, 2000). Furthermore, the growth of European securitisation was largely inhibited by regulatory constraints (Stone and Zissu, 2000).[59]

The outstanding growth of the European mortgage securitisation markets has been attributed to increased institutional demand, technological and financial innovation, and the introduction of the Euro (Altunbas et al., 2009). The adoption of the Euro resulted in

[59] Most of continental Europe required specific regulation to allow the issuance of MBSs (Stone and Zissu, 2000). This setback was addressed by the enactment of securitisation-enabling regulation in Belgium, France, Germany, Greece, Italy, Portugal and Spain.

the elimination of exchange rate risk in the Euro area, lowered transaction costs, and increased liquidity. However, the growth of the securitisation markets has been heterogeneous across the Euromarket. This growth was attained with certain associated costs: agency problems that misaligned incentives, and increased complexity and opacity of securitised bonds that rendered efficient pricing difficult (Segoviano et al., 2015). Given this backdrop, investors in European MBS may have relied on other avenues such as credit ratings and trustees for mitigating MBS risks. Therefore, we aim to assess whether investors may have incorporated the experience and reputation of trustees in the pricing of MBSs.

We find that engaging reputable trustees led to lower MBS spreads during the credit boom period (between 2005 and the first half of 2007) prior to the 2007-2009 financial crisis. Furthermore, the importance of reputable trustees for risk mitigation increased gradually each year between 2005 and 2007 as the crisis loomed. Our findings suggest that the reputation of trustees was deemed to be a critical yardstick as risk assessment became more difficult.

The chapter is structured as follows. Section 5.2 provides a background to the securitisation trustee's role and reviews the extant literature. Section 5.3 describes the data and methodology used. Section 5.4 presents the results and section 5.5 puts forward the conclusions.

5.2. Background and Literature Review

Securitisation involves the conversion of relatively illiquid assets such as mortgages into tradable securities. This is achieved by transferring a pool of mortgage loans to a Special Purpose Vehicle (SPV), established solely for this transaction. With guidance from ratings agencies, an underwriter structures the asset pool into tranches, which are then rated and issued as MBSs to investors. The key aspects of the securitisation transaction are governed by a contractual document known as a pooling and servicing agreement (PSA).

The PSA governs the transfer of mortgage loans to the SPV, management of the SPV, servicing of the pooled mortgages and issuance of the MBSs to investors. The foremost section of this contract defines the rights and obligations of the deal parties (originators, servicers, trustees and investors). The subsequent sections focus on structural considerations, servicing standards, and the reporting framework (McQueen et al., 2013).

5.2.1. The Role of the Securitisation Trustee

The originator (also termed the seller, issuer, or sponsor) advances mortgages to borrowers and aggregates these mortgages into an asset pool while the servicer collects periodic payments from borrowers. Consequently, the originator and servicer[60] are more knowledgeable about the mortgages securitised than other deal parties, particularly investors. The originator usually retains an obligation to augment or substitute assets within the pool if asset values fall below certain thresholds. In this regard, the trustee is empowered to demand the addition of new assets or replacement of assets that no longer conform to asset requirements specified in the PSA (ABA, 2010). The servicer is also responsible for reporting collections and loss amounts to trustees who are in turn charged with the calculation and distribution of cash flows/losses based on the servicer's reports. Furthermore, trustees are required to review servicer reports to detect breaches of warranty and representations by the issuer and servicer.

Morton (2005) explains that the pre-default duties of trustees in securitisation arrangements are conventionally twofold. Firstly, the trustee provides non-discretionary agency services that are largely ministerial in nature such as acting as analytics provider, account custodian (or cash manager) and principal paying agent.[61] Secondly, as the asset custodian, the trustee is the legal representative of noteholders and holds legal title to the SPV's assets on their behalf. As a delegated monitor, the trustee holds a lien on the assets and is authorised to enforce specified remedies in the interest of investors as dictated by the transaction documentation or a controlling majority of noteholders. A banking institution usually performs the former role while the latter must be performed by a trust company. However, most trustees package all these services such that they become a one-stop shop for all trust and administrative services.

In an event of default[62], the trustee's responsibilities surpass detecting negligence, and the trustee is now required to conduct the affairs of the SPV according to the prudent man

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[60] In practice, the originator and servicer are commonly the same institution or of the same banking group (He et al., 2012).

[61] The analytics provider is responsible for preparing regular (usually monthly) reports on the notes, deal performance and the evolution of the portfolio composition. The account custodian is tasked with operating and monitoring the SPV's bank account and the paying agent. Collections from the servicer are passed on to the paying agent who uses these funds to settle transaction participants' fees and expenses, interest and principal payments on the obligations due on the tranches according to the priority of payments (waterfall provisions) in the transaction documentations (Slaughter and May, 2010; ABA, 2010)

[62] Concerns regarding defaults also arise where the servicer fails to make scheduled remittances/advances to the trust or where the originator/servicer violates any covenants as indicated in the PSA. Where a breach

rule[63]. The trustee is required to enforce remedies when certain trigger events occur (such as a covenant breaches). The trustee either relies on its own discretion or the instruction of a controlling majority of the investors to enforce the obligations of the issuer/servicer (Macaulay, 2004). In such cases, the trustee is expected to leverage its bargaining power to protect the interest of noteholders: for instance, by securing an active seat on creditor committees, and making timely information requests from the issuer to inform the decision to switch from a passive to an active stance. An experienced trustee knows the optimal moment to call for dialogue amongst bondholders and issuers, and when to seek legal/financial advice (Wilmington Trust, 2017). Experienced trustees coordinate the envisioned actions of noteholders and minimise or avoid the problems and costs associated with the actions of individual investors. Trustees stand out based on factors including staffing levels, locations, information systems and experience in problem solving (Coleman and Libunao, 2013).[64]

Prior to default, the trustee's role is limited to channelling funds to investors and providing performance reports based on data supplied by the servicer. The trustee examines the servicer reports to determine whether the SPV is liquid enough to meet monthly principal and interest disbursement obligations to investors. This is largely acquiescent, as their duty at this stage does not include actively monitoring the originator/servicer. The PSA often specifies representations and warranties in relation to mortgage origination and underwriting standards. If any of these are breached, the sole remedy stipulated in the PSA is usually the repurchase of the defective mortgages. Trustees are responsible for determining whether mortgage loan losses are a consequence of the breach of particular representations or warranties (Buckley, 2010). It has been suggested that some trustees failed to verify the accuracy of data supplied by servicers because they lacked the ability to do so. Thus, some trustees tend to enforce

occurs, the trustee becomes an active participant and proactively notifies investors of the said breach and awaits the instructions of the next course of action on investors' behalf.

[63] In Speight v Gaunt [1883] UKHL 1, Lord Blackburn is quoted saying "…as a general rule a trustee sufficiently discharges his duty if he takes in managing trust affairs all those precautions, which an ordinary prudent man of business would take in managing similar affairs of his own". Furthermore, quoting Lord Lindley in the case of In Re Whiteley [1886] 33 Ch. Div. 347 "…the duty of a trustee is not to take such care only as a prudent man would take if he had only himself to consider, the duty rather is to take such care as an ordinary prudent man would take if he were minded to make an investment for the benefit of other people for whom he felt morally bound to provide."

[64] Trustees are typically appointed based on reporting quality and fee considerations. Their capability of handling the documentation review process is also a key criterion in tendering process. Large trustees typically increase their market presence by acting as one-stop shops for fiduciary and agency functions. These institutions are authorised to alter documentation terms and correct manifest errors (Choudhry, 2013).

representations and warranties based on the honour system even though they have litigation as a disciplining device at their disposal (Levitin, 2010).

Although the precise role of trustees is specified in the PSA, market participants including investors and rating agencies have increasingly assumed that trustees have a comprehensive active monitoring role. In all fairness, some of these PSAs are lengthy contractual documents which tend to be vague and ambiguous. Consequently, investors unrealistically expect trustees to perform the duties in excess of their contractual obligations (ABA, 2010).

Moreover, Morton (2005) argues that trustees' compensation does not cover services they have not been commissioned for. Thus, they are not appropriately compensated for active monitoring. In addition, trustees have no commercial interest in the securitisation transaction, and they merely follow documentation to determine the appropriate course of action in given circumstances. Trustees perform a range of ministerial duties and take enforcement actions on behalf of investors if breaches are discovered. In his congressional witness statement, Levitin (2010) states that the trustee's duties are largely limited unless a default event occurs.[65] Although the role of the trustee is mostly passive, this function becomes active when the deal or the issuer is experiencing distress or default. The duties of the trustee during such circumstances become variable and relatively fluid (Schwarcs and Sergi, 2008).

5.2.2. Literature Review

Traditional financial intermediation theories focus on the ability of intermediaries to reduce the frictions of transaction costs and asymmetric information (Allen and Santomero, 1997). The securitisation chain is fraught with several degrees of information asymmetries where one party usually has an information advantage over another regarding the quality of the underlying assets (Ashcraft and Schuermann, 2008). For instance, originators/servicers are more knowledgeable than investors are about collateral quality. Adverse selection occurs where lenders securitise low quality loans, and the ex-post moral hazard problems emerge because of reduced incentives to monitor underlying borrowers after the transaction closes. With regard to servicing, the main areas of contention are reimbursable costs, mortgage modification and foreclosure decisions.[66]

[65] In most cases, default events depend on the financial condition of the originator/servicer.

[66] First, for mortgages that are less than 90 days delinquent, the servicer must advance interest payments to the trust. Second, in the event of foreclosure, the servicer incurs all expenses out of pocket. The servicer is

Investors could address this by stipulating stringent modification and foreclosure rules in the PSA or by granting the servicer autonomy to administer the servicing function in the best interests of investors. In the absence of a trustee, these options would require investors to monitor the servicer's expenses actively.

The securitisation arrangement presents collective action and free-rider (under-monitoring) problems as the tranched notes are issued to multiple investors.[67] On the one hand, ownership fluidity, fragmented ownership, investor anonymity and bond liquidity worsen the collective action problem by essentially limiting concerted investor effort (Schwarcs and Sergi, 2008). On the other hand, no single investor has the incentive to incur the fixed cost of monitoring the borrower and enforcing covenants. The traditional financial intermediation literature suggests engaging a delegated monitor to mitigate both problems where an intermediary – the trustee – monitors the borrower(s) on behalf of the dispersed lenders (Diamond, 1984; Haubrich, 1989; Diamond, 1996). Thus, the financial intermediary minimises monitoring costs by avoiding the duplication of efforts in information production. Furthermore, the legal literature (Schwarcs and Sergi, 2008; Bazzana, 2012) agrees that the appointment of a trustee is a more efficient option because this intermediary could facilitate coordination of strategies among investors and mitigate costly individual investor actions.

The free rider problem is resolved if the issuer, rather than investors, compensates the trustee (Smith and Warner, 1979). This setup creates an incentive for the issuer to *persuade* the trustee to disregard contraventions of the covenants stipulated in the PSA. However, *bribing* a reputable trustee can be quite costly as large trustees thrive on the value of their reputation. Therefore, being implicated in a bribery scandal could severely damage their appeal to investors and issuers alike. Consequently, issuers would prefer reputable trustees to engender positive market perception and minimise borrowing costs.

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only reimbursed when the property is sold, consequently, this creates an incentive for the servicer to overstate expenses particularly during periods of high recovery rates. Finally, since the servicer's compensation is a fixed percentage of mortgages outstanding, there is an incentive to modify terms and defer foreclosure on delinquent mortgages.

[67] Securitisation involves aggregating and conveying relatively homogenous assets from an originator to a bankruptcy remote SPV. Assets are tranched to accommodate different risk and return profiles of various investors [see for example, Ashcraft and Schuermann (2008) for a comprehensive review of the frictions within the securitisation process]. This pooling and tranching mechanism deviates from the traditional intermediation model. However, banks remain the key driving force of the proliferation of mortgage-backed securitisation. They tend to play critical roles throughout the life of an MBS as issuer (originator), servicer or underwriter (Cetorelli and Peristiani, 2012). Generally, the issuer engages an underwriter to analyse investor demand and structure, price, and market the issue (Choudhry, 2013). The underwriter structures the notes in consultation with the rating agencies to meet the risk-return profiles of potential investors.

Investors would also prefer honest trustees as trustee credibility is expected to mitigate adverse issuer behaviour post-issuance.

Our research is related to the literature on the certification role of intermediary reputation. In the model of Chemmanur and Fulghieri (1994), investment banks acquire reputation by maintaining strict evaluation standards and their credibility is dependent on past deals. They show that, in equilibrium, reputable intermediaries underwrite safer issues and secure higher prices for issuers. Also, Booth and Smith (1986) model reputation as a bonding strategy to address information asymmetry problems between intermediaries and investors. They show that reputational capital is positively correlated with quality under information asymmetry. Using a sample of over 3000 bonds issued between 1991 and 2000, Fang (2005) finds that reputable banks that offer higher quality underwriting services are able to secure lower yields and higher net proceeds for issuers.

Our study is also closely related to the empirical work of Andres et al. (2012) on corporate bond pricing. They examine the initial yields of US non-investment-grade corporate bonds issued between 2000 and 2008 and find that engaging trustees with underwriting businesses reduced issuer borrowing costs by at least 33 basis points after conditioning on credit ratings. Consistent with superior monitoring efforts, they also find significantly lower bond defaults and less downgrade risk associated with these trustees. They interpret their results as evidence of reputational spillover effects of intermediaries that provide multiple services within a market segment. However, they do not find any evidence in support of larger trustees being better debt monitors. Based on a sample of US MBS issued between 2000 and 2006, He et al. (2012) find that launch spreads were higher for MBSs issued by reputable issuers (based on market share) between 2004 and 2006. They show that spreads rose because investors price the increased risk of reputable issuers securing inflated ratings, especially during boom periods.

Another strand of literature focuses on the problems trustees encounter. Allon (2009) argues that trustees experience significant difficulty in keeping up with technological advancements and the increasing complexity of assets in their custody. As transactions become more complex, the trustee's role of monitoring payments and other parties grows complicated (Spiotto, 2012). Furthermore, relative to other parties, trustees' fees are the lowest hence their compensation may not reflect the increasing complexity of structured instruments. Additionally, they may have been under-resourced or lacked the incentive to detect fraud and misrepresentation in structured transactions (Colloff, 2005; Allon, 2009).

Nonetheless, we expect that reputable trustees are better situated to counter these drawbacks, or are at least perceived to be so.

5.3. Data and Methodology

5.3.1. Data Sources

For each deal, Dealogic provides basic information on collateral types (residential and commercial mortgages), the number of tranches, composite credit rating, primary yield spread – in basis points over the reference rate, asset origin, tranche and deal value. We manually collect other deal and tranche characteristics, including initial constituent credit ratings, maturity (measured by *weighted average life* as explained below) and the identity of deal trustees' data from Bloomberg.

5.3.2. Data Selection

We collect data on all European MBS issuances between 1999 and the first half of 2007 from Dealogic and Bloomberg. This sample consists of deal and tranche level data on residential and commercial MBSs. The cut-off date is chosen to preclude the influence of changing attitudes towards structured finance in the latter half of 2007. We focus on MBS issuances as these form the largest component of the securitisation market. At the end of the second quarter of 2007, MBSs accounted for 62% of securitised bonds outstanding. More specifically, residential MBS (RMBS) accounted for 50% of all issuances while commercial MBS (CMBS) constituted approximately 12% of the total securitisation volume outstanding (SIFMA, 2017).

Tranches in our initial sample are either floating rate or fixed rate bonds issued in the Euromarket. However, we restrict our sample to floating rate tranches in order to circumvent the difficulties associated with estimating a consistent benchmark yield curve for each fixed rate tranche. For the floating rate notes, we use quoted spreads in excess of the relevant benchmark (e.g. 3-month LIBOR/3-month EURIBOR)[68] as a measure of funding/borrowing cost, where the benchmark rate represents the rates at which highly rated banks can obtain unsecured debt. These spreads represent extra compensation for credit, liquidity and optionality risks. However, the optionality risk in the price for floating rate tranches is marginal (Fabozzi and Vink, 2015). Therefore, the initial spreads reflect the risk premiums compensating for credit risk above LIBOR/EURIBOR and the liquidity risk of the tranche.

[68] The spreads on the floating rate European securitised bonds in our sample are quoted exclusively over LIBOR or EURIBOR.

Following, Cuchra (2005) and He et al. (2012), we do not include the reference rates in the initial spread to avoid incorporating a systematic component into our results. Theoretically, the benchmark rates are not risk-free rates. They are essentially spreads over the risk free rate to proxy for the relevant maturity. However, prior to the summer of 2007, the EURIBOR and the LIBOR were largely viewed as suitable proxies for the risk free rates because spreads between these benchmark rates and the corresponding overnight rates were considered to be negligible and insignificant[69] (ECB, 2013, 2014; Grbac and Runggaldier, 2015). Due to the increased counterparty risk as well as funding hurdles during the onset of the financial crisis, these reference rates increasingly began to reflect the credit risk and liquidity risk of the interbank sector (Grbac and Runggaldier, 2015). Following Fabozzi and Vink (2012a), we also restrict our sample to tranches issued at par to preclude distortions of discounts or premiums on the offering price. This results in a final sample of 4,201 tranches from 730 deals.

5.3.3. Empirical model

The baseline model for explaining the primary yield spread of tranche *d* issued at time *t* is specified as follows:

$$\begin{aligned} LogSpread_{d,t} = {} & \beta_0 + \beta_1 Trustee\ Reputation + \sum_{p=1}^{P} \beta_c \times \\ & Pre\text{-}crisis\ Years_p + \sum_{f=1}^{F} \beta_e \times \\ & Tranche\ and\ Deal\ characteristics_f + \sum_{h=1}^{H} \beta_g \times \\ & Other\ \ Control\ Variables_h + \\ & \sum_{s=1}^{S-1} \beta_j \times Collateral\ Controls_s + \\ & \sum_{c=1}^{C-1} \beta_k \times Credit\ Rating_c + \sum_{b=1}^{B-1} \beta_l \times Issuer_b + \\ & \sum_{l=1}^{L-1} \beta_m \times Country_l + \sum_{y=1}^{Y-1} \beta_y \times Time_y + w_{d,t} \end{aligned} \quad (1)$$

We explain the dependent and explanatory variables of the model below.

LogSpread represents the natural logarithm of the initial yield spread quoted as a fixed premium in basis points over the relevant benchmark rate. MBS tend to be issued at par however secondary market prices can deviate from par to account for beneficial or adverse impacts (such as accounting and tax implications) associated with non-par traded securities. Also, data on secondary market spreads, which are usually sourced from pricing matrices or dealer quotes, are rather difficult to obtain. Consequently, the initial

[69] Spreads between EURIBOR and LIBOR were virtually zero until August 2007. The spreads widened and peaked after 15th September 2008 when the Lehman Brothers declared bankruptcy.

spread is a more reliable indicator of the actual offer price and risk premiums demanded by investors (Fabozzi and Vink, 2012a).

Trustee Reputation is measured with two alternative variables. ***Trustee Share***, a continuous variable, is the number of deals a trustee has been assigned to as a fraction of the number of all deals issued in the previous year. ***Trustee Top5*** is a dummy variable that takes the value of 1 if the trustee is one of the top five trustees in terms of total market volume during this period, and 0 otherwise. Top five trustees constitute 51.23% of all deals in our sample. We expect lower spreads on deals with reputable trustees as they are more likely to be more effective debt monitors.

Pre-crisis Period is a set of dummy variables that proxy for the credit boom period; for the years ***2005*** (1 if 2005 and 0 otherwise), ***2006*** (1 if 2006 and 0 otherwise) and ***2007*** (1 if 2007 and 0 otherwise). This variable controls for the impact of the increase in the securitisation activity volume in the market during this period. We interact trustee reputation variables with ***Pre-crisis Period*** dummy variables to determine whether the influence of trustee market share varied significantly during the boom period. Following the intuition of Carbo-Valverde et al. (2015) and He et al. (2016), we also use an alternative variable ***Boom*** – a dummy variable that takes a value of 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise.

In order to understand factors that investors incorporate into the price of MBS, it is important to first take into account the generic factors considered by rating agencies as a starting point. If credit ratings capture these factors accurately, then they should have no explanatory power in our empirical analysis. Although all agencies have a relatively different credit rating methodology, their individual approaches tend to cover three main areas: asset analysis, structural analysis and counterparty risk analysis (Fabozzi and Vink, 2012b). These authors also note that majority of defaults have rarely been as a result of counterparty risk. The risk profile of a structured bond is therefore largely a function of the collateral, structural factors and the tranche's maturity (Whetten and Adelson, 2004).

5.3.3.1. Control Variables

We construct ***Distance***, a dummy variable that takes the value of 1 if the nationality of the originator's parent differs from the country of origination and 0 otherwise. Information based theories of banking (Stein, 2002; Mian, 2006; Detragiache et al., 2008; Berger et al., 2008) suggest that foreign banks face informational difficulties when assessing credit applications from local borrowers, especially opaque ones. Therefore,

they tend to focus on observables (hard information) when granting credit as this type of information is easier to come by. However, in their theoretical model on securitisation and lending competition, Frankel and Jin (2015) argue that despite the relative informational disadvantage of foreign banks, securitisation enhances competition for borrowers with strong observables (favourable hard information – e.g. credit score, loan-to-value ratio). Thus, these banks tend to make worse lending decisions because they lack or possess relatively limited soft information (e.g. borrower's job, income stability). In fact, Loutskina and Strahan (2011) find empirical evidence suggesting that geographical diversification led to a decline in screening incentives as securitisation volumes surged. Consequently, we expect the spreads on MBS issued by foreign banks to be higher.

Decisions on tranching are taken depending on a number of factors including desired credit rating, expected client base, and market segmentation. Due to the different levels of priority with regard to the cash flow/loss distribution, tranches carry different levels of risk and different credit ratings. Investors with different risk appetites decide which tranche is suitable for their preference. For instance, due to regulatory requirements, institutional investors, such as pension funds, are typically interested in holding the highest rated tranches. As expressed in Boot and Thakor (1993), tranching ranks cash flows into informationally insensitive securities (i.e. safe assets) and informationally sensitive tranches (i.e. riskier assets). In practice, tranches are usually classified into senior, mezzanine and equity tranches where the equity tranche is the first to absorb credit losses. The equity tranche is highly leveraged while the senior tranche is unleveraged. Tranching essentially relegates investment risk into the lower informationally sensitive tranches, with a fundamental objective of determining a minimum subordination level that will render the senior security riskless. Furthermore, relative to investors, the issuer has more information about the mortgage pool. Therefore the retention of a risky tranche minimises the *lemons discount* (Riddiough, 1997). Retained tranches are essentially credit enhancement devices to shield investors from the effects of the originator's perverse incentives (Franke et al., 2012).[70] In our dataset, we know of deals where the issuer retained at least one tranche; however, it is unclear which tranche was retained. We use

[70] Further evidence suggests that equity retention maximises originators' screening effort (Kiff and Kisser, 2014) and minimises information loss (Guo and Wu, 2014). However, (Kuncl, 2015) show that although retention aligns originator and investor interests, the efficiency of this device is limited especially during economic booms.

Retained to proxy for tranche retention within a deal. This is a binary deal level variable which is set to 1 if at least one tranche is retained and 0 otherwise.

As a result of advancements in structuring techniques, the true structure of tranche cash flows in different states of the economy grew more complex and opaque. There are two prominent views on the complexity of structured bonds (Ghent et al., 2017). On the one hand, if the primary objective of structuring is to generate low risk securities from variable quality collateral, then complexity is just a natural consequence of structuring. In this case, deals backed by low quality collateral feature more intricate and complicated structures. However, the quality of the underlying collateral is not necessarily negatively related to the default of the securities. On the other hand, complexity can be used as a strategic device to obscure the true quality of an asset, thereby deliberately making the due-diligence process cumbersome for investors. Following Ghent et al. (2017), we measure complexity as a deal level variable denoting the amount of information that investors need to process to arrive at the true value of a tranche. As in their empirical model, a number of other studies (He et al., 2016; He et al., 2012; Furfine, 2014) have used the number of tranches in a deal to proxy for complexity. Using data on European MBSs, Cuchra and Jenkinson (2005) note that the creation of additional tranches with distinct ratings resulted in increased informationally sensitive tranches compared to further tranching within the same rating class. Therefore, we refine our complexity measure by computing ***Ratings/Tranches*** as the ratio of the number of unique ratings in a deal to the total number of tranches in a deal.

5.3.3.2. Asset factors

Asset analysis involves evaluating the quality of collateral underlying the deal. This quality differs across countries and issuers. Our sample contains tranches backed by two distinct types of collateral: residential and commercial mortgages. When rating RMBSs, agencies devote more attention to underwriting standards and historical loss data. However, the focus of agencies when rating CMBSs is the income earning capacity of the property (Kothari, 2006). Therefore, due to the differing risk profiles of both types of securities, it is expected that the pricing considerations of RMBS differ from those of CMBS. Consequently, we use ***Collateral*** as a dummy variable that takes the value of 1 for RMBS and 0 for CMBS.

Fabozzi and Vink (2012b) provide empirical evidence underscoring the importance of country of origination as an essential consideration for pricing securitised bonds. The

authors also show that credit rating agencies lay emphasis on the country of origination as this can greatly influence the performance of the securities owing to variations in macroeconomic conditions, legal systems, cash flow currencies and origination standards. Also, prepayment patterns tend to be a function of the country of origination and the overall profile of the collateral (Cuchra, 2005). In general, countries with expected unfavourable economic conditions warrant more conservative assumptions in generating credit ratings. To this effect, we control for country risk by including ***Country***, a factor variable, in our analyses. Thus, country fixed effects are used in all specifications to capture geographically induced variations respectively.

5.3.3.3. Structural factors

Credit enhancements are techniques used in structuring MBSs in order to increase the credit quality of the bonds and achieve favourable ratings. An MBS issuer consults credit rating agencies to ascertain the required levels of credit enhancement necessary for the issue to attain the desired credit ratings. The most common form of credit enhancement is subordination in which deals follow a senior/subordinate structure. Subordinated tranches absorb losses before senior tranches do. The subordinate tranches are more exposed to credit losses from the underlying collateral; consequently, senior tranches receive higher ratings but lower returns. This variable features as a common control variable in the securitisation literature (He et al., 2016; Fabozzi and Vink, 2012b; He et al., 2012). We compute the ***Subordination*** level for each tranche in our sample. This variable is computed as the value of tranches in the same deal that have an equal or higher rating than the given tranche as a fraction of the total deal value. As our main measure of deal structure, this variable proxies for the credit support offered by lower tranches in each deal. As Whetten and Adelson (2004) note, subordination levels and tranche sizes determine how the risk of the collateral is redistributed among tranches. Subordination levels indicate the absolute risk levels for each tranche while size[71] defines tranche liquidity. We control for tranche sizes using ***Size***, which we compute as the natural logarithm of the principal value of the relevant tranche.

[71] Smaller deals have fewer tranches and Cuchra (2005) attribute this to issuers' goal of fostering liquidity on the secondary market. However, Schaber (2008) argues that this trend is due to the cost inefficiency associated with marketing and research efforts by originators and investors respectively.

Rather than nominal maturity, issuers tend to place more emphasis on the weighted average life[72] of the securitised bonds. Unlike nominal maturity, weighted average life is a composite metric of effective maturity that incorporates appropriate prepayment assumptions. Therefore, the weighted average life in years will always be shorter than the nominal maturity of a mortgage backed security. There is ample evidence indicating that weighted average life is a major determinant of launch spreads (Cuchra, 2005; Cuchra and Jenkinson, 2005; He et al., 2016; He et al., 2012). Consequently, we control for effective maturity using the ***Weighted Average Life*** (as reported by Bloomberg) for each tranche.

Although all the MBSs in our sample are floating rate notes, a number of bonds are structured as step-up bonds where the offered spread at issuance resets after a given period. We control for this using a dummy variable, ***Step-up tranche***, which takes the value of 1 if the relevant MBS is a step-up note and 0 otherwise.

5.3.3.4. Credit Ratings

The securitisation pricing literature overwhelmingly concurs that credit ratings explain a substantial variation in initial yields. For instance, Fabozzi and Vink (2012a) find that credit ratings explain 74% of the variation in the yields of UK RMBSs. Other papers such as Cuchra (2005) and Fabozzi and Vink (2012b) find similar evidence. This is expected since MBSs are typically structured by underwriters in consultation with rating agencies to achieve a specific rating.

In practice, many issuers elect to secure or report more than one credit rating on each debt obligation. This could be because of investment guidelines for certain institutional investors or regulatory requirements for certain issues to have at least two ratings. In addition, Standard & Poors (S&P) and Fitch ratings measure the probability of default while Moody's ratings, by contrast, measure expected losses. Therefore some issuers perceive that securing a Moody's rating and an S&P/Fitch rating may provide additional information with regards to creditworthiness (Güntay and Hackbarth, 2010; Fabozzi and Vink, 2015).

Issuers have the latitude to choose which ratings to purchase. These choices allow issuers to selectively report only the highest rating while potentially neglecting unfavourable

[72] According to Cuchra (2005) nominal maturity is less meaningful for securitisation issues because weighted average life incorporates essential modelling factors such as prepayment assumptions, embedded options and expected repayment speed of the underlying assets. In contrast with corporate bonds, the nominal maturity of MBSs is unrelated to the expected date of principal repayment.

preliminary ratings. Based on a sample of privately issued MBS, He et al. (2012) show that the rating shopping hypothesis [as modelled by Skreta and Veldkamp (2009); Sangiorgi et al. (2009)] was priced by investors into initial yields. The authors find that yields were highest on single rated tranches and least on tranches rated by all three agencies. Rating shopping is not the primary focus of this study; however, we have controlled for this phenomenon as there is existing evidence that investors factored it into initial yields. We control for rating shopping[73] with ***Credit Rating Agencies,*** the number of initial ratings reported for each tranche. Issuers are not required to report all ratings; however, ratings from all three agencies suggest more transparency while ratings from either one or two may indicate suppression of negative ratings.

Deals in our sample are rated by at least one of the three major rating agencies (S&P, Moody's or Fitch).[74] Dealogic reports a composite credit rating that combines the credit ratings from different rating agencies for each tranche. The use of composite credit ratings is quite common in the corporate bond literature (Campbell and Taksler, 2003) as well as in the securitisation literature (Fabozzi and Vink, 2015). We map the composite ratings onto a numerical scale where AAA=1, AA+=2 and AA=3 and so on[75] for the sample descriptive statistics. We categorise AAA/Aaa rated bonds as prime and bonds with other ratings as non-prime. ***Credit Rating*** is coded as a factor variable to control for each distinct rating.

Rating agencies use different methods and various criteria in determining credit ratings of securitised mortgage bonds. Some of the components of assessed risks may be tranche specific while others may be deal specific. Changes in deal specific risk factors tend to trigger deal wide rating revisions. It is therefore unlikely that tranches within a specific deal are independent of each other. For instance, the ratings on multiple tranches tend to be modified around the same time (Adelino, 2009). Therefore, we cluster standard errors at the deal level to mitigate correlation of errors within deals (Cuchra, 2005).

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[73] He et al. (2012) include the number of initial ratings as well as ratings disagreements in their analyses. We find these variables to be highly collinear. However, the influence of ratings disagreements is beyond the scope of our study.

[74] Based on turnover in 2014, S&P, Moody's and Fitch controlled 91.89% of the credit ratings sector in the EU (ESMA, 2015).

[75] We map the composite ratings onto a numerical scale where AAA=1, AA+=2, AA=3, AA−=4, A+=5, A=6, A−=7, BBB+=8, BBB=9, BBB−=10, BB+=11, BB=12, BB−=13, B+=14, B=15, B−=16, CCC+=17, CCC=18, CCC−=19 and CC=20.

We employ a fixed effects model where time (issuance-***time***) and ***issuer*** and ***trustee*** effects are conditioned out in order to account for issuer and trustee specific attributes. On the one hand, pooled cross-sectional data has the advantage of increasing the sample size, which in turn improves the precision of estimators assuming that the relationships being estimated are temporally stable. However, this assumption may be too strict and time dummy variables can be used to allow for some variation over time (Wooldridge, 2013). Also, since we use pooled cross-sectional data, the distribution of our independent variables may change over time and tranches within a given year may be affected by the same macroeconomic conditions. We introduce ***time*** (year) dummy variables to capture the net effect of all time varying factors (Petersen, 2009; Fabozzi and Vink, 2015). We do not explicitly control for macroeconomic conditions as the ***time*** (year) dummy variables capture the effect of unobserved systematic period effects. In addition, including time dummies allows us to interact them with other key variables to determine whether these variables have changed over time.

On the other hand, it is infeasible to control for all variables that influence yield spreads, and our model is susceptible to an omitted variable bias. We deal with this shortcoming by characterizing possible unobserved variables, the most common of which is a fixed effect – time-invariant characteristics of issuers and trustees in our sample. We address the omitted variable bias by explicitly including dummy variables for each cross sectional unit, in other words, for each issuer and each trustee. These dummy variables should absorb the individual effects of the issuers and trustees.

5.3.4. Descriptive statistics

We present the sample characteristics statistics in Table 5-1. Panel A shows the distribution of the sample according to rating categories and underlying collateral. The collaterals within the data are split into residential (RMBS, 81.81%) and commercial (CMBS, 18.19%) categories. Based on the composite rating, the sample comprises 1,568 (37.32%) prime tranches and 2,633 (62.68%) non-prime tranches. Panel B shows that a large number of tranches receive multiple ratings (51.06% and 42.80% for 3 and 2 ratings, respectively) while only 6.14% of tranches are solely rated. Panel C shows top 5 trustees and top 10 issuers based on number of deals. The trustee market seems rather concentrated as the top 5 trustee banks were party to 51.23% of all deals issued.

Table 5-1 Sample characteristics

Panel A: Tranche distribution by rating categories and underlying collateral

Collateral	Prime	Non-Prime	Total	Percentage
Commercial mortgages	219	545	764	18.19%
Residential mortgages	1,349	2,088	3437	81.81%
Total	1,568	2,633	4,201	100.00%
Percentage	37.32%	62.68%		

Panel B: Tranche distribution by number of ratings secured

No. of Ratings	RMBS	CMBS	Total	Percentage
1	218	40	258	6.14%
2	1,277	521	1,798	42.80%
3	1,942	203	2,145	51.06%
Total	3,437	764	4,201	100.00%

Panel C: Top issuing and trustee banks (number of deals)

Issuing Banks	Percentage	Trustee Banks	Percentage
Lehman Brothers Holdings Inc.	4.90%	Stichting Security	12.86%
Ally Financial Inc.	4.39%	Bank of New York	11.94%
Morgan Stanley	3.37%	JPMorgan Chase & Co.	9.90%
Barclays Bank Plc	2.96%	Deutsche Bank	8.88%
Royal Bank of Scotland Group Plc	2.76%	Capita Plc	7.65%
NRAM PLC	2.55%		
Kensington Group Plc	2.35%		
Credit Suisse AG	2.24%		
Commerzbank AG	2.14%		
Banco Santander SA	2.04%		
Deutsche Bank AG	2.04%		
HBOS Plc	2.04%		
	33.78%		51.23%

In Table 5-2, we categorise the tranches into cohorts based on rating category and country of collateral (country of risk). 54.8% of all tranches are based on assets originated in the UK, followed by Spain (13.12%) and Netherlands (8.97%). These three countries account for 76.89% of the tranches in our sample.

Table 5-2 Country of risk

	RMBS			CMBS			All Issues	
	Prime	Non-Prime	Total	Prime	Non-Prime	Total	Frequency	Percentage
United Kingdom	757	1,092	1,849	132	321	453	2,302	54.80%
Spain	213	332	545	2	4	6	551	13.12%
Netherlands	118	250	368	2	7	9	377	8.97%
Germany	48	109	157	54	139	193	350	8.33%
Italy	122	154	276	15	31	46	322	7.66%
Portugal	24	57	81				81	1.93%
Ireland	37	34	71	1	3	4	75	1.79%
France	11	9	20	12	34	46	66	1.57%
Greece	8	17	25				25	0.60%
Sweden	5	9	14	1	6	7	21	0.50%
Belgium	5	13	18				18	0.43%
Russian Federation		9	9				9	0.21%
Switzerland	1	1	2				2	0.05%
Ukraine		2	2				2	0.05%
Total	1,349	2,088	3,437	219	545	764	4,201	100.00%
Percentage			81.81%			18.19%		100.00%

Table 5-3 Descriptive statistics

Variable	Type	N	Mean	Median	Std. Dev	p75
Spread (basis points)	RMBS	3,437	62.55	30.00	87.86	65.00
	CMBS	764	82.46	48.00	99.76	86.00
	Total	4,201	66.18	34.00	90.46	72.00
Weighted Average Life (years)	RMBS	3,437	5.33	4.99	3.21	6.90
	CMBS	764	5.99	6.00	1.86	7.00
	Total	4,201	5.45	5.07	3.02	6.95
Credit Rating	RMBS	3,437	4.68	3.00	3.89	9.00
	CMBS	764	4.95	4.00	3.68	9.00
	Total	4,201	4.73	3.00	3.86	9.00
Number of Ratings	RMBS	3,437	4.00	4.00	1.27	5.00
	CMBS	764	5.19	5.00	1.33	6.00
	Total	4,201	4.21	4.00	1.36	5.00
Number of Tranches	RMBS	3,437	9.29	7.00	5.85	14.00
	CMBS	764	6.64	6.00	2.20	8.00
	Total	4,201	8.81	7.00	5.47	13.00
Ratings/Tranches	RMBS	3,437	0.59	0.60	0.30	0.83
	CMBS	764	0.79	0.80	0.17	1.00
	Total	4,201	0.62	0.67	0.29	0.83
Subordination	RMBS	3,437	0.06	0.05	0.08	0.09
	CMBS	764	0.16	0.13	0.15	0.23
	Total	4,201	0.08	0.05	0.10	0.10
Tranche Value (€ million)	RMBS	3,437	244.00	45.60	479.00	255.00
	CMBS	764	136.00	53.10	202.00	135.00
	Total	4,201	224.00	47.50	444.00	227.00
Deal Value (€ million)	RMBS	3,437	2,170.00	1,110.00	2,390.00	2,630.00
	CMBS	764	768.00	661.00	440.00	970.00
	Total	4,201	1,910.00	1,010.00	2,240.00	2,000.00

In Table 5-3, we present the descriptive statistics for the aggregate sample. The mean spread is 66.18 basis points (bps) for the full sample compared to 62.55 bps for RMBSs and 82.46 bps for CMBSs. RMBS deals, averaging approximately €2.17 billion, are more than twice the size of an average CMBS deal (€768 million). Similarly, RMBS tranches are 1.79 times larger than CMBS tranches suggesting that RMBS issues contain relatively more tranches per deal. RMBS deals have an average of 9.29 tranches per deal and at least 4 distinct rating categories while CMBS deals typically contain 6.64 tranches with 5.19 unique rating groups. The median rating for the whole sample is 4.73 which corresponds to AA−.

5.4. Regression Results

We estimate our models progressively. To start with, we present the results for the full sample. Subsequently, we split the sample according to risk categories –prime (AAA rated) tranches and non-prime (non-AAA rated) tranches, to examine whether reputational effects differ depending on the level of risk borne by the investors.

5.4.1. Trustee reputation variables

Results for the full sample are presented in Table 5.4 in six columns. We first employ ***Trustee Top5*** only (in column 1) and find that it has an insignificant coefficient. This implies that the reputation of trustees had no impact on spreads. It is consistent with the prevalent view in the literature that investors perceive trustees as ineffective monitoring devices (Amihud et al., 2000; Schwarcs and Sergi, 2008; Bavoso, 2015; Spiotto, 2012).

Before introducing the interactions with the year dummy variables, it is worth noting the impact of the pre-crisis period (2005-2007) on initial yield spreads of MBSs. We find consistently significant and negative coefficients for the year dummy variables for the pre-crisis years (base year is 2000). Initial yields gradually declined during these years. European securitisation activity soared between 2005 and 2007 and this period corresponds to highest activity values in our sample. These results capture the decline in return on financial assets due to general credit cycle conditions during this period.

We introduce ***Trustee Top5***'s interaction with the pre-crisis period (***Boom***) in column 2 of Table 4. We find ***Trustee Top5*** x ***Boom*** to be statistically significant and negative. This indicates that investors started to perceive reputable trustees to be more effective debt monitors as the volume of issuance increased in the credit boom period before the financial crisis. Investors may have assumed that trustees were relatively passive parties in MBS deals in general. However, it seems that during the progressive phase of the expansionary period, investors started to rely on reputable trustees, as more effective debt monitors, to shield them from increasing risks in MBS deals. The negative spreads are consistent with the reputation buying effect identified by (Carbo-Valverde et al., 2015). They study the certification effect of underwriters of bank debt from 2003 to 2013 and find evidence of reputation discounts and these discounts increased significantly during the crisis period.

Table 5-4 The impact of trustee reputation on initial yield spreads of MBS tranches

This table reports OLS regressions of the log of initial yield spread (logspread) of European MBS tranches on trustee reputation, deal, collateral and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Trustee Share is the number of deals a trustee has been assigned to as a fraction of the number of all deals issued in the previous year. Trustee Top5 is a dummy variable that takes the value of 1 if the trustee is one of the top five trustees in terms of total market volume during this period, and 0 otherwise. HOT equals 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. Credit Rating Agencies is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in Euros. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Issuer fixed effects is a set of dummy variables for each issuer. Country dummy variables equal 1 when the asset is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the annual issuance periods. The omitted categories are tranches rated by 3 agencies, residential mortgage backed notes, and issuance Year 2000. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)	
Reputation												
Trustee Top5	-0.0558	(0.1009)	0.1190	(0.1093)	0.1072	(0.1077)						
Trustee Top5 x HOT			-0.2354***	(0.0346)								
Trustee Top5 x 2005					-0.1429***	(0.0429)						
Trustee Top5 x 2006					-0.2428***	(0.0399)						
Trustee Top5 x 2007					-0.3702***	(0.0503)						
Trustee Share							-0.5413**	(0.2266)	0.0657	(0.2448)	0.0928	(0.2495)
Trustee Share x HOT									-2.1493***	(0.4018)		
Trustee Share x 2005											-1.4949**	(0.5976)
Trustee Share x 2006											-2.3755***	(0.4939)
Trustee Share x 2007											-2.3475***	(0.4867)
Pre-crisis Period												
2005	-0.8318***	(0.0610)	-0.6437***	(0.0496)	-0.6875***	(0.0520)	-0.7390***	(0.0463)	-0.5740***	(0.0559)	-0.6331***	(0.0661)
2006	-0.8893***	(0.0612)	-0.7067***	(0.0500)	-0.6720***	(0.0527)	-0.7915***	(0.0467)	-0.6175***	(0.0578)	-0.6002***	(0.0610)
2007	-0.9047***	(0.0657)	-0.6960***	(0.0583)	-0.6766***	(0.0625)	-0.7970***	(0.0523)	-0.6028***	(0.0658)	-0.5862***	(0.0697)
Asymmetric Information												
Ratings/Tranches	0.0683	(0.0559)	0.1030*	(0.0549)	0.1043*	(0.0544)	0.0679	(0.0568)	0.1007*	(0.0570)	0.1010*	(0.0567)
Retained	0.0043	(0.0231)	-0.0107	(0.0240)	-0.0089	(0.0239)	0.0013	(0.0232)	-0.0051	(0.0236)	-0.0045	(0.0238)

	(1)		(2)		(3)		(4)		(5)		(6)	
Distance	0.0813*	(0.0460)	0.0970**	(0.0487)	0.0979**	(0.0476)	0.0953**	(0.0478)	0.1080**	(0.0501)	0.1102**	(0.0498)
Credit Rating Agencies												
1	0.1223***	(0.0453)	0.1443***	(0.0443)	0.1440***	(0.0436)	0.1247***	(0.0460)	0.1391***	(0.0456)	0.1405***	(0.0454)
2	0.0791***	(0.0211)	0.0683***	(0.0209)	0.0642***	(0.0207)	0.0806***	(0.0211)	0.0743***	(0.0214)	0.0716***	(0.0215)
Tranche Characteristics												
Subordination	0.2239***	(0.0865)	0.2362***	(0.0854)	0.2285***	(0.0843)	0.2361***	(0.0857)	0.2350***	(0.0850)	0.2319***	(0.0847)
Weighted Average Life	0.3413***	(0.0157)	0.3426***	(0.0157)	0.3439***	(0.0155)	0.3419***	(0.0158)	0.3426***	(0.0159)	0.3429***	(0.0158)
Size	0.0008	(0.0060)	-0.0004	(0.0061)	0.0001	(0.0060)	0.0011	(0.0060)	0.0002	(0.0061)	0.0003	(0.0061)
Step-Up tranche	-0.1044***	(0.0344)	-0.0952***	(0.0328)	-0.0976***	(0.0322)	-0.1075***	(0.0352)	-0.1017***	(0.0348)	-0.1018***	(0.0348)
Collateral												
Residential Mortgages	-0.1410***	(0.0503)	-0.1457***	(0.0473)	-0.1473***	(0.0467)	-0.1367***	(0.0501)	-0.1295***	(0.0494)	-0.1304***	(0.0497)
Controlled for												
Tranche credit rating	Yes		Yes		Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
N	4201		4201		4201		4159		4159		4159	
Adjusted R^2	0.930		0.931		0.932		0.931		0.931		0.930	

We subsequently interact ***Trustee Top5*** with each of the year variables for the pre-crisis credit expansionary period (***2005***, ***2006*** and ***2007***) in column 3. We find that all of the coefficients for ***Trustee Top5*** x ***2005, Trustee Top5*** x ***2006*** and ***Trustee Top5*** x ***2007*** are significant and the size of the coefficient increased as the financial crisis loomed. This shows that as the credit markets expanded rapidly between 2005 and 2007, investors perceived trustee reputation to be increasingly important in mitigating possible MBS risks.

We follow a similar approach in employing ***Trustee Share*** and interacting it with pre-crisis year dummy variables in columns 4 to 6 of Table 5-4. We find that ***Trustee Share*** is negatively related to spreads and is statistically significant (column 4). Different from the dummy trustee reputation proxy (***Trustee Top5***) this finding shows that investors perceived trustees as effective monitoring devices. However, when we interact ***Trustee Share*** with ***Boom*** and pre-crisis year dummy variables the coefficient of ***Trustee Share*** becomes statistically insignificant. In contrast, and similar to results reported above, all of the coefficients for ***Trustee Share*** x ***Boom*** (column 5), ***Trustee Top5*** x ***2005***, ***Trustee Top5*** x ***2006*** and ***Trustee Top5*** x ***2007*** (column 6) are significant. We also observe that the coefficients for the latter two variables are significantly larger. Overall, we find similar results with our two alternative trustee reputation indicators.

5.4.2. Other variables

Out of the three main control variables, only ***Distance*** is statistically significant in all models. This provides some evidence that investors value local issuer expertise, where it is expected that domestic banks would be more specialised due to their familiarity with the local market. Thus, they are more likely to detect borrower misrepresentation and extend safer loans. ***Retained*** is not significant in any of the specifications. Retention as an alignment device seems to have lost its importance since it does affect issuers' borrowing costs. ***Ratings/Tranches*** is weakly significant but only in some of the models.

We observe that the number of rating agencies associated with a deal is a significant predictor of spreads. Using spreads on MBSs rated by all three agencies as the reference category, initial yields on notes rated by two agencies were between 6% to 8% higher, while the premium on those rated by one agency ranged from 12% to 14%. Our cautious interpretation is that investors incorporate the value of rating triangulation into the pricing

process. Reported ratings from all three agencies suggest more transparency while ratings from either one or two may indicate suppression of negative ratings.

Subordination is strongly significant in all of the models, and it seems that credit ratings do not completely capture the leverage effects within deals and higher subordination signals generally higher risk deals. ***Weighted Average Life*** is a key determinant of initial spreads as this variable is significant and consistently positive in all specifications in Table 5-4. This finding is consistent with Cuchra (2005), where launch spreads were persistently positively related to effective maturity. Liquidity, proxied by ***Size,*** is not significant in any of the specifications.

With regards to collateral, spreads on RMBS notes were at least 12% lower than initial funding costs associated with CMBS notes. This is consistent with our expectations as commercial mortgages are larger, less regulated and attract more risk weighting. Also, there is comparatively less competition in the commercial mortgage market hence the prices of these mortgages are higher compared to the prices of residential mortgages.

5.4.3. Prime versus non-prime tranches

We split the sample into prime (AAA rated) and non-prime (non-AAA rated) subsamples to test the impact of trustee reputation on spreads under different risk levels. Existing literature argues that investors do not solely rely on credit ratings and shows that they consider other indicators (such as issuer reputation, rating bias and creditor protection) that were already incorporated in credit ratings when pricing MBSs (Fabozzi and Vink, 2012a). Here we aim to examine whether investor behaviour changes depending on the risk level of the tranches.

We present the results for the ***Trustee Top5*** in Table 5-5 for prime (columns 1 to 3) and non-prime (4 to 6) tranches. Our findings for the two sub-samples are very similar to the results reported above for the main sample. We find that ***Trustee Top5*** is insignificant for both sub-samples. We also find that all ***Trustee Top5*** and pre-crisis years interaction variables are statistically significant with similar size coefficients. It seems that investors generally perceive trustees as ineffective debt monitors for all MBS tranches regardless of risk levels. They incorporate the value of reputable trustees into yields but only during the periods of increased market activity. We present the results for the ***Trustee Share*** in Table 5-6 for prime (columns 1 to 3) and non-prime (4 to 6) tranches. We find that ***Trustee Share*** is significant for both sub-samples when employed without the interaction variables; however, the coefficients for this variable lose their significance when

interaction variables for the pre-crisis years are introduced into the model. We consistently find that during the pre-crisis period, investors valued trustee reputation, regarding trustees as efficient monitors during risky periods.

Turning to the other variables, in Table 5-5 and Table 5-6, we find that the rating shopping (***Credit Rating Agencies***) variables are mostly insignificant for AAA tranches. Investors do not seem to be sceptical when tranches are rated AAA, and the involvement of multiple rating agencies in deal structuring seems to be of little importance to AAA investors. This finding resonates with the argument that the demand for collateral fed into the demand for high-quality asset-backed securities (Gorton and Metrick, 2012b). On the other hand, ***Credit Rating Agencies*** remains positive and highly significant in all specifications for the non-prime sample. Unlike investors of prime tranches, investors of non-prime tranches discounted the required yields as the number of agencies increased. This is not surprising as it is less likely that issuers, regardless of size, can influence all three rating agencies to report favourable ratings only. Reporting ratings from two agencies does not necessarily mean that the unfavourable ratings from a third agency have been suppressed. However, using notes rated by three agencies as the base, we find that yields on non-prime tranches rated by two agencies are 5% to 7% higher while spreads on those rated by just one agency were around 18% to 19% higher. We find that ***Rating/Tranches*** variable is strongly significant and positively related to spreads for the prime sample only. This variable captures the number of information sensitive categories within a deal. Thus, spreads are higher for AAA rated tranches in deals with more information sensitive tranches.

Similar to the full sample, we find some significance for the ***Distance*** variable; however, this finding is confined to prime tranches. Therefore, even though investors of prime tranches may have overly relied on credit ratings, they demanded higher yields when foreign banks originated the underlying assets. The size and significance of coefficients for ***Weighted Average Life*** show similar patterns for both prime and non-prime samples; however, coefficients are much larger in the prime sample. ***Size***, on the other hand, is only significant for prime tranches and carries a negative sign. This means that investors of prime tranches demand lower liquidity premiums and higher maturity premiums.

Table 5-5 The impact of trustee reputation on initial yield spreads of prime and non-prime MBS tranches

This table reports OLS regressions of the log of initial yield spread (logspread) of European prime (columns 1-3) and non-prime MBS tranches (columns 4-6) on trustee reputation, deal, collateral and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Trustee Share is the number of deals a trustee has been assigned to as a fraction of the number of all deals issued in the previous year. Trustee Top5 is a dummy variable that takes the value of 1 if the trustee is one of the top five trustees in terms of total market volume during this period, and 0 otherwise. HOT equals 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. Credit Rating Agencies is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in euro. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the asset is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the annual issuance periods. The omitted categories are tranches rated by 3 agencies, residential mortgage backed notes, and issuance Year 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	Prime tranches						Non-prime tranches					
	(1)		(2)		(3)		(4)		(5)		(6)	
Reputation												
Trustee Top5	-0.0563	(0.1453)	0.1131	(0.1556)	0.1005	(0.1547)	-0.0142	(0.0881)	0.1621	(0.1155)	0.1523	(0.0943)
Trustee Top5 x HOT			-0.2462***	(0.0448)					-0.2313***	(0.0364)		
Trustee Top5 x 2005					-0.1304**	(0.0566)					-0.1690***	(0.0440)
Trustee Top5 x 2006					-0.2682***	(0.0557)					-0.2214***	(0.0403)
Trustee Top5 x 2007					-0.3699***	(0.0622)					-0.3597***	(0.0523)
Pre-crisis Period												
2005	-0.7949***	(0.0776)	-0.6666***	(0.0739)	-0.7553***	(0.0748)	-0.8680***	(0.0634)	-0.7203***	(0.0658)	-0.7673***	(0.0672)
2006	-0.9087***	(0.0770)	-0.7851***	(0.0745)	-0.7815***	(0.0778)	-0.8931***	(0.0628)	-0.7449***	(0.0651)	-0.7591***	(0.0655)
2007	-0.8984***	(0.0811)	-0.7819***	(0.0780)	-0.7177***	(0.0804)	-0.9226***	(0.0673)	-0.7805***	(0.0688)	-0.7149***	(0.0716)
Asymmetric Information												
Ratings/Tranches	0.2109***	(0.0663)	0.2468***	(0.0660)	0.2507***	(0.0662)	-0.0124	(0.0597)	0.0202	(0.0570)	0.0219	(0.0560)
Retained	0.0215	(0.0345)	0.0046	(0.0354)	0.0061	(0.0359)	0.0077	(0.0231)	-0.0050	(0.0246)	-0.0038	(0.0243)
Distance	0.1156*	(0.0656)	0.1334**	(0.0676)	0.1356**	(0.0682)	0.0565	(0.0484)	0.0714	(0.0515)	0.0722	(0.0501)

	Prime tranches						Non-prime tranches					
	(1)		(2)		(3)		(4)		(5)		(6)	
Credit Rating Agencies												
1	-0.2292**	(0.1049)	-0.1821*	(0.1052)	-0.1827*	(0.1038)	0.1856***	(0.0390)	0.1959***	(0.0377)	0.1934***	(0.0377)
2	0.0284	(0.0310)	0.0161	(0.0309)	0.0112	(0.0306)	0.0682***	(0.0217)	0.0550**	(0.0217)	0.0520**	(0.0214)
Tranche Characteristics												
Subordination	0.2158*	(0.1256)	0.2487**	(0.1209)	0.2380**	(0.1194)	0.3942***	(0.1256)	0.4011***	(0.1240)	0.3958***	(0.1237)
Weighted Average Life	0.5173***	(0.0175)	0.5189***	(0.0174)	0.5192***	(0.0173)	0.1541***	(0.0242)	0.1533***	(0.0242)	0.1546***	(0.0236)
Size	-0.0320***	(0.0090)	-0.0326***	(0.0089)	-0.0321***	(0.0089)	0.0016	(0.0096)	-0.0017	(0.0097)	-0.0011	(0.0095)
Step-Up tranche	0.0045	(0.0357)	0.0130	(0.0350)	0.0100	(0.0348)	-0.1737***	(0.0370)	-0.1653***	(0.0351)	-0.1680***	(0.0346)
Collateral												
Residential Mortgages	-0.1570**	(0.0647)	-0.1542**	(0.0615)	-0.1584***	(0.0607)	-0.1113**	(0.0516)	-0.1213**	(0.0483)	-0.1219**	(0.0474)
Controlled for												
Tranche credit rating	Yes		Yes		Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
N	1568		1568		1568		2633		2633		2633	
Adjusted R^2	0.826		0.831		0.833		0.929		0.931		0.932	

Table 5-6 The impact of trustee reputation on initial yield spreads of prime and non-prime MBS tranches

This table reports OLS regressions of the log of initial yield spread (logspread) of European prime (columns 1-3) and non-prime MBS tranches (columns 4-6) on trustee reputation, deal, collateral and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Trustee Share is the number of deals a trustee has been assigned to as a fraction of the number of all deals issued in the previous year. Trustee Top5 is a dummy variable that takes the value of 1 if the trustee is one of the top five trustees in terms of total market volume during this period, and 0 otherwise. HOT equals 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. Credit Rating Agencies is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in euro. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when the asset is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the annual issuance periods. The omitted categories are tranches rated by 3 agencies, residential mortgage backed notes, and issuance Year 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	Prime tranches						Non-prime tranches					
	(1)		(2)		(3)		(4)		(5)		(6)	
Reputation												
Trustee Share	-0.5255**	(0.2529)	0.1245	(0.2593)	0.1649	(0.2661)	-0.4893*	(0.2755)	0.1146	(0.3161)	0.1380	(0.3200)
Trustee Share x HOT			-2.6209***	(0.5497)					-1.9223***	(0.4181)		
Trustee Share x 2005					-1.4896	(1.0140)					-1.5798***	(0.5519)
Trustee Share x 2006					-2.8382***	(0.7485)					-2.0358***	(0.4884)
Trustee Share x 2007					-2.9230***	(0.5775)					-2.0632***	(0.5339)
Pre-crisis Period												
2005	-0.7795***	(0.0544)	-0.5691***	(0.0661)	-0.6702***	(0.0922)	-0.7478***	(0.0502)	-0.6071***	(0.0589)	-0.6386***	(0.0655)
2006	-0.8887***	(0.0551)	-0.6702***	(0.0703)	-0.6549***	(0.0835)	-0.7680***	(0.0495)	-0.6185***	(0.0598)	-0.6107***	(0.0625)
2007	-0.8692***	(0.0611)	-0.6246***	(0.0824)	-0.5976***	(0.0818)	-0.7876***	(0.0550)	-0.6212***	(0.0664)	-0.6096***	(0.0724)
Asymmetric Information												
Ratings/Tranches	0.2070***	(0.0677)	0.2490***	(0.0685)	0.2531***	(0.0684)	-0.0085	(0.0610)	0.0195	(0.0600)	0.0187	(0.0597)
Retained	0.0181	(0.0347)	0.0094	(0.0353)	0.0103	(0.0358)	0.0050	(0.0232)	0.0008	(0.0237)	0.0012	(0.0238)
Distance	0.1369*	(0.0711)	0.1551**	(0.0734)	0.1571**	(0.0743)	0.0628	(0.0494)	0.0728	(0.0518)	0.0742	(0.0514)
Credit Rating Agencies												
1	-0.2372**	(0.1074)	-0.2007*	(0.1077)	-0.2022*	(0.1081)	0.1886***	(0.0395)	0.1956***	(0.0387)	0.1963***	(0.0387)
2	0.0335	(0.0312)	0.0179	(0.0318)	0.0131	(0.0317)	0.0678***	(0.0219)	0.0634***	(0.0223)	0.0621***	(0.0223)
Tranche Characteristics												
Subordination	0.2283*	(0.1272)	0.2399**	(0.1218)	0.2315*	(0.1212)	0.3988***	(0.1256)	0.4009***	(0.1235)	0.3998***	(0.1238)
Weighted Average Life	0.5181***	(0.0177)	0.5193***	(0.0176)	0.5194***	(0.0176)	0.1544***	(0.0242)	0.1533***	(0.0242)	0.1536***	(0.0242)
Size	-0.0311***	(0.0090)	-0.0320***	(0.0090)	-0.0321***	(0.0090)	0.0025	(0.0097)	0.0004	(0.0097)	0.0004	(0.0096)

	Prime tranches						Non-prime tranches					
	(1)		(2)		(3)		(4)		(5)		(6)	
Step-Up tranche	0.0029	(0.0365)	0.0094	(0.0364)	0.0085	(0.0364)	-0.1780***	(0.0379)	-0.1734***	(0.0370)	-0.1736***	(0.0371)
Collateral												
Residential Mortgages	-0.1491**	(0.0646)	-0.1394**	(0.0633)	-0.1412**	(0.0634)	-0.1088**	(0.0515)	-0.1039**	(0.0505)	-0.1044**	(0.0507)
Controlled for												
Tranche credit rating	Yes		Yes		Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
N	1568		1568		1568		2633		2633		2633	
Adjusted R^2	0.826		0.831		0.833		0.929		0.931		0.932	

5.4.4. Robustness checks

Our original model is susceptible to endogeneity concerns as trustees are appointed by issuers, who may consciously choose trustees for a number of reasons. In particular, larger issuers may choose to work with larger trustees that are more active in the market. Following the literature (Fang, 2005; Andres et al., 2012; Carbo-Valverde et al., 2015) we further control for non-random issuer-trustee matching using a Heckman two-stage approach in examining the influence of trustee reputation on MBS spreads while holding issuer characteristics constant. Andres et al. (2012), using this approach for high yield corporate bond spreads, found no evidence of self-selection bias.

In the first step, prior to estimating the main model, we run a logistic model to estimate the probability of appointing a top five trustee (***Trustee Top5***). According to Spiotto (2012), trustees tend to examine deals before assuming trusteeship prior to closing. It is also reasonable to expect that larger issuers would secure the services of reputable trustees. It is expected that trustees may prefer certain deals to others; therefore, we utilise a number of MBS tranche and deal characteristics that the trustee might look at before accepting to be the trustee for a specific deal. The model we estimate in the first step is as follows:

$$\begin{aligned} Trustee\ Top5_d = {} & \beta_0 + \beta_1 LargeIssuer_d + \sum_{f=1}^{F} \beta_e \times \\ & Information\ asymmetry_f + \sum_{h=1}^{H} \beta_g \times \\ & Tranche\ \&\ Deal\ characteristics_h + \\ & \sum_{s=1}^{S-1} \beta_j \times Collateral\ Controls_s \quad + \sum_{c=1}^{C-1} \beta_k \times Credit\ Rating_c + \\ & \sum_{l=1}^{L-1} \beta_m \times Country_l + \sum_{y=1}^{Y-1} \beta_y \times Time_y + \\ & w_{d,t} \end{aligned} \tag{2}$$

where;

Trustee Top5 is a dummy variable that takes the value of 1 if the trustee is one of the top five trustees in terms of total market volume during this period, and 0 otherwise. ***LargeIssuer*** is a dummy variable that takes the value of 1 if the issuer is one of the top twelve issuers in terms of total market volume, and 0 otherwise. For information asymmetry variables we use ***Ratings/Tranches***, ***Distance*** and ***Retained***. For tranche characteristics, we employ ***Size*** and ***Weighted Average Life***. We also control for credit ratings and collateral. All of these variables have the same specification as explained above for equation 1.

Table 5-7 for the whole sample as well as for prime and non-prime subsamples. We do not find ***Large Issuer*** to be a significant determinant of ***Trustee Top5*** in any of the models. This result shows no evidence of a relationship between large issuers and top trustees. We also find that tranches in deals that have an equity tranche retained by the issuer, with more than one credit rating, where the issuer is a subsidiary of a foreign bank and backed by residential mortgages are more likely to have a top five trustee.

Subsequently, in the second step, we estimate the main models with ***Trustee Top5*** adding the inverse of Mills ratio (IMR), which is derived from the logistic estimation in equation 2. We present results in Table 5-8 for the whole sample (columns 1 to 3) and sub-samples for prime (columns 4 to 6) and non-prime tranches (columns 7 to 9). We find that the coefficient of IMR is insignificant in all of the models which signals that selection bias is not present in our original estimations. Similar to our original results the coefficient of ***Trustee Top5*** is not statistically significant in any of the models. In line with our first set of results in section 5.4.1, interactions of ***Trustee Top5*** with the ***Year*** variables are all negative and significant. We still find that reputable trustee led to lower spreads as the market expanded just before the financial crisis. We observe that the coefficients for these variables become larger in the two-step estimations. Overall, our results are robust to the inclusion of trustee and issuer fixed effects and endogeneity concerns are minimal in our estimations.

Table 5-7 First stage selection model results

This table reports logistic regressions of the Trustee Top5 on Large Issuer. Trustee Top5 is a dummy variable that takes the value of 1 if the trustee is one of the top five trustees in terms of total market volume during this period, and 0 otherwise. Large Issuer is a dummy variable that takes the value of 1 if the issuer is one of the top twelve issuers in terms of total market volume during this period, and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable that equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable that equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. Credit Rating Agencies is the number of initial ratings reported for a tranche. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in euro. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Country dummy variables equal 1 when the asset is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the annual issuance periods. The omitted categories are tranches rated by 3 agencies, residential mortgage backed notes, and issuance Year 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	All tranches		Prime tranches		Non-prime tranches	
	(1)		(2)		(3)	
Large Issuer	-0.6822	(0.6025)	-0.6262	(0.6191)	-0.6335	(0.6209)
Asymmetric Information						
Ratings/Tranches	-0.1109	(0.5234)	-0.6098	(0.5335)	0.0219	(0.5592)
Retained	0.5621*	(0.2979)	0.4732	(0.3171)	0.6533**	(0.3046)
Distance	2.0162***	(0.5456)	1.6406***	(0.5164)	2.1662***	(0.5880)
Credit Rating Agencies						
1	-0.1948**	(0.0937)	-0.1886*	(0.0980)	-0.3004**	(0.1491)
2	0.0598	(0.0389)	0.1372***	(0.0500)	-0.0556	(0.0918)
Tranche Characteristics						
Weighted Average Life	0.0361	(0.3098)	0.6334	(0.4701)	-0.3580	(0.3221)
Size	0.0335	(0.1723)	0.2143	(0.1960)	-0.0752	(0.2081)
Collateral						
Residential Mortgages	1.0141***	(0.3383)	1.0030***	(0.3484)	0.9705***	(0.3599)
Controlled for						
Issuer fixed effects	Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes	
N	2329		848		1473	

Table 5-8 Second stage estimations with inverse Mill's ratio

This table reports OLS regressions of the log of initial yield spread (logspread) of European prime and non-prime MBS tranches on trustee reputation, deal, collateral and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. Trustee Top5 is a dummy variable that takes the value of 1 if the trustee is one of the top five trustees in terms of total market volume during this period, and 0 otherwise. HOT equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of number of distinct rating classes within a deal divided by number of tranches per deal. Retained is a dummy variable equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. Credit Rating Agencies is the number of initial ratings reported for a tranche. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Step-up tranche is a dummy variable equal to 1 if the spread quoted at issuance is adjusted upwards on a specified future date and 0 otherwise. Weighted Average Life is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Size is the natural logarithm of tranche face value in euro. Rating dummy variables indicate initial effective tranche credit rating. Collateral is the type of asset backing the structured bond grouped as commercial and residential mortgages. Issuer fixed effects is a set of dummy variables indicating each issuer. Country dummy variables equal 1 when asset is originated in the relevant country and 0 otherwise. Time is a factor variable consisting of the annual issuance periods. The omitted categories are tranches rated by 3 agencies, residential mortgage backed notes, and issuance Year 1999. Standard errors in parentheses are clustered at the deal level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	All tranches			Prime tranches			Non-prime tranches		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inverse Mill's Ratio	-0.0405 (0.0516)	-0.0234 (0.0486)	-0.0450 (0.0493)	-0.0748 (0.0703)	-0.0497 (0.0689)	-0.0696 (0.0734)	0.0194 (0.0474)	0.0295 (0.0440)	0.0019 (0.0449)
Reputation									
Trustee Top5	-0.2080 (0.1382)	0.0226 (0.1665)	0.0162 (0.1662)	-0.2816 (0.1877)	-0.0770 (0.1980)	-0.0865 (0.1979)	-0.0599 (0.1067)	0.1700 (0.1290)	0.1664 (0.1270)
Trustee Top5 x HOT		-0.3346*** (0.0537)			-0.3637*** (0.0706)			-0.3165*** (0.0535)	
Trustee Top5 x 2005			-0.2659*** (0.0700)			-0.2779*** (0.0929)			-0.2535*** (0.0654)
Trustee Top5 x 2006			-0.3172*** (0.0603)			-0.3648*** (0.0844)			-0.2747*** (0.0584)
Trustee Top5 x 2007			-0.4461*** (0.0767)			-0.4471*** (0.1011)			-0.4698*** (0.0745)
Pre-crisis Period									
2005	-0.9161*** (0.0934)	-0.7128*** (0.0894)	-0.7834*** (0.6972)	-0.8572*** (0.1320)	-0.6526*** (0.1300)	-0.7393*** (0.1364)	-0.9520*** (0.0914)	-0.7437*** (0.0864)	-0.8100*** (0.0920)
2006	-0.9743*** (0.0933)	-0.7730*** (0.0883)	-0.8036*** (0.6953)	-0.9617*** (0.1290)	-0.7630*** (0.1283)	-0.7798*** (0.1350)	-0.9793*** (0.0903)	-0.7698*** (0.0846)	-0.8187*** (0.0834)
2007	-0.9798*** (0.0960)	-0.7966*** (0.0886)	-0.7397*** (0.7356)	-0.9541*** (0.1263)	-0.7740*** (0.1244)	-0.7310*** (0.1325)	-1.0016*** (0.0972)	-0.8105*** (0.0882)	-0.7287*** (0.0921)
Asymmetric Information									
Ratings/Tranches	0.0968 (0.0882)	0.1166 (0.0828)	0.1170 (0.0835)	0.2673** (0.1054)	0.2603*** (0.1001)	0.2603** (0.1019)	0.0600 (0.0880)	0.0919 (0.0824)	0.0956 (0.0813)
Retained	-0.0182 (0.0386)	-0.0232 (0.0396)	-0.0236 (0.0400)	0.0115 (0.0585)	0.0038 (0.0592)	0.0058 (0.0612)	-0.0095 (0.0374)	-0.0107 (0.0390)	-0.0136 (0.0389)
Distance	0.0857 (0.0548)	0.1023* (0.0553)	0.0903 (0.0559)	0.1491** (0.0715)	0.1637** (0.0719)	0.1571** (0.0750)	0.0754 (0.0564)	0.0899 (0.0561)	0.0722 (0.0560)
Credit Rating Agencies									
1	0.2061*** (0.0684)	0.1831*** (0.0659)	0.1761*** (0.0656)	-0.0871 (0.2121)	-0.0907 (0.2055)	-0.1028 (0.2046)	0.2432*** (0.0576)	0.2132*** (0.0550)	0.2055*** (0.0556)
2	0.0637** (0.0277)	0.0535* (0.0275)	0.0461* (0.0269)	0.0574 (0.0431)	0.0459 (0.0424)	0.0388 (0.0416)	0.0512* (0.0292)	0.0409 (0.0288)	0.0315 (0.0279)
Tranche Characteristics									
Subordination	0.4130*** (0.1580)	0.4206*** (0.1543)	0.4038*** (0.1521)	0.1250 (0.2085)	0.1504 (0.2033)	0.1394 (0.2004)	0.3946** (0.1624)	0.4265*** (0.1575)	0.4006** (0.1558)
Weighted Average Life	0.3205*** (0.0227)	0.3215*** (0.0226)	0.3245*** (0.0222)	0.5013*** (0.0258)	0.5025*** (0.0257)	0.5050*** (0.0255)	0.1455*** (0.0292)	0.1458*** (0.0291)	0.1492*** (0.0284)
Size	-0.0198** (0.0096)	-0.0197** (0.0095)	-0.0197** (0.0092)	-0.0579*** (0.0132)	-0.0549*** (0.0129)	-0.0550*** (0.0128)	0.0131 (0.0127)	0.0098 (0.0122)	0.0103 (0.0118)
Step-Up tranche	-0.1252** (0.0486)	-0.1123** (0.0446)	-0.1116** (0.0444)	0.0233 (0.0471)	0.0364 (0.0439)	0.0385 (0.0442)	-0.2502*** (0.0555)	-0.2350*** (0.0514)	-0.2369*** (0.0508)
Collateral									
Residential Mortgages	-0.1545** (0.0689)	-0.1711*** (0.0634)	-0.1871*** (0.0644)	-0.2280** (0.0894)	-0.2473*** (0.0834)	-0.2645*** (0.0865)	-0.0792 (0.0708)	-0.0967 (0.0654)	-0.1135* (0.0655)
Controlled for									
Tranche credit rating	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trustee fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Issuer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2243	2243	2243	805	805	805	1430	1430	1430
Adjusted R^2	0.927	0.929	0.930	0.827	0.835	0.836	0.922	0.926	0.927

5.5. Conclusion

We consider the role of trustees – who are nominated to protect the interests of investors – in securitisation pricing and whether investors rely on them to mitigate risks. There is a growing literature showing that investors attempted to incorporate the potential costs of misaligned interests in the yields of securitisation products in the pre-crisis period. We contribute to this literature by investigating whether investors factored trustee reputation into the valuation of MBSs. We do this by examining the effect of reputation on primary spreads of MBSs using a large sample of rated European securitisation issuances between 1999 and the first half of 2007.

We find that hiring reputable trustees led to lower spreads during the credit boom period prior to the 2007-2009 financial crisis. Furthermore, the importance of reputable trustees for risk mitigation increased gradually as the financial crisis loomed. Overall, our findings suggest that the reputation of trustees was regarded as a critical yardstick, as risk assessment became more difficult. Thus, investors began to associate trustee reputation with effective debt monitoring as the concern for defaults grew in boom periods. We also show that although investors incurred substantial losses during the financial crisis, they did not exclusively rely on credit ratings. They took steps to protect their investments, however inadequate, by adjusting the valuations of the structured notes they purchased.
The role of the trustee may be a passive one, especially with respect to breaches. However, it is unclear whether investors initially appreciated how passive the trustee's role was. In an attempt to revive and reform securitisation, regulators have proposed the inclusion of another third party, an independent reviewer, into the securitisation chain. Public comments on early drafts of Regulation AB (SEC, 2014) revealed that investors and other stakeholders were against allocating this role to trustees due to concerns about affiliations with other parties such as servicers. Investors have clearly outlined their frustrations against trustees, and it is unclear whether these sentiments persist. Therefore, consistent with the proposal of Regulation AB, trustees should not be in the position of appointing independent credit reviewers as this might compound investor concerns about conflicting interests.

The US banking industry's trade association argues that trustees were not complicit in the deteriorating quality of MBSs during the financial crisis (ABA, 2010). They stress that although the responsibilities of trustees in MBS transactions exceed those embedded in conventional corporate debt transactions, the request for compensation from trustees is evidence that market participants have clearly misinterpreted the remit of trustees. In this

regard, responsibilities of the trustees should be clearly outlined to avoid further misinterpretation. Recent policy changes in the European Securitisation market may have remedying implications on some of the issues highlighted above. We expect that the implementation of the EU framework on Simple, Transparent, and Standardised (STS) Securitisations should limit, possibly eliminate, and spread variation due to issuer and trustee reputation.

Chapter 6. Issuer Reputation, Pricing and Performance

6.1. Introduction

Securitisation has transformed the financial intermediation landscape over the past four decades. However, this innovation has come under intense scrutiny because of its role in the 2007-09 financial crisis. Consequently, there has been significant academic and regulatory interest in clarifying the risks and benefits of securitisation. Rather than performing their own due diligence, the complexity and the opacity of the pre-crisis securitisation market may have diverted investors' attention to simple metrics such as credit ratings and issuer reputation. The literature provides empirical evidence suggesting that investors incorporated factors other than credit ratings in the pricing of mortgage-backed securities (MBS) in the years preceding the financial crisis. Furthermore, prices were informative enough to predict losses (He et al., 2016) as well as default and downgrades (Adelino, 2009). However, the literature is relatively silent on how these tendencies varied during the growth period (2004-2007) preceding the crisis.

In this chapter, our focus is twofold. On the one hand, we examine the link between issuer reputation and quality by assessing the performance of European mortgage-backed securities (MBS) sold by reputable issuers. On the other hand, we analyse the efficacy of the pricing mechanism in predicting performance with a key interest in the boom period preceding the 2007-09 financial crisis. We focus on the European market as it has received considerably less research attention even though it is the second largest market after the US Securitisation market. Both markets are substantially different hence painting both markets with a broad-brush may be inappropriate. The remarkable expansion of the US securitisation markets has been attributed to the influence of the Government Sponsored Enterprises (GSEs) however, there is limited government participation in the development of the European markets. Also, issuance levels in Europe were initially held back by regulatory constraints. However, securitisation laws were passed in multiple countries to address this bottleneck throughout the 1990s.[76] The markets, however, grew remarkably in the late 1990s as a result of the introduction of the Euro, technological advancement and increased demand from institutional investors (Altunbas et al., 2009).

The strong demand for highly rated securities during the growth period created an incentive for broker/dealers to harness developments in financial engineering to create

[76] European countries where securitisation enabling laws had to be passed include France, Spain, Belgium, Portugal and Italy.

more of these highly rated securities from low quality loans (Segoviano et al., 2015). The demand for MBSs climbed in the years leading to the financial crisis as these bonds offered higher yields[77], attracted lower capital charges and were often used as collateral. In addition, MBSs are offered in a wide range of maturities to meet various investment horizons (BlackRock, 2004).

Investor demand for MBSs also soared due to rating-dependent regulation. Credit ratings were of prime importance in determining minimum capital requirements for financial institutions such as banks and insurance companies. National regulations also restrict pension funds from investing in non-investment grade bonds[78]. This central of role ratings spurred the institutional demand for highly rated bonds such as MBSs as the supply of highly rated single name securities was quite limited (Benmelech and Dlugosz, 2009). Consequently, adverse selection problems emerged as issuers relaxed their lending standards to cater for this increase in demand. This is evident in the increased delinquencies recorded in the US subprime mortgage sector during the financial crisis (Keys et al., 2010; Nadauld and Sherlund, 2013; Demyanyk and Van Hemert, 2011)

This breakdown in the securitisation machine can be attributed to misaligned incentives and imperfect information. Information loss occurs as securitisation extends the distance between the originator and the ultimate investors. Consequently, certain borrower characteristics observed by the lender are not transmitted to the final investor. There is an incentive for the bank to extend loans that rate high on characteristics that affect its fee income – those characteristics observable by investors (hard information), despite the possibility that these loans are risky according to unreported dimensions (soft information). Thus, securitisation limits or removes the incentive to collect soft information (Rajan et al., 2015) and to perform its screening and monitoring function efficiently.

In addition to equity retention, it is assumed that reputational concerns and pricing should act as mechanisms for limiting the potential for such originator behaviour (Fender and Mitchell, 2009). Naturally, the risk of losing long run reputation should motivate intermediaries to avoid misrepresentations in contractual disclosures and produce high-

[77] Relative to single-name securities of comparable quality, MBSs offer higher yields to compensate investors for the variable maturity and payment characteristics of these bonds. MBSs tend to make monthly income payments as opposed to conventional fixed income securities that make semi-annual payments.

[78] Bonds rated BBB (Baa3) or higher by Standard & Poor's/Fitch (Moody's).

quality securities in the interest of investors (Chemmanur and Fulghieri, 1994). However, (Griffin et al., 2014) argues that it seems reputational concerns may be ineffective control mechanisms for checking opportunistic behaviour when the securities under consideration are relatively more complex. Furthermore, ultimate investors are empowered with the price mechanism to discipline the parties involved in the securitisation process. However, the accuracy of this mechanism is a function of the quality of available information. Consequently, two types of investors emerge – sophisticated and less sophisticated investors. Sophisticated investors are well suited to analyse the risk of the collateral and hence tend to buy lower rated information insensitive tranches. On the contrary, less sophisticated investors patronise, highly rated senior tranches (Fender and Mitchell, 2009)

In this chapter, we aim to evaluate the predictive ability of the reputation and price mechanisms. We attempt to achieve this aim by using a large dataset of 4,247 European mortgage-backed securities issued between 1999 and 2007. First, using market volume as a measure of reputation, we test the influence of reputation on performance using credit rating downgrades as well as underlying pool delinquencies. Second, we test the predictive ability of yield spreads to measure the efficacy of the price mechanism in predicting performance.

This chapter makes multiple contributions to the securitisation literature. First, we assess the link between issuer reputation and bond performance proxied by credit rating transitions and delinquency rates using a sample of mortgage-backed securities issued in the European securitisation market. Winton and Yerramilli (2015) argue that reputable issuers are more likely to continue performing their monitoring function during periods of increased competition while less reputable institutions tend to increase market share at the expense of monitoring existing obligors. On the contrary, we find that although prominent issuers generally originate higher quality assets, the relative quality of their asset pools declined substantially. More importantly, these bonds were less likely to be downgraded. He et al. (2016) report inconclusive results after examining the impact of issuer size on the cumulative default rates of US MBS. However, there are significant differences between the US and the European securitisation markets. The growth of the US securitisation market has been progressive and continuous since the early 1970s. In contrast, the European securitisation market grew rapidly and exponentially in the 2000s after the introduction of Euro (Altunbas et al., 2009).

Second, we extend the securitisation literature by considering the effect of the distance between the issuer and the origination market on the performance of the issued bonds. Information based theories of banking (Stein, 2002; Detragiache et al,2008;Mian, 2006;Berger et al, 2008) suggest that foreign banks may be less capable of processing soft information.[79] Hence foreign banks tend to focus on lending to borrowers that can be readily screened using hard information such as such as accounting information or collateral values. Thus, information asymmetry in financial intermediation is exacerbated by bank-borrower distance, and domestic banks have a comparative advantage over foreign banks. Local banks have geographically specific knowledge and soft information that makes them better assessors of borrower creditworthiness and the market value of collateral (Hess and Smith, 1988). As the borrower-lender distance increases, lenders increasingly rely on credit scoring based on hard information, and this may result in the origination of lower quality loans (DeYoung et al., 2008). In their model, Frankel and Jin (2015) assume that soft information is only observable to the local bank consequently, the remote bank is less likely to participate in this market. However, as a result of securitisation, the remote bank can now compete in the local market as the remote bank can now leverage its ignorance: investors are unlikely to accuse the remote bank of purposefully originate low quality loans for the sake of securitisation. Thus remote banks tend to make worse lending choices as they are less efficient at collecting and processing soft information. For the first time, we examine whether issuer distance can explain the performance of MBS. We find that issuances by reputable foreign banks are of relatively low quality and were more likely to be downgraded by the rating agencies.

Finally, we analyse the predictive ability of initial yields during the boom period as well as the preceding years along the prime (AAA) and non-prime (non-AAA) dimensions. The securitisation pricing literature concurs that initial yield spreads of non-AAA bonds are strongly predictive of MBS downgrades (Adelino, 2009) and default rates (Adelino, 2009; He et al., 2016). Indeed, Adelino (2009) showed that even after conditioning on credit ratings, AAA tranche yields have no predictive power however it is unclear how this predictive ability varied during the boom period. Therefore, we extend the author's work by examining the predictability of yield spreads on prime and non-prime MBSs, especially during the boom period (2005-07). We confirm the author's initial findings that launch spreads do indeed have predictive power and this power is largely driven by

[79] Soft information in this context refers to information that is difficult to quantify and record such as borrower character and credibility.

spreads on non-AAA rated MBS bonds. However, our main finding is that launch spreads had no predictive ability in the years preceding the boom period. Thus, the predictive potency of yields in its entirety emerged during the boom period as asset quality declined and issuances grew more complex, thereby rendering pricing difficult.

This chapter is structured as follows. The next section provides a background to the securitisation process, the European securitisation market and section 6.3 reviews the extant literature. Section 6.4 describes the data and methodology used. Section 6.5 presents the results and section 6.6 concludes.

6.2. Background

It is well established that banks are comparatively efficient loan originators. They have a relative advantage at screening and monitoring borrowers hence securitisation creates an avenue for banks to specialise and profit from these tasks while reaping diversification gains by shifting risks to capital market participants who are better suited to absorb these risks (Greenbaum and Thakor, 1987; Pavel and Phillis, 1987). Rosenthal and Ocampo (1988) argue that originators' portfolios grow concentrated over time as they tend to operate in areas where they are able to manage and absorb expected losses. Hence, securitisation serves as an avenue to shed the catastrophe risk within their portfolios. Furthermore, securitisation is a more efficient approach to risk management. This efficiency is achieved by stripping and partitioning credit and prepayment risks, which in turn enhances risk sharing (Greenbaum and Thakor, 1987; Rosenthal and Ocampo, 1988).

Securitisation may also be used as an alternative source of capital to traditional debt and equity funding (Gorman, 1987; Farruggio and Uhde, 2015). Although, multiple empirical studies show that securing funding was the primary motivation for asset securitisation in Europe[80], Jones (2000) highlight the central role of securitisation in engineering regulatory capital arbitrage. Using securitisation, banks can reduce their effective risk-based capital requirements significantly, without a commensurate reduction in economic risks. For example, under Basel I, unsecured loans were not risk adjusted hence banks had to hold the same level of capital for AAA and BBB rated corporate loans of the same value. Therefore it was costlier to hold safer loans on the balance sheet. Securitisation under this regime allowed banks to concentrate a large portion of the default risk the equity/retained tranche, which is then retained while selling the higher quality tranches.

[80] Martìn-Oliver and Saurina (2007) and Cardone-Riportella et al. (2010) for Spanish banks; Affinito and Tagliaferri (2010) for Italian banks; Bannier and Hänsel (2008) for banks based in 17 European countries

Thus, according to the regulatory arbitrage hypothesis, banks will securitise safer assets while keeping riskier ones as banks perceived the capital requirements on safer assets to be excessive. Although a few studies (Berndt and Gupta, 2009; Krainer and Laderman, 2014; Elul, 2015b) show that securitised loans were riskier than portfolio loans, several studies report converse findings where securitised assets were safer than portfolio loans (Ambrose et al., 2005; Agarwal et al., 2012; Albertazzi et al., 2015; Benmelech et al., 2012; Shivdasani and Wang, 2011; Cebenoyan and Strahan, 2004).

However, this tendency of securitising high quality assets can also be explained by the reputation hypothesis. Since the placement of securitisation follows a repeated game structure, the loss of reputation creates an incentive for issuing banks to maintain or improve their credit quality standards to ensure encouraging levels of subscription and continual market access. Consequently, securitised loans should be safer than portfolio loans (Ambrose et al., 2005). In case reputation considerations fail to control opportunistic issuer behaviour, investors are expected to enforce discipline using the price mechanism. The efficacy of this mechanism is highly dependent on the quality and accessibility of information available (Fender and Mitchell, 2009).

6.2.1. The European Securitisation Market

Securitisation involves the transformation of illiquid assets such as mortgages into relatively marketable securities – mortgage-backed securities. Securitisation starts with the extension of credit such as mortgages. These mortgages are pooled and conveyed to a special purpose vehicle, an entity set up for the sole purpose of this transaction. With the help of an underwriter, typically an investment bank, the asset pool is structured into various tranches, which are then rated by credit rating agencies. Credit rating agencies evaluate the credit risk of these tranches based on either expected losses or probability of default. Finally, the rated tranches are sold as mortgage-backed securities to investors.

Although a number of securitisation transactions had been closed in Europe, modern securitisation was largely an American phenomenon in the 1980s. The development of European securitisation had been limited by the variable and absence of legal and regulatory frameworks in many European countries (Baums, 1994; Hayre, 1999). From the demand side, the dearth of analytical tools and suitable information infrastructure to support the efficient information transmission to market participants limited the viability of securitisation. Also, the lack of mortgage contract standardisation across countries and

exchange rate risks somewhat limited the appeal of cross-border transactions (Hayre, 1999).

The European market, however, expanded significantly at the turn of the millennium. Altunbas et al. (2009) attribute the sharp growth to the increase in demand from institutional investors, the developments in the storage, processing and pricing of financial data, and the introduction of the Euro. European securitisation is dominated by UK issuances while the market in the Euro area is driven by Italy, Spain, Netherlands and Germany. Furthermore, MBSs dominate securitisation issuances due to the commoditisation of mortgages and the standardisation of credit assessment procedures. Prior to the financial crisis, most of the issuances were placed with private investors however investor interest dried up during the financial crisis and has not been encouraging ever since. As of March 2017, approximately 55.6% of issuances are retained for use as collateral for ECB repo programmes.[81]

6.3. Related Literature

Securitisation involves the pooling of illiquid assets into marketable securities, which are sold on to investors. The bankruptcy-remoteness feature of these transactions, as well as the fact that investors do not observe the quality of the collateralised mortgages, limits the incentive to carefully screen the mortgagors, thereby creating the first inefficiency – adverse selection. Furthermore, the second inefficiency is the moral hazard problem where there is a limited incentive to continuing monitoring the securitised loans (Geithner and Summers, 2009; Keys et al., 2010). Securitisation advocates argue that reputation is a sufficient self-disciplining mechanism. However, Kawai (2015) contends that this argument fails to recognise the interplay between both market inefficiencies. In fact, they show that the reputation incentive can actually worsen the moral hazard problem. Buiter (2008) criticised Alan Greenspan's tenure at the Fed as failing to recognise the weaknesses associated with reputation as a self-disciplining mechanism in markets characterised by short horizons and easy exits.

Conventional wisdom suggests that reputational considerations should be a sufficient incentive for issuers to originate quality assets in the interest of investors. Also, the value of reputation as a disciplining mechanism is supported in various standard finance theories (Booth and Smith, 1986; Chemmanur and Fulghieri, 1994). Hartman-Glaser et

[81] According to industry reports by the Securities Industry and Financial Markets Association (SIFMA), 59.6% of 2016 issuances and 55.6% of issuances in the first quarter of 2017 were retained.

al. (2012) analyse a repeated security issuance game with reputation concerns. In this model, issuers can use equity retention as a credible signal of asset quality to investors who cannot directly observe asset quality. In this setup, there are upstanding and strategic/opportunistic issuers. Upstanding issuers are consistently honest about collateral quality while opportunistic issuers implement a payoff maximising strategy. Thus, opportunistic issuers are initially honest when reputation is low; go on to build a reputation only to be exploited in the future by misreporting collateral quality.

On the empirical front, using a sample of CLO, MBS, ABS, and CDOs worth $10.1 trillion, Griffin et al. (2014) find that for complex securities, reputable underwriters may issue securities that underperform during downturns. Thus, they show that this common intuition regarding the role of reputation in maintaining issuer discipline can break down with complex securities. In standard reputation models, investors can assess the quality of simple assets in good and bad states. In their model, however, securities are complicated such that investors are unable to evaluate the performance of the securities in a hypothetical economic state; hence investors only become aware of asset values in a bad economic state when this state occurs. Therefore, this creates an incentive for reputable banks to issue poor quality securities. This explains the tendency for opportunistic reputable underwriters to increase issuance volumes prior to an economic downturn. In fact, Piskorski et al. (2015) and Griffin and Maturana (2016) show that misreporting by originators and underwriters was quite common in private label mortgage backed securitisation. Furthermore, misreporting was a strong predictor of losses while issuance yields were not. This indicates that investors were unaware of these misreporting tendencies. However, it is not clear whether reputable issuers were relatively more culpable.

However, Griffin et al. (2014) focus on underwriters, and they use the activity levels of these banks in the IPO market to measure reputation in the fixed income market. In this chapter, we focus on the issuer as they are responsible for asset origination. We argue that holding the intricacies of structuring constant, high quality MBSs are created from high quality mortgages. Hence issuers who wish to retain favourable access to the securitisation markets over the long term are more likely to securitise their high quality assets

Winton and Yerramilli (2015) argue that reputable issuers are more likely to continue performing their monitoring function during periods of increased competition while less

reputable institutions tend to increase market share at the expense of monitoring existing obligors. Evidently, investors are generally willing to receive lower spreads on securitised bonds issued by reputable banks. However, He et al. (2012) show that investors demanded higher spreads on securities issued by reputable issuers in the few years prior to the financial crisis. They attribute this finding to investors' concern about the questionable relationship between issuers and rating agencies, where large issuers are better positioned to secure inflated ratings.

Concerning the demand side, a common post-crisis narrative is that investors failed to perform their due diligence. However, Adelino (2009) show that while yield spreads of non-AAA rated tranches could predict downgrades and defaults, yield spreads on AAA-rated tranches had no predictive power. Hence the failure to perform due diligence may have been as a result of complexity or incentive problems. Bolton et al. (2012) rightly, identify that although this evidence is intriguing, Adelino (2009) does not provide any insight on whether this chasm between highly rated and lower rated tranches worsened during the boom period. He et al. (2016) find that spreads on non-AAA tranches, especially single rated tranches issued by large issuers, had a strong loss predictive power. However, their results indicate that majority of AAA investors unduly depended on ratings.

6.4. Data and Empirical Framework

6.4.1. Data

Our sample comprises 4,247 residential and commercial mortgage-backed securities issued in 14 European countries[82] from 1999 to the first half of 2007. This cut-off date is chosen to circumvent changing investor attitude as investors' appetite for asset-backed securities began declining in June 2007. Originators have largely retained post-2007 European issuances. According to data published by SIFMA, issuing banks were only able to place 36% of all issuances between July and December of 2007. Thus, investors were no longer buying these bonds hence issuing banks mainly use new issues as collateral for central bank (European Central Bank) repo transactions. As of 2017, the UK and Dutch issues account for most placed issues throughout Europe.

For our study, we combine data from multiple sources as indicated in Table 6-1. First, we collect rating transition data from Bloomberg to construct our primary bond performance

[82] United Kingdom, Spain, Netherlands, Germany, Italy, Portugal, Ireland, France, Greece, Sweden, Belgium, Russia, and Ukraine

variable – ***Downgrade***. We identify bonds that were downgraded by at least one of the three largest credit ratings agencies –Standard & Poor's, Moody's and Fitch – between the issuance date and 2011, as more than half the bonds in our sample are paid off by that date. We construct ***Downgrade*** as a dummy variable where all downgrades take the value of 1 and 0 otherwise. This variable allows us to test our hypotheses on individual bonds within deals thereby increasing the number of observations available for analysis. Although the ratings of all three agencies are forward-looking, ratings issued by Moody's measure expected losses contingent on default while ratings issued by Standard & Poor's and Fitch are indicators of the probability of the securities defaulting. A prime weakness of this measure is that credit ratings are not reviewed as frequently as delinquency rates are reported. Also, credit ratings can be supported by structural features thereby weakening the link between the performance of the underlying assets and rating changes.

Second, we focus on the industry standard metric of the performance of loan portfolios – delinquencies. In this regard, we collect data on the delinquency rates of the underlying asset pools covering the first four years after issuance. Due to the sparseness of pool delinquency data prior to 2002, only 50% of the deals in the sample end up in our regressions.

Third, we collect initial tranche and deal-level data as well as the identity of the issuing bank from Dealogic and Bloomberg. Tranches in our sample are either floating rate or fixed rate bonds issued in the Euromarkets. However, we restrict our sample to floating rate tranches only to circumvent the difficulties associated with estimating a consistent benchmark yield curve for each fixed rate tranche. For the floating rate notes, we use the quoted spreads in excess of the relevant benchmark (3m-Libor/3m-Euribor) as a measure of funding cost. These spreads represent extra compensation for credit, liquidity and optionality risks, however, according to Fabozzi and Vink (2015), the optionality risk in the price for floating rate tranches is marginal. Therefore, the initial spreads reflect the risk premiums compensating for liquidity risk and credit risk. Rather than assume that all securities are issued at par, we restrict our sample to tranches issued at par to preclude distortions of discounts or premiums on the actual yield spreads. This results in a final sample of 4,247 tranches from 733 mortgage-backed deals.

Table 6-1 Definitions and sources of independent variables

Variable	Description	Source
Dependent Variables		
Downgrade	Equals 1 if the relevant bond/tranche was ever downgraded by any of the rating agencies from issuance up to 2011	Bloomberg
90+ Day Delinquency (3rd Year)	The average 90+ day delinquency rate (%) in the third year of issuance	Bloomberg
90+ Day Delinquency (4th Year)	The average 90+ day delinquency rate (%) in the fourth year of issuance. An increasing rate indicates deterioration in asset quality	Bloomberg
90+ Day Delinquency (3 Year Average)	The average 90+ day delinquency rate (%) over the first three years of issuance	Bloomberg
90+ Day Delinquency (4 Year Average)	The average 90+ day delinquency rate (%) over the first four years of issuance. This variable captures variations in the earlier years of issuance.	Bloomberg
Deal Level Variables		
TopIssuer	Top Issuer is a dummy variable that takes the value of 1 if the issuer is within the top 10 issuers based on volume, and 0 otherwise. There are 12 issuers on this list as the bottom 3 issuers had the same market share over the aggregate period. These issuers individually accounted for more than 2% in terms of total market volume during this period. Jointly, they account for 33.78% of the market activity	Authors' calculation

Variable	Description	Source
3 CRA Reported	The number of initial ratings reported by credit rating agencies/issuer for a tranche. This variable is constructed as a binary variable that takes the value of 1 if the relevant tranche is rated by 3 agencies and 0 otherwise. We use this variable to control for rating shopping.	Bloomberg
Weighted Average Loan to Value (WALTV)	Weighted average loan to value (WALTV) measures the quality of a pool of mortgages; where loan to value (LTV) is the ratio of the mortgage loan to the value of the real estate. Hence, high LTV ratios correspond to lower equity. WALTV is computed as the average of the loan-to-value ratios of all the loans within the pool, weighted by the respective loan amount relative to the value of the asset pool.	Bloomberg
Number of tranches	Number of tranches per deal	Dealogic/Bloomberg
Number of ratings	Number of distinct ratings within a deal	Bloomberg
Ratings/tranches	The ratio of the number of distinct ratings to the number of tranches. We use this variable as a measure of complexity such that deals with more rating classes for given number of tranches are considered to be more opaque and riskier	Authors' calculation
Deal Size	The value of the total deal in €millions	Dealogic
Retained	This is a binary variable that takes the value of 1 when at least one tranche is retained as per the notes accompanying each transaction	Dealogic

Variable	Description	Source
Tranche Level Variables		
Tranche Size	The value of the tranche deal in €millions	Dealogic
Spread	The quoted margin (in basis points) in excess of the relevant benchmark. This spread measures the compensation required by investors for the risk borne. It is expected that this margin still has predictive value even after conditioning on credit ratings	Dealogic
LogSpread	The natural logarithm of the quoted margin; to correct a positive skew in the distribution of the Spread	Authors' calculation
Year	The year of deal issuance, ranging from 1999-2007. We expect that the general quality of the issuances declined throughout the growth period	Dealogic
Boom	This is a dummy variable that equals 1 if the relevant bond was issued between 2005 and 2007, and 0 otherwise	Authors' calculation
Distance	This is a binary variable that takes the value of 1 the nationality of the issuer's parent differs from the country of the issuer's operations	Authors' calculation
Collateral	This is a factor variable indicating whether a deal is backed by either residential or commercial mortgages	Dealogic
Weighted Average Life	The effective maturity of the relevant tranche subject to prepayment speed assumptions.	Bloomberg

Variable	Description	Source
Credit rating	The reported credit ratings are mapped onto an ordinal numerical scale where AAA=1, AA+=2 and so on. These are used as indicator variables within the regressions, and the numeric values are of no significance.	Dealogic/Bloomberg
Bank Characteristics		
Total Assets	Total assets is used as a proxy for bank size and scale of operations	Orbis (previously Bankscope)
Net Loans/ Total Assets	This variable measures diversification of the asset base. More specifically, it measures the proportion of total assets made up of loans. A higher ratio may indicate low liquidity	Orbis (previously Bankscope)
Deposits/Total Assets	As a measure of funding diversification, this ratio measures what fraction of assets are funded by deposits	Orbis (previously Bankscope)
Equity/Total Assets	Leverage - The ratio of total equity to total assets.	Orbis (previously Bankscope)
Loan Growth	Annual percentage change in the value of gross loans	Orbis (previously Bankscope)
Loan Loss Reserves/Gross Loans	The ratio of loan loss reserves to gross loans issued	Orbis (previously Bankscope)

Finally, in an attempt to substantiate our results, we also collect bank-level data from Bankscope (now Orbis Bank Focus) to control for the influence of bank characteristics on the performance of the mortgage-backed securities in our sample. The dependent and explanatory variables, used in our empirical models and analyses are explained in Table 6-1 and the following sub-sections.

6.4.1.1. Dependent Variables

In order to answer our research questions on how issuer reputation influences bond performance, we use credit rating downgrades and defaults as proxies of tranche and pool (deal) performance respectively.

6.4.1.2. Rating Downgrades

Although recent evidence (Fabozzi and Vink, 2012a, b, 2015; He et al., 2012) indicates that investors incorporated a variety of factors into pricing asset backed securities, credit ratings are the single most important determinant of bond prices at origination. Structured finance credit ratings are forward-looking credit opinions that account for credit risks of the underlying assets, structural risks and counterparty risks. Hence, we assume that ratings account for delinquency rates. However, structural features can be engineered to stave off rating downgrades. For instance, high levels of credit protection can result in the maintenance or upgrade of an existing credit rating. Therefore, credit ratings measure the performance of the underlying assets as well as structural features. Given that no organised secondary market for mortgage-backed security exists, pricing data is very scant. Therefore, we rely on credit rating downgrades as a measure of deterioration in at least one or more of these dimensions. We collect credit ratings at issuance and rating changes of all bonds from issuance until 2011. Subsequently, we convert the ratings to a numerical point scale, where AAA/Aaa=1, AA+/Aa1=2 and so on. Thus, ***Downgrade*** is defined as a negative migration to a lower rating for instance from AAA to AA+. Downgrades are typically triggered by adverse changes in credit risk, counterparty risk or structural risk associated with how the deal was engineered. Following Adelino (2009), we model downgrades as a binary variable where 1 represents downward rating adjustments as at December 2011 relative to the rating awarded at issuance while 0 represents upgrades or maintained ratings. Therefore, this variable represents bonds that suffered at least one downgrade by any of the rating agencies.

6.4.1.3. Defaults

We define default as the proportion of loan pools that are 90+ days delinquent. We do not observe actual defaults in our dataset however we rely on delinquency rates as a measure

of severely underperforming loans (Avery et al., 1996). A loan is delinquent when an obligor fails to make a scheduled payment. As the payments are typically made in monthly intervals, lenders typically classify delinquent loans into 30, 60, 90, or more days delinquent relative to the duration the earliest missed payment has been overdue. The delinquency rate is simply the ratio of the number of loans with delinquent payments to the total number of loans within the asset pool

Delinquency rates are customarily used as measures of performance in the lending industry as the definition of default varies significantly.[83] This metric has also been increasingly used as a measure of performance in academic research.[84] Furthermore, the Basel Committee classifies obligations beyond 90 days overdue as unlikely to be repaid (BCBS, 2002). Also, we focus on 90+ delinquencies (serious delinquencies), as loans in this category are more likely to default. Although not all delinquent loans eventually default, Keys et al., (2010) show that approximately 66% of loans that are 90 days delinquent tend to default within the next 12 months. Similarly, Tracy and Wright (2012) show that mortgages entering the 90+ delinquency bucket have a reasonably low cure rate[85] of approximately 23.3%. Furthermore, 90% of 90 day+ delinquent subprime loans usually transition to foreclosure (Keys et al., 2008).

SIFMA also issued a standard default assumption for analysing mortgage defaults where mortgage default rates peaks between 30 and 60 months after origination (Hu, 2011). Using historical data, Soyer and Xu (2010) find that mortgage default rates tend to peak between 40 and 50 months after origination. Securitisation deals are typically closed within three to twelve months, and issuers are typically required to replace mortgage loans that are delinquent within a specified warranty period after the deal closes. However, we do not have data on seasoning of the loan pool. Hence we are unable to ascertain the exact stage in the life cycle of the loans within the pool.

To circumvent this limitation, we plot the delinquency data over the first four years. We find that the highest point of the distribution tends to occur within the third and fourth year as per Figure 6-1. Evidently, delinquency rates are highest in the third (fourth) year

[83] Experian (2007) defines default as payments that are at least six months overdue while Equifax (2016) only considers a loan to be in default if payments are more than 60 days overdue.

[84] See Demyanyk and Van Hemert (2011); Keys et al. (2010); Keys et al. (2012); Dell'Ariccia et al. (2012)

[85] The cure rate refers to the percentage of delinquent loans that are either repaid or brought current by making missed payments.

for 2 (3) out of 5 vintages, hence we focus on the delinquency rates in the third and fourth year as our dependent variables. Initially, we compute the average delinquency rates in the third and fourth year after issuance. Subsequently, as suggested by Guettler et al. (2011), we compute the average delinquency rates over the first three and four years to obtain a summary measure that captures the delinquencies within the initial years as well. Although our 36-48 month range is rather crude, it falls within the 30-60 month and 40-50 month bands indicated above.

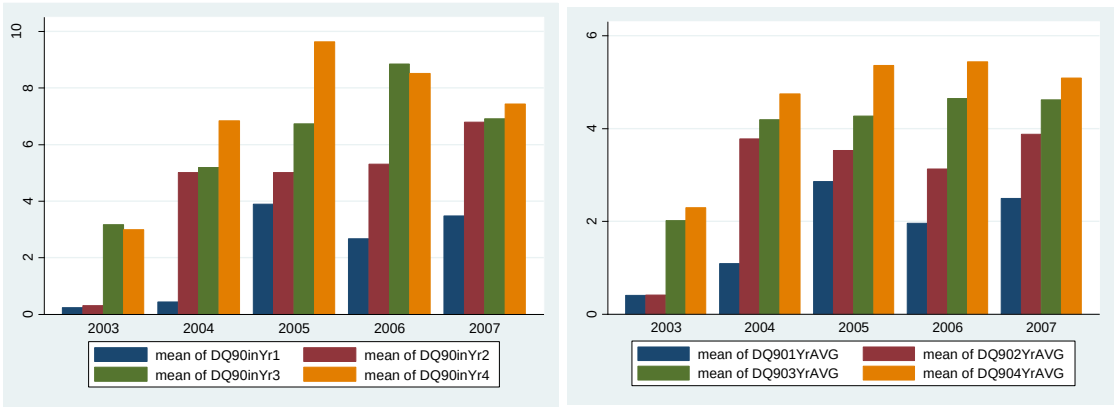

Figure 6-1 Distribution of delinquency rates

6.4.1.4. Independent Variables

6.4.1.4.1. Reputation

Frequent securitisers tend to build a reputation, and hence they can issue mortgage backed securities at relatively lower costs. It is also argued that reputable issuers are more likely to continue performing their monitoring function during periods of increased competition while less reputable institutions tend to increase market share at the expense of monitoring existing obligors (Winton & Yeramilli, 2015). Hence we expect that bonds issued by reputable market players to outperform those issued by their rivals who securitise less frequently.

The reputation variable (*Top Issuer*) is computed based on the market share of the issuing banks. Market share or market share-based measures have been widely used in the existing literature as empirical proxies for reputation.[86] Following the intuition in Fang (2005), we use a binary variable to capture the qualitative difference between large and small issuers. *Top Issuer* is a dummy variable that takes the value of 1 if the issuer features in the list top 10 issuers by market volume, and 0 otherwise. There are 12 issuers

[86] See McDonald and Fisher (1972), Beatty and Ritter (1986), Simon (1990), De Long (1991), Megginson and Weiss (1991), Beatty and Welch (1996), Fang (2005) and Guettler et al (2011)

satisfying this criterion, and they jointly represent 33.78% of issuance levels (see Table 6-2, Panel A).[87]

Table 6-2 Sample characteristics

Panel A: Top issuing and trustee banks (Number of deals)

Issuing Banks	%	Trustees	%
Lehman Brothers Holdings Inc.	4.90%	Stichting Security	12.86%
Ally Financial Inc.	4.39%	Bank of New York	11.94%
Morgan Stanley	3.37%	JPMorgan Chase & Co.	9.90%
Barclays Bank Plc	2.96%	Deutsche Bank	8.88%
Royal Bank of Scotland Group Plc	2.76%	Capita Plc	7.65%
NRAM PLC	2.55%		
Kensington Group Plc	2.35%		
Credit Suisse AG	2.24%		
Commerzbank AG	2.14%		
Banco Santander SA	2.04%		
Deutsche Bank AG	2.04%		
HBOS Plc	2.04%		
	33.78%		51.23%

Panel B: Tranche distribution by rating categories and underlying collateral

Collateral	Prime	Non-Prime	Total
Commercial mortgages	257	643	900
Residential mortgages	1,326	2,021	3,347
Total	1,583	2,664	4,247
Percentage	37%	63%	100%

Panel C: Tranche distribution by Number of Ratings Secured

No. of Ratings	CMBS	RMBS	Total
1	55	206	261
2	581	1,205	1,786
3	264	1,936	2,200
Total	900	3,347	4,247

6.4.1.4.2. Credit Ratings

We incorporate two credit rating variables in our regressions – *Credit Rating* and *3 CRA Reported*. Firstly, the securitisation pricing literature overwhelmingly concurs that credit ratings explain substantial variation in initial yields. For instance, Fabozzi and Vink (2012a) find that credit ratings explain 74% of the variation in the yields of UK RMBS. Other papers find similar evidence (Fabozzi and Vink, 2012b; Cuchra, 2005). This is

[87] There are 12 issuers on this list because the bottom 3 issuers had the same market share over the aggregate period.

expected since mortgage-backed securities are typically structured by underwriters, in consultation with rating agencies, to achieve a specific rating. All deals in our sample are rated by at least one of the three well-renowned credit rating agencies – Standard & Poor's, Moody's and Fitch.[88] Dealogic reports a composite credit rating that combines the credit ratings from different rating agencies for each tranche. The use of composite credit ratings is quite common in the corporate bond literature (Campbell and Taksler, 2003) as well as the securitisation literature (Fabozzi and Vink, 2015; Cuchra, 2005). We map the composite ratings onto a numerical scale where AAA=1, AA+=2 and AA=3 and so on, in order to compute the summary statistics for this variable. However, we only include an indicator for each rating in all our regressions. Furthermore, we categorise the AAA/Aaa rated bonds as prime and bonds with other ratings as non-prime in the latter aspect of our analyses (See Table 6-2, Panel B).

Apparently, rating shopping, where issuers solicit ratings from multiple agencies and then only reporting the favourable ratings or ratings from agencies with lenient standards, was common practice in the securitisation industry (Adelson, 2006). Sangiorgi and Spatt (2016) theoretically show that investors adjust prices to account for potential rating bias when issuers report fewer ratings than the number of ratings available to the issuer. Furthermore, empirical evidence shows that single rated deals tend to suffer more severe adverse credit migrations relative to deals with multiple ratings (Benmelech and Dlugosz, 2010). He et al. (2016) also find that cumulative losses are higher on solely rated MBS deals compared to deals with multi-rated deals. Although rating shopping is beyond the remit of our study, given the evidence of its influence on bond performance, we control for this phenomenon using a dummy variable *3 CRA Reported.* This variable takes the value of 1 where a tranche is rated by all 3 agencies (less likelihood of rating shopping) and 0 otherwise (See Table 6-2, Panel C for the distribution of the number of ratings).

Additionally, Fabozzi and Vink (2012b) provide empirical evidence indicating that investors consider a number of credit factors when pricing European ABS deals. These credit factors include credit enhancement, collateral, and country of origination.

6.4.1.4.3. Credit Enhancement

The most popular form of credit enhancement in securitisation is *subordination.* Consequently, this variable features as a standard control variable in the securitisation

[88] Based on turnover in 2014, S&P, Moody's and Fitch controlled 91.89% of the credit ratings sector in the EU (ESMA, 2015)

literature (He et al., 2016; Fabozzi and Vink, 2012b; He et al., 2012). Subordination is exemplified in the waterfall structure (senior-subordinate) of cash flow/loss distribution. Under a waterfall structure, the priority of cash flow distribution follows a descending order of seniority while losses are allocated from the bottom-up (from the equity tranche to the senior-most tranche). For each tranche, the subordination level is computed as the value of tranches in the same deal that have an equal or higher rating than the given tranche as a fraction of the total deal value. Although this variable is our main measure of deal structure, this variable also represents the level of protection offered by lower tranches in each deal.

Furthermore, we control for tranche retention in our regressions. Gorton and Pennacchi (1989); Gorton and Pennacchi (1995) show that securitisation (loan sales) decreases banks' screening and monitoring incentives however this misalignment of incentives can be addressed by the issuer retaining some exposure to the issue. Retained tranches are essentially credit enhancement devices to shield investors from the effects of the originator's perverse incentives (Franke et al., 2012). Our dataset does not explicitly indicate which tranches are retained however deal notes state whether at least one tranche was retained in the deal. We account for retention by constructing ***Retained*** a binary variable indicating deals in which certain tranches of the deal were retained by the originator.

6.4.1.4.4. Collateral

Securitisation instruments are usually classified by collateral. Our sample contains tranches backed by two distinct types of collateral: residential and commercial mortgages (See Table 6-2, Panel B). CMBSs are significantly different from RMBSs. CMBSs are business loans secured against commercial real estate while RMBSs are residential mortgage loans. When rating residential mortgage-backed securities, agencies pay more attention to underwriting standards and historical loss data. However, the focus of agencies when rating commercial mortgage backed securities, is the income earning potential of the property. Also, prepayment risk has been historically lower for CMBS due to the covenants stipulating lock-in periods and prepayment penalties (Kothari, 2006). We introduce ***Collateral*** as a dummy variable that takes the value of 1 for residential mortgage backed securities and 0 for commercial backed securities.

Concerning collateral quality, Demyanyk and Van Hemert (2011) finds that combined loan-to-value ratio is one of the most important determinants of loan performance.

Consequently, we use the weighted average loan to value ratio at origination (***WALTV***) as a measure of borrower leverage to account for credit risk that credit ratings fail to capture. Loan-to-value (LTV) represents loan value as a percentage of the value of the collateral backing the said loan. ***WALTV*** is calculated as the average, weighted according to the loan amount, of the LTV of each single loan in the pool.

6.4.1.4.5. Country of origination

Drawing on the information based theories of banking (Stein, 2002; Detragiache et al,2008;Mian, 2006;Berger et al, 2008), where foreign banks encounter difficulties in evaluating opaque local borrowers, we are interested in investigating whether the performance of bonds issued by foreign banks differed from those issued by domestic banks. We construct ***Distance***, a binary variable that takes the value of 1 the nationality of the issuer's parent differs from the country of the issuer's operations. Table 6-3 presents the sample distribution according to the country of origination. Tranches backed by mortgages originated in the UK account for more than half of our sample. Other significantly active countries include Spain, Netherlands, Germany and Portugal account for approximately 38% of our sample.

Table 6-3 Country of origination

	CMBS	RMBS	Total	Percentage
United Kingdom	451	1885	2336	55.00%
Spain	6	568	574	13.52%
Netherlands	9	369	378	8.90%
Germany	189	152	341	8.03%
Italy	45	279	324	7.63%
Portugal		80	80	1.88%
Ireland	4	70	74	1.74%
France	44	19	63	1.48%
Greece		25	25	0.59%
Sweden	7	14	21	0.49%
Belgium		18	18	0.42%
Russia		9	9	0.21%
Switzerland	1	1	2	0.05%
Ukraine		2	2	0.05%
	756	3491	4247	100.00%

6.4.1.4.6. Complexity

As explained in section 6.4.1.4.2 above, we control for credit ratings in all our specifications. However, Opp et al. (2013) and Furfine (2014) show that increased deal

complexity may result in rating inflation. Furfine (2014) further show that complexity proxied by the number of tranches is correlated with poor loan performance. Therefore, we initially account for deal complexity using the number of tranches per deal. Furthermore, we find that most deals contain multiple tranches with identical ratings but with different issue currency and weighted average life. In practice, It has been suggested that these additional tranches are usually created to meet needs of the broad range of investors (Cuchra and Jenkinson, 2005). Consequently, we create a refined measure of complexity as the ratio of the number of uniquely rated tranches to the total number of tranches in a deal – ***Ratings/Tranches***.

6.4.1.4.7. Other deal and tranche characteristics

We account for tranche size using principal values (also used as a measure of complexity in Furfine, 2014) and control for interest rate risk exposure using the ***Weighted Average Life*** of each tranche. Based on prepayment speed assumptions, the weighted average life of a bond is computed as the weighted average time until each monetary unit of principal remains outstanding. The weighted average life accounts for prepayment risk and hence will always be shorter than the nominal maturity of the underlying mortgages.

In our robustness tests, we control for common bank characteristics to ensure that our findings are not driven by time-varying underlying issuer characteristics. These include size (Total Assets), asset diversification (Net Loans/ Total Assets), funding diversification (Deposits/Total Assets), leverage (Equity/Total Assets), Loan Growth and asset quality (Loan Loss Reserves/Gross Loans

6.4.2. Empirical Model: Reputation

We rely on two main indicators of performance: downgrade and delinquency. Following, Adelson and Bartlett (2005) and Adelino (2009), the first set of models employ credit rating migrations (Downgrade) as the dependent variable and the independent variables include, issuer reputation (Top Issuer), rating shopping (3 CRA Reported), Distance, weighted average loan to value (WALTV) and control variables. The baseline logistic regression model is specified as follows

$$Downgrade = \beta_0 + \beta_1 TopIssuer + \beta_2 3\ CRA\ Reported + \beta_3 Distance + \beta_4 WALTV + Controls(Years, Collateral, Size, LogWAL, Complexity, Retained) + \varepsilon \quad (1)$$

In subsequent iterations of this model, the interaction of ***TopIssuer*** with ***Boom*** is used to determine whether reputable issuers sold relatively poor quality securities during the growth period (2005-07). We interact ***TopIssuer*** with ***3 CRA reported*** to ascertain whether bonds with 3 ratings issued by reputable issuer were riskier. The interaction of ***TopIssuer*** and ***Distance*** allows us to explore the performance of bonds issued by foreign banks. Finally, we interact ***TopIssuer*** with ***AAA*** rated bonds to assess the performance of highly rated bond issued reputable issuers.

Using ***Downgrade*** as our dependent variable inherently assumes that downgrades represent deterioration in underlying asset quality. However, rating changes may reflect changes in the structural integrity of the deal as well as changes in the quality of the underlying asset pool. To relax this assumption, we use 90+ day delinquency rates to measure pool quality. Consequently, we specify another, but similar model to Equation 1 based on deal level variables only as delinquency rates reflect pool wide performance and are not tranche specific.

$$90 + day\ Delinquency = \beta_0 + \beta_1 TopIssuer + \beta_2 TopIssuer * Boom + \beta_3 3\ CRA\ Reported + \beta_4 Distance + \beta_5 WALTV + Controls\ (Years, Collateral, DealSize, Complexity, Retained) + \varepsilon \quad (2)$$

Subsequently, we control for bank level characteristics to test the reliability of our inferences. Also, we make an innocuous assumption that unobservable factors that might affect both dependent and independent variables simultaneously are time invariant. Thus, we introduce entity fixed effects to exploit within-group variation over time and control for unobserved heterogeneity and time fixed effects to control for market conditions and macroeconomic trends associated with the relevant issuance years. All regressions are estimated with heteroscedasticity-robust standard errors clustered at the issuer level to control for heteroskedasticity and control for correlation between deals from the same issuer.

6.4.3. Empirical Model: Pricing

We take our analysis one step further by using yield spreads as an alternate predictor that subsumes the effects of reputation, deal and tranche characteristics.

Credit rating agencies have come under increased scrutiny because of their role in precipitating the seizure of the securitisation markets in 2007/08. The models used by

credit rating agencies are susceptible to honest errors and manipulation (Ashcraft and Schuermann, 2008). As explained by Benmelech and Dlugosz (2009), both possibilities are not mutually exclusive. On the one hand, the authors argue that rating agencies underestimated defaults across borrowers. Rating disagreement is less likely for simple assets hence the incentive for rating shopping is limited. However, for complex securities, where rating disparities are non-trivial, the incentive for shopping emerges (Skreta and Veldkamp, 2009). On the other hand, it has been argued that the compensation structure of the rating industry created incentives for rating inflation where agencies deliberately relaxed model assumptions to arrive at favourable opinions in order to win and retain clients (Griffin et al., 2013; Griffin and Tang, 2012). The common narrative that investors outsourced their due diligence responsibilities to credit rating agencies is inconsistent with the tenets of an efficient market where prices are reliable metrics of value and readily incorporate available information.

This aspect of the analysis seeks to ascertain whether investors solely relied on credit ratings and whether this tendency varied across MBS clientele. Several theoretical models (Boot and Thakor, 1993; DeMarzo, 2005) identify two types of investors: less informed investors and informed investors. Because of their information handicap, less informed investors tend to invest in higher quality information insensitive assets while informed investors leverage their information advantage to invest lower rated assets. Based on a sample of US MBS Adelino (2009) presents evidence that investors in triple-A notes were differentially informed about asset quality. The author finds that launch spreads of residential mortgage backed securities can predict future downgrades and even default, but this predictive power is restricted to spreads of non-AAA tranches. However, as highlighted by Bolton et al. (2012), it is unclear whether the overreliance of AAA investors on credit ratings varied during the period of increased issuance prior to the financial crisis. Consequently, we use Adelino (2009)'s specifications in Equations 3 and 4 as our benchmark model. Subsequently, we run similar models for the boom period to examine the predictive ability of yield spreads across the investor sophistication spectrum.

We rely on the logistic regression model specified by the author with rating fixed effects.

$$Downgrade = \beta_0 + \beta_1 Logspread_i + \beta_2 Credit\ Rating_i + \beta_3 Tranche/Deal\ \ Characteristics_i + \varepsilon_{it} \quad (3)$$

$$Downgrade = \beta_0 + \beta_1 Logspread_i * AAA + \beta_2 Credit\ Rating_i + \beta_3 Tranche/Deal\ Characteristics_i + \varepsilon_{it} \quad (4)$$

If credit ratings are informationally efficient then yield spreads should not be significant predictors of performance. We, therefore, aim to examine the predictive ability of yield spreads, especially on the highest (AAA/Aaa) rated bonds issued during the boom phase of securitisation transactions in Europe. Our model introduces an interaction of spreads and the highest rating class – ***LogSpread#AAA*** – to examine the predictive power of yield spread on AAA/Aaa rated tranches.

6.4.4. Descriptive Statistics

Table 6-4 presents summary statistics of our sample at the deal, tranche and bank levels. The deal and tranche level variables are described below.

6.4.4.1. Deal Level Variables

For the deal level analysis, we use default frequencies (delinquency rates) as our dependent variables. These variables represent the proportions of the collateral pool that are at least 90 days delinquent. We use the average delinquency rate in the third and fourth years of issuance as measures of pool performance. Furthermore, we use the average delinquency rates over the three and four year period after issuance to capture pool performance in the earlier years. The mean delinquency rate in the 3rd year of issuance is 5.26% compared to a 3-year average delinquency rate of 3.31% for 432 deals. Similarly, the mean delinquency rate in the fourth year stood at 5.71% in the 4th year compared to a 3.72% 4-year average delinquency rate on 465 deals. This trend indicates that delinquency rates must have been much lower in the first two years of issuance. It is also worth noting that distribution of the default frequencies is quite uneven; the median delinquency rates range from 0.72% to 1.19% while the mean ranges from 3.31% to 5.71%.

Demyanyk and Van Hemert (2011)find that combined loan-to-value ratio is one of the most important determinants of loan performance. Consequently, we use the weighted average loan to value ratio at origination (WALTV) as a measure of risk embedded in the underlying loans. The mean (median) WALTV of our sample is 71.39% (71.92%). The typical deal is worth €1.190bn and contains at least 6 tranches with 3 distinct rating classes resulting in an average complexity measure (Number of ratings/Number of tranches) of 75.33%.

6.4.4.2. Tranche Level Variables

The mean yield spread is 66.45 basis points (bps) over the whole sample with a standard deviation of 91.67 bps. Weighted average life, proxies the interest rate risk associated with a tranche. Due to the propensity of obligors to prepay their mortgages, nominal maturity is a less reliable measure of the term of MBSs. Based on prepayment speed assumptions, the weighted average life is computed as the weighted average time until each monetary unit of principal is repaid. Hence, the weighted average life will always be shorter than the nominal maturity of the underlying mortgages. The mean (median) weighted average life of the sample is 5.44 years (5.10 years). The average principal amount of tranches in our sample equals €224m, and the average credit rating of 4.73 corresponds to Aa3 (AA-) on the Moody's (S&P/Fitch) scale.

Table 6-4 Descriptive statistics

Panel A: Tranche Level Variables	**Deals**	**Tranches**	**Mean**	**St. Dev**	**25th percentile**	**Median**	**75th percentile**
Spread (basis points)	733	4247	66.45	91.67	18.00	34.00	73.00
Weighted Average Life (years)	733	4247	5.44	2.99	3.73	5.10	6.93
Tranche Value (Euro m)	733	4247	224.00	443.00	20.60	47.50	226.00
Credit Rating Average	733	4247	4.73	3.83	1.00	3.33	8.50
Subordination	733	4247	8.1%	10.4%	1.6%	5.0%	10.7%
Panel B: Deal Level Variables	**Deals**	**Tranches**	**Mean**	**St. Dev**	**25th percentile**	**Median**	**75th percentile**
90+ Day Delinquency (3rd Year)	432	2929	5.26%	8.75%	0.17%	1.04%	5.31%
90+ Day Delinquency (4th Year)	465	3048	5.71%	9.82%	0.24%	1.19%	5.34%
90+ Day Delinquency (3 Year Average)	432	2929	3.31%	5.53%	0.13%	0.72%	3.55%
90+ Day Delinquency (4 Year Average)	465	3048	3.72%	6.18%	0.18%	0.88%	3.36%
Weighted Average Loan-to-Value	733	4247	71.39%	12.35%	63.33%	71.92%	77.54
Number of tranches	733	4247	6.06	3.95	4.00	5.00	7.00
Number of Ratings	733	4247	3.86	1.40	3.00	4.00	5.00
Ratings/Tranches	733	4247	75.33%	0.25	0.60	0.80	1.00
Deal Value (Euro m)	733	4247	1,190.00	1,420.00	495.00	804.00	1,300.00
Panel C: Bank Characteristics	**Deals**	**Tranches**	**Mean**	**St. Dev**	**25th percentile**	**Median**	**75th percentile**
Total Assets (Euro bn)	440	2767	429.28	550.35	16.87	123.32	720.18
Tier 1 Ratio	440	2767	9.27%	10.55%	6.39%	7.60%	9.45%
Net Loans/Total Assets	440	2767	55.76%	23.46%	36.99%	57.61%	72.26%
Deposits to Total Assets %	440	2767	33.93%	19.43%	25.77%	33.01%	44.07%
Loan Loss Reserves/Loans %	391	2382	2.28%	6.43%	0.88%	1.49%	2.04%
Loan Growth %	428	2717	2.13%	19.73%	-2.81%	0.08%	5.15%

6.5. Regression Results

In this section, we explain our main results. We initially run our reputation baseline model using ***Downgrade*** as the dependent variable. We perform similar analyses using default frequencies (delinquency rates) in the third and fourth year of issuance on issuer reputation and deal characteristics. Subsequently, we run the same regressions using the default frequencies over the first 3 and 4 years as dependent variables.

6.5.1. Does issuer reputation explain future performance?

6.5.1.1. Downgrade

Table 6-5 presents the results of the logistic regression on the full sample. We regress ***Downgrade*** on issuer reputation (***TopIssuer***), tranche and deal characteristics, and other control variables.

Consistent with our expectations, ***TopIssuer*** is negative and highly statistically significant in all regressions indicating that generally, bonds issued by frequent issuers are less likely to be downgraded. ***3 CRA Reported*** is not statistically significant in any of our regressions, thereby indicating that even if ratings were shopped, this had no bearing on the probability of a downgrade. However, ***Distance*** is positive and weakly significant, thus, bonds sold by foreign issuers performed worse than those issued by domestic rivals.

In columns 2 to 5, we interact ***TopIssuer*** with ***Boom***, ***3CRA Reported***, ***Distance*** and ***AAA*** respectively. ***TopIssuer#Boom*** and ***TopIssuer#3CRA Reported*** are not significant at any of the conventional levels. Therefore, issuances from frequent issuers during the boom were no different from deals issued by less reputable institutions. Similarly, the interaction of ***TopIssuer*** and ***3CRA Reported*** in column 3 is of no significance in determining the likelihood of a downgrade.

In column 4 however, we find that ***TopIssuer#Distance*** is positive and significant at the 95% confidence level. Thus, bonds issued by reputable foreign issuers are more likely to be downgraded. We expected bonds issued by foreign banks to be riskier due to the informational disadvantages they face in host economies. However, it seems this tendency is confined to frequent (reputable) foreign issuers.

Table 6-5 The impact of reputation on performance (Downgrades)

This table reports logistic regressions of the Downgrade of European MBS tranches on issuer reputation, collateral, deal, and tranche-level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. TopIssuer is a binary variable set to 1 if an issuer is in the top ten issuers in terms of volume and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. 3CRA is a dummy variable equal to 1 if the relevant deal was rated by 3 agencies and 0 otherwise. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. LogWAL is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Tranche Size is the natural logarithm of tranche face value in euros. Credit Rating dummy variables indicate initial effective tranche credit rating. Collateral is a factor variable indicating whether the relevant bond is backed by commercial or residential mortgages. Issuer and trustee fixed effects is a set of dummy variables indicating each issuer and trustee respectively. Time is a factor variable consisting of the issuance periods annually. The omitted categories are commercial mortgage backed notes, and issuance year 1999. Standard errors in parentheses are clustered at the issuer level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)	
	Downgrade		Downgrade		Downgrade		Downgrade		Downgrade		Downgrade	
TopIssuer	-2.728***	(0.843)	-2.810***	(0.853)	-2.753***	(0.816)	-3.688***	(0.965)	-2.545***	(0.829)	-3.661***	(0.951)
TopIssuer#Boom			0.866	(0.532)							0.839	(0.530)
TopIssuer#3CRA					0.197	(0.641)					0.343	(0.643)
TopIssuer#Distance							2.099**	(0.950)			2.145**	(0.922)
TopIssuer#AAA									-0.567	(0.364)	-0.658*	(0.354)
Distance	0.802*	(0.447)	0.800*	(0.452)	0.792*	(0.442)	-0.493	(0.905)	0.807*	(0.448)	-0.505	(0.857)
3CRA	-0.182	(0.343)	-0.225	(0.350)	-0.316	(0.386)	-0.180	(0.344)	-0.159	(0.338)	-0.417	(0.355)
Retained	0.445	(0.327)	0.504	(0.340)	0.448	(0.329)	0.392	(0.323)	0.440	(0.329)	0.448	(0.338)
Ratings/Tranches	-1.434*	(0.833)	-1.457*	(0.811)	-1.423*	(0.826)	-1.468*	(0.837)	-1.454*	(0.827)	-1.485*	(0.800)
WALTV	4.713**	(2.075)	4.728**	(2.009)	4.715**	(2.066)	4.605**	(2.044)	4.598**	(2.089)	4.478**	(1.971)
Subordination	-3.611	(2.313)	-3.820*	(2.320)	-3.608	(2.317)	-3.488	(2.333)	-3.473	(2.294)	-3.542	(2.299)
LogWAL	2.343***	(0.392)	2.351***	(0.398)	2.342***	(0.390)	2.357***	(0.390)	2.364***	(0.395)	2.384***	(0.396)
Tranche Size	0.156	(0.118)	0.156	(0.118)	0.157	(0.121)	0.137	(0.123)	0.142	(0.121)	0.123	(0.127)
Residential Mortgages	-1.952***	(0.705)	-1.931***	(0.720)	-1.981***	(0.702)	-2.067***	(0.740)	-1.911***	(0.695)	-2.053***	(0.735)

	(1)	(2)	(3)	(4)	(5)	(6)
	Downgrade	Downgrade	Downgrade	Downgrade	Downgrade	Downgrade
Control for						
Credit Ratings	Yes	Yes	Yes	Yes	Yes	Yes
Trustee fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Issuer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	3513	3513	3513	3513	3513	3513
Pseudo R-squared	0.512	0.514	0.512	0.515	0.513	0.518
AIC	2484.487	2478.675	2484.122	2467.109	2480.337	2459.535
BIC	2909.819	2910.170	2909.453	2873.948	2911.833	2891.030

In column 5, we introduce ***TopIssuer#AAA*** into the baseline model in an attempt to ascertain the extent to which the highest quality ratings on bonds issued by reputable issuers are revised downwards. This interaction is statistically insignificant. In column 6, our prominent findings remain consistent when we include all the interactions in the baseline model, and ***TopIssuer#AAA*** is now significant at the 10% level. Bonds sponsored by reputable issuers are generally less likely to face deterioration in quality. Furthermore, as much as AAA rated bonds sold by frequent issuers are less likely to decline in quality. However, issuances by reputable foreign sponsors are more likely to suffer downgrades.

We replicate the regression model in column 6 of Table 6-5 while controlling for the sponsoring banks' characteristics, the results of which are reported in Table 6-6. We control for size (Total Assets) in all the regressions, asset concentration (Net Loans/ Total Assets) in column 1, diversification of funding sources (Deposits/Total Assets) in column 2, leverage (Tier 1 Ratio) in column 3, Loan Growth in column 4, Loan Loss Reserves/Gross Loans in column 5. Column 6 controls for all these bank characteristics simultaneously.

Similar to the findings highlighted above, ***TopIssuer*** is negative and statistically significant at the 1% level in columns 1 to 4. However, this variable loses its significance after controlling for the loan loss reserve ratio in columns 5 and 6. ***TopIssuer#Boom*** remains negative but is now statistically significant at the 5% (1%) level in columns 1-5 (column 6) indicating that issuance by reputable players during the growth period were less likely to be downgraded. Once more, ***TopIssuer#3 CRA Reported*** is not significant in any of our models while ***TopIssuer#Distance*** remains positive and statistically significant in all our models except column 4. The latter observation confirms our initial findings that issuances by reputable foreign sponsors were more likely to be downgraded. However, ***TopIssuer#AAA*** is no longer significant after controlling for bank level characteristics.

In Table 6-6, we find that ***WALTV*** is positive and statistically significant at the 5% level suggesting that bonds collateralised by mortgages with high LTV ratios (lower borrower equity) are more likely to deteriorate in quality. This is not surprising as high LTV mortgages are generally considered to be riskier and hence attract higher interest rates. ***Ratings/Tranches*** is negative and statistically significant at the 10% level.

Table 6-6 The impact of reputation and bank characteristics on performance (Downgrades)

This table reports logit regressions of the Downgrade of European MBS tranches on issuer reputation, collateral, deal, tranche and bank level characteristics. The sample includes all rated floating tranches issued between 2000 and June 2007. TopIssuer is a binary variable set to 1 if an issuer is in the top ten issuers in terms of volume and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of number of distinct rating classes within a deal divided by number of tranches per deal. Retained is a dummy variable equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. 3CRA is a dummy variable equal to 1 if the relevant deal was rated by 3 agencies and 0 otherwise. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. LogWAL is the natural logarithm of the mean number of years the principal value of a tranche remains unpaid. Tranche Size is the natural logarithm of tranche face value in euros. Credit Rating dummy variables indicate initial effective tranche credit rating. Collateral is a factor variable indicating whether the relevant bond is backed by commercial or residential mortgages. Issuer and trustee fixed effects is a set of dummy variables indicating each issuer and trustee respectively. The omitted categories are commercial mortgage backed notes, and issuance year 2000. Standard errors in parentheses are clustered at the issuer level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)	
	Downgrade		Downgrade		Downgrade		Downgrade		Downgrade		Downgrade	
TopIssuer	-4.254***	(1.205)	-3.720***	(1.320)	-4.080***	(1.341)	-3.610***	(1.215)	-0.540	(9.241)	-24.985	(21.142)
TopIssuer#Boom	-2.679**	(1.059)	-2.429**	(1.210)	-2.515**	(1.057)	-2.705**	(1.217)	-3.507**	(1.595)	-5.588***	(1.883)
TopIssuer#3CRA	-0.095	(0.852)	-0.078	(0.833)	-0.081	(0.841)	-0.195	(0.865)	-0.140	(0.908)	-0.183	(0.996)
TopIssuer#Distance	2.012*	(1.211)	2.030*	(1.201)	2.043*	(1.202)	1.676	(1.258)	2.814*	(1.505)	2.519*	(1.495)
TopIssuer#AAA	0.104	(0.519)	0.094	(0.520)	0.099	(0.513)	0.241	(0.522)	0.653	(0.566)	0.682	(0.575)
Distance	-0.211	(1.097)	-0.247	(1.080)	-0.221	(1.073)	-0.079	(1.113)	-0.772	(1.031)	-0.549	(0.956)
3CRA	-0.192	(0.552)	-0.243	(0.538)	-0.202	(0.554)	-0.104	(0.570)	-0.131	(0.539)	0.040	(0.655)
Retained	0.449	(0.437)	0.463	(0.428)	0.469	(0.426)	0.385	(0.428)	0.066	(0.537)	-0.226	(0.485)
Ratings/Tranches	-1.623*	(0.921)	-1.599*	(0.933)	-1.613*	(0.922)	-1.631*	(0.908)	-1.271	(1.386)	-1.716	(1.286)
WALTV	5.142**	(2.208)	4.946**	(2.131)	5.116**	(2.187)	5.375**	(2.243)	6.276***	(2.394)	5.797**	(2.414)
Subordination	-4.959**	(2.223)	-4.761**	(2.157)	-4.821**	(2.172)	-5.215**	(2.367)	-6.067***	(2.323)	-5.622**	(2.438)
LogWAL	2.328***	(0.360)	2.329***	(0.362)	2.328***	(0.360)	2.288***	(0.353)	2.275***	(0.437)	2.332***	(0.455)
Tranche Size	0.114	(0.156)	0.116	(0.159)	0.116	(0.157)	0.110	(0.153)	0.127	(0.142)	0.140	(0.155)
Residential Mortgages	-3.125***	(1.020)	-3.023***	(1.043)	-3.093***	(1.025)	-3.300***	(0.987)	-4.289***	(0.976)	-5.074***	(0.650)

	(1)		(2)		(3)		(4)		(5)		(6)	
Bank Characteristics												
Total Assets	0.950**	(0.400)	0.794**	(0.372)	0.694	(0.554)	0.897**	(0.437)	1.225**	(0.566)	-1.268	(1.210)
Net Loans/Total Assets	0.011	(0.014)									-0.039	(0.062)
Deposits/Total Assets			-0.018	(0.011)							-0.067**	(0.028)
Tier 1 Ratio					-0.033	(0.097)					-0.442***	(0.124)
Loan Growth							-0.012**	(0.005)			-0.026*	(0.014)
LLR/Gross Loans									0.101	(0.245)	-0.720	(0.578)
Control for												
Credit Ratings	Yes		Yes		Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
N	2302		2302		2302		2264		1937		1912	
Pseudo R-squared	0.518		0.520		0.518		0.521		0.546		0.563	
AIC	1628.770		1625.294		1641.046		1613.621		1308.591		1260.536	
BIC	1892.881		1889.404		1939.606		1928.490		1559.191		1543.887	

However, this significance is lost upon controlling for the loan loss reserve in column 5 and all the bank characteristics simultaneously in column 6. Therefore, it would seem that complex deals tend to retain their original ratings. The ratings of different agencies tend to converge for simple securities. However, ratings typically differ significantly on relatively complex securities thereby creating an incentive to shop for ratings (Skreta and Veldkamp, 2009). However, our findings suggest that complex and opaque deals are less likely to suffer downgrades. This may be because of the efficacy of the structural component of complex deals. These deals usually feature high-level engineering to tailor cash flows to a diverse range of investors. This resulting complexity stands in sharp contrast to structuring designed to befuddle investors. ***Weighted Average Life (LogWAL)*** enters the regressions with a positive coefficient and remains statistically significant at the 1% level. Thus long-term bonds are more likely to be downgraded as bonds with longer maturities, or less prepayment risk are statistically more likely to be plagued with an increased risk that the tranches will not fully pay down by their final maturity dates. ***Retained*** and ***Tranche Size*** are still not statistically significant at any of the conventional levels even after controlling for bank level characteristics.

Consistent with Barclays (2006), as CMBS tend to be more complicated and riskier, we find that RMBSs are still less likely to be downgraded even after controlling for bank characteristics individually and collectively in Table 6-6. We are agnostic regarding the influence of bank level characteristics on bond performance as the focus of this chapter is the importance of higher-level variables such as reputation and, functional distance.

6.5.1.2. Delinquency

In Table 6-7, we regress delinquency rates in the third (column 1) and fourth years (column 2) of issuance, as well as 3-year (column 3) and 4-year (column 4) average delinquency rates, on issuer reputation and deal level characteristics as delinquencies, tend to be highest in these years. Similar to our analysis above, we also include time and entity fixed effects to control for the influence of aggregate trends and unobserved heterogeneity respectively. The regression results consistently indicate that deals sponsored by frequent issuers (***TopIssuer***) perform better – indicated by lower ex-post delinquency rates. ***TopIssuer#Boom*** enters the regression with a positive sign and is statistically significant.

Table 6-7 The impact of reputation on performance (Delinquency)

This table reports OLS regressions of the Delinquency rates of European MBS tranches on issuer reputation, collateral, and deal level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. TopIssuer is a binary variable set to 1 if an issuer is in the top ten issuers in terms of volume and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. 3CRA is a dummy variable equal to 1 if the relevant deal was rated by 3 agencies and 0 otherwise. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Collateral is a factor variable indicating whether the relevant bond is backed by commercial or residential mortgages. Issuer and trustee fixed effects is a set of dummy variables indicating each issuer and trustee respectively. The omitted categories are commercial mortgage backed notes, and issuance year 1999. Standard errors in parentheses are clustered at the issuer level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
	DQ90inYr3		DQ90inYr4		DQ903YrAVG		DQ904YrAVG	
TopIssuer	-0.095***	(0.030)	-0.100***	(0.037)	-0.051**	(0.022)	-0.046*	(0.024)
TopIssuer#Boom	0.044***	(0.014)	0.046**	(0.018)	0.018**	(0.008)	0.015*	(0.009)
TopIssuer#3CRA	0.004	(0.020)	0.001	(0.026)	0.004	(0.011)	0.007	(0.012)
TopIssuer#Distance	-0.066	(0.045)	-0.136*	(0.076)	-0.038	(0.025)	-0.034	(0.031)
Distance	0.079	(0.049)	0.161**	(0.078)	0.036	(0.027)	0.034	(0.032)
3CRA	0.015	(0.015)	0.010	(0.017)	0.010	(0.008)	0.006	(0.008)
Retained	-0.002	(0.007)	0.010	(0.015)	0.005	(0.005)	0.006	(0.005)
Ratings/Tranches	0.005	(0.025)	0.008	(0.039)	-0.016	(0.022)	-0.019	(0.023)
Deal Size	-0.024**	(0.012)	-0.020**	(0.010)	-0.018**	(0.008)	-0.015*	(0.008)
WALTV	0.016	(0.038)	-0.001	(0.044)	0.009	(0.025)	0.018	(0.027)
Residential Mortgages	0.121***	(0.031)	0.137***	(0.036)	0.069***	(0.016)	0.083***	(0.020)
Control for								
Credit Ratings	Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes	

	(1) DQ90inYr3	(2) DQ90inYr4	(3) DQ903YrAVG	(4) DQ904YrAVG
N	411	446	411	465
Adjusted R-squared	0.784	0.713	0.806	0.789
AIC	-1582.366	-1496.002	-1999.653	-2131.510
BIC	-1489.938	-1397.594	-1907.225	-2019.675

Therefore, although issuances by reputable banks are usually of higher quality in normal periods, the delinquency rates on issuances during the growth years were higher than less frequent securitisers. One interpretation of this finding is that during the boom period when general asset quality declined, larger issuers securitised comparatively poorer quality assets. Alternatively, the delinquency rates could have increased as a result of decreased monitoring effort. However, this is inconsistent with Winton and Yerramilli (2015), who argue that reputable issuers are more likely to continue performing their monitoring function during periods of increased competition while less reputable institutions tend to increase market share at the expense of monitoring existing obligors. Thus, although the quality of issuances from reputable issuers declined during the boom period, these issuances were less likely to be downgraded. This could be because of strong structural features that compensate for declines in underlying asset quality.

3 CRA Reported is still not significant and the ***Distance*** variable is positive and marginally significant in column 4 but remains insignificant elsewhere. Furthermore, ***TopIssuer#3 CRA Reported*** is not significant in any of the models while ***TopIssuer#Distance*** is also mostly insignificant except for column 2 where this interaction becomes negative and statistically significant at the 10% significance level. Thus, delinquency rates were comparatively lower for reputable foreign issuers.

The ***Deal Size*** variable is negative and statistically significant at the 5% and 10% levels in columns 1-3 and 4 respectively. This indicates that larger deals generally performed much better. Certainly, it is reasonable to assume that larger deals are more diversified thereby driving delinquency rates downwards. Also, deals collateralised by residential mortgages tend to suffer higher defaults. However, it is worth noting that CMBS only make up 15-19% of the various samples used in the regressions. No other deal level variables are statistically significant.

Furthermore, we run the same set of regressions while controlling for all the bank characteristics simultaneously. The results are presented in Table 6-8. ***TopIssuer*** remains negative, but this variable is only statistically significant at the 10% significance level in column 3 where the dependent variable is the 3-year average delinquency rate. Once more, ***3 CRA Reported*** remains an insignificant predictor of performance while ***Distance*** also remains positive but regains its significance in 3 out 4 models. Therefore, deals sponsored by foreign issuers tend to be riskier as expected. Regarding the interactions, ***TopIssuer#Boom*** remains positive and is now statistically significant at the 1% level.

Table 6-8 The impact of reputation and bank characteristics on performance (Delinquency)

This table reports OLS regressions of the Delinquency rates of European MBS tranches on issuer reputation, collateral, deal, and bank level characteristics. The sample includes all rated floating tranches issued between 1999 and June 2007. TopIssuer is a binary variable set to 1 if an issuer is in the top ten issuers in terms of volume and 0 otherwise. Boom equals to 1 if a deal is issued in the years from 2005 to 2007 and 0 otherwise. Ratings/Tranches is the ratio of the number of distinct rating classes within a deal divided by the number of tranches per deal. Retained is a dummy variable equals 1 if a tranche in the relevant deal is retained. Distance is a dummy variable equals 1 if an issuers' nationality of operations differs from the home country of the parent institution. 3CRA is a dummy variable equal to 1 if the relevant deal was rated by 3 agencies and 0 otherwise. Subordination is the value of tranches with an identical or a better rating as a fraction of the total deal value. Collateral is a factor variable indicating whether the relevant bond is backed by commercial or residential mortgages. Issuer and trustee fixed effects is a set of dummy variables indicating each issuer and trustee respectively. Time is a factor variable consisting of the issuance periods annually. The omitted categories are commercial mortgage backed notes, and issuance year 1999. Standard errors in parentheses are clustered at the issuer level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
	DQ90inYr3		DQ90inYr4		DQ903YrAVG		DQ904YrAVG	
TopIssuer	-0.273	(0.325)	-0.024	(0.375)	-0.235*	(0.131)	-0.216	(0.171)
TopIssuer#Boom	0.116***	(0.035)	0.115***	(0.041)	0.069***	(0.018)	0.080***	(0.018)
TopIssuer#3CRA	-0.017	(0.035)	-0.016	(0.041)	-0.005	(0.015)	-0.008	(0.020)
TopIssuer#Distance	-0.054	(0.056)	-0.128**	(0.064)	-0.028	(0.030)	-0.047	(0.032)
TopIssuer#AAA								
Distance	0.076*	(0.045)	0.161***	(0.061)	0.037	(0.026)	0.061**	(0.027)
3CRA	0.031	(0.032)	0.029	(0.031)	0.016	(0.014)	0.018	(0.017)
Retained	0.003	(0.010)	-0.006	(0.026)	0.004	(0.004)	0.001	(0.007)
Ratings/Tranches	0.005	(0.030)	0.014	(0.051)	0.005	(0.012)	0.008	(0.017)
Deal Size	-0.014	(0.011)	-0.001	(0.013)	-0.013**	(0.006)	-0.011*	(0.006)
WALTV	0.044	(0.034)	0.085	(0.057)	0.027	(0.023)	0.039	(0.024)
Collateral								
Residential Mortgages	0.096**	(0.043)	0.084	(0.054)	0.068***	(0.020)	0.072***	(0.023)

	DQ90inYr3		DQ90inYr4		DQ903YrAVG		DQ904YrAVG	
Bank Characteristics								
Total Assets	0.009	(0.029)	-0.007	(0.033)	0.001	(0.013)	-0.002	(0.015)
Net Loans/ Total Assets	0.000	(0.001)	-0.000	(0.001)	-0.000	(0.001)	-0.000	(0.001)
Deposits/Total Assets	-0.001**	(0.001)	0.000	(0.001)	-0.001***	(0.000)	-0.001**	(0.000)
Tier 1 Ratio	-0.001	(0.004)	-0.005	(0.005)	0.000	(0.002)	-0.001	(0.003)
Loan Growth	-0.001	(0.000)	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
Loan Loss Reserves/Gross Loans	-0.006	(0.009)	0.001	(0.010)	-0.006	(0.003)	-0.005	(0.005)
Control for								
Credit Ratings	Yes		Yes		Yes		Yes	
Trustee fixed effects	Yes		Yes		Yes		Yes	
Issuer fixed effects	Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes	
N	265		273		277		282	
R-squared	0.802		0.688		0.829		0.805	
Adjusted R-squared	0.657		0.449		0.703		0.658	
AIC	-1028.464		-862.760		-1432.655		-1348.416	
BIC	-924.651		-758.086		-1327.558		-1242.801	

Thus, reputable issuers generally issued higher quality deals however during the lending boom, they issued bonds collateralised by subpar asset pools. Moreover, the extent of this deterioration is significant at the 99% confidence level.

TopIssuer#3CRA Reported is now negative but still insignificant, and ***TopIssuer#Distance*** is negative and largely insignificant. Also, ***WALTV***, ***Ratings/Tranches***, ***Retained*** are not significant at any of the conventional levels in any of the models. ***Deal Size*** remains negative but is only statistically significant in columns 3 and 4, which correspond to 3 and 4-year average delinquency rates respectively as the dependent variables. Given that the delinquency rates of loan pools securitised by reputable issuers increased during the boom period, it is expected that the relevant bonds will suffer relatively more severe downgrades. As this did not happen, the structural features may have compensated for increasing delinquency rates.

6.5.2. Are yield spreads informative during boom periods?

Although we control for credit ratings in our above analysis, it has been argued that spreads account for initial credit ratings as well as other pricing factors not fully absorbed into ratings. However, this finding is confined to spreads on non-AAA tranches only; this suggests that investors were differentially informed about the quality of the mortgage-backed securities. Moreover, it is unclear how this segmentation varied during the market boom phase.

First, we regress ***Downgrade*** on ***LogSpread*** while controlling for weighted average life (***LogWAL***), credit ratings and time fixed effects on the full sample. The results are reported in columns 1 and 2 of Table 6-9. In column 1, we re-establish that yield spreads (***LogSpread***) have statistically significant predictive power for future credit performance. We introduce the ***LogSpread#AAA*** in column 2, and as predicted by Adelino (2009), this variable is not significant thereby confirming that the predictive power for future credit performance comes exclusively for lower rated classes.

Second, in order to examine whether this predictive power worsened or strengthened during the boom period, we then estimate the model on a subsample of bonds issued before 2005 (See columns 3 and 4) and those issued during the growth phase, from 2005 to 2007 (See columns 5 and 6). In columns 3 and 4 of Table 6-9, ***LogSpread*** and ***LogSpread#AAA*** are both insignificant. Hence, spreads across the investor sophistication spectrum had no predictive power prior to the growth period.

Table 6-9 The predictive potency of yield spreads

This table reports logistic regressions of the Downgrades of European MBS tranches on the log of initial yield spreads and credit ratings. The sample includes all rated floating tranches issued between 1999 and June 2007. AAA is a dummy variable set to 1 if a tranche is rated AAA/Aaa and 0 otherwise. Credit Rating is a factor variable controlling for the fixed effect of individual credit rating indicators at the tranche level. Time is a factor variable consisting of the issuance periods annually. Standard errors in parentheses are clustered at the issuer level. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	1999-2007				1999-2004				2005-2007			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Downgrade		Downgrade		Downgrade		Downgrade		Downgrade		Downgrade	
Yield Spread												
logspread	1.767***	(0.203)	1.659***	(0.226)	0.311	(0.306)	0.579	(0.368)	2.230***	(0.281)	2.362***	(0.336)
AAA#logspread			0.259	(0.181)			-0.537	(0.372)			-0.306	(0.296)
LogWAL	0.740***	(0.112)	0.714***	(0.116)	1.135***	(0.180)	1.185***	(0.180)	0.560***	(0.138)	0.588***	(0.143)
Control for												
Credit Ratings	Yes		Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
N	4182		4182		1550		1550		2609		2609	
Pseudo R-squared	0.291		0.291		0.120		0.122		0.229		0.230	
AIC	4102.998		4102.383		1216.551		1216.766		2788.822		2789.287	
BIC	4312.170		4317.893		1334.163		1339.724		2929.623		2935.955	

Evidently, as much as the predictive power of spreads is concentrated in the prices of lower rated bonds, all of this predictive potency emerged during the growth period as the volume of issuances increased significantly. We confirm this finding in columns 5 and 6 of Table 6-9, where we ran the model on the 2005-2007 subsample. ***LogSpread*** is positive and statistically significant at the 99% confidence level while ***LogSpread#AAA*** is negative and insignificant. Therefore, launch spreads on triple-A rated bonds had no predictive power throughout our sample period.

In summary, we find that yield spreads have a strong predictive power indicating that investors did not solely rely on credit ratings. However, similar to Adelino (2009), this finding is confined to non-AAA rated bonds. Furthermore, we find that prior the boom phase in 2004, spreads on prime (AAA/Aaa) and non-prime bonds had no predictive power about subsequent rating downgrades after conditioning on initial credit ratings. We run the same model for the 2005-07 boom period and that the spread variables become statistically significant at the 1% level for non-prime bonds only. On the one hand, this indicates that during the period of increased uncertainty, sophisticated investors began to incorporate factors beyond credit ratings into initial yield spreads. On the other hand, we find evidence in suggesting that less sophisticated investors solely relied on credit ratings rather than performing their own due diligence.

6.6. Concluding Remarks

This chapter shows that reputation capital generated from the frequency of MBS issuance – especially during the growth phase corresponding to 2005-2007, predict future performance, measured by credit rating downgrades. Reputable issuers generally issued bonds collateralised by high quality asset pools with lower delinquency rates, however, during the boom period, as credit standards declined, the asset pools securitised by reputable issuers were of worse quality compared to those securitised by their less prominent rivals. We conjecture that this may have occurred because of decreased monitoring efforts. However, issuances by reputable sponsors were less likely to be downgraded by the rating agencies. This finding could be because of the efficacy of structuring techniques in compensating for the declining credit quality of the underlying assets. Overall, our finding is consistent with conventional wisdom regarding the tendency of reputable banks to create high quality securities. Evidently, reputable issuers tend to offer higher quality securities, even from low quality assets.

Furthermore, deals sponsored by reputable foreign issuers reported higher delinquency rates and were more likely to be downgraded because of adverse changes in the credit profile of the asset pool, counterparty risk or the structural elements of the deal. Sensibly, we find that bonds with high underlying borrower leverage and higher interest risk exposure are more likely to be downgraded.

On the pricing dimension, using initial yield spreads we confirm that initial prices of mortgage backed securities incorporated more information than credit ratings. Previous research argues that this finding is driven by sophisticated investors who mainly invested in non-AAA rated bonds. However, based on the evidence presented in our analyses, this finding is only true during the period characterised by increased issuance prior to the financial crisis. Thus, prior to 2005, our data do not support the predictive ability of yield spreads. Also, spreads on AAA/Aaa rated bonds, however, have no predictive ability hence investors were differentially informed about the quality of the MBSs they purchased. Evidently, more sophisticated investors, in non-AAA tranches, adjusted their prices upwards as issuances increased while credit standards were perceived to be declining. However, yields on AAA-rated issuances were not revised, probably due to the overreliance on the credit ratings.

On the backdrop of several post-crisis proposals, the European lawmakers reached an agreement with national governments to revive the European securitisation markets. This deal sets out criteria for simple, transparent and standardised securitisation (STS), and represents a cornerstone of the drive to establish a capital markets union. It is expected that these criteria in conjunction with the reform of the credit rating industry should make the pricing process more efficient. Furthermore, as the market is re-established, it would be interesting to see further dialogue on the role of reputation, and information asymmetry in the post-crisis issuance.

Chapter 7. Conclusion

Modern securitisation was pioneered by US government sponsored enterprises (GSE) in the 1970s. Subsequently, private enterprises began securitising assets beyond the remit of GSEs and expanded into the UK markets in 1985. The use of securitisation grew steadily from the late 1980s onwards. However, this tool initially failed to launch in continental Europe primarily because of limited government sponsorship and legal complexities. Gradually, the adoption of the Euro, technological developments and enactment of securitisation frameworks resulted in an active European Securitisation market from the late 1990s onwards.

Securitisation involves aggregating and tranching of cash generating assets which are then sold to investors in the capital market. Banks tend to employ securitisation to increase their funding capacity and diversify their funding sources as well as to obtain capital relief. The released funding can then be used to further lending or pursue other opportunities that might generate better returns for shareholders. Securitisation also allows banks to circumvent liquidity shocks to deposit funding and help banks to transfer risks to other market participants who are better suited to manage these risks. Although securitisation is a legitimate funding mechanism, this tool has been discredited and stigmatised primarily due to its role in magnifying the financial crisis. Policymakers have sought to revive the securitisation markets via a number of initiatives. Regulatory trends such as the establishment of the STS framework, lower capital charges for qualifying securitisations and increased disclosure to investors, are likely to increase the appeal of securitisations to investors especially for cross-border investors.

The US and several European countries experienced a contemporaneous expansion of mortgage debt and securitisation in the run-up to the financial crisis. In Europe, mortgage debt largely remained on banks' balance sheets however the originate-to-distribute model was relatively prevalent in the US economy. This innovation resulted in increased credit availability on the one hand but engendered a decline in lending standards. Moreover, the misalignment of incentives in the securitisation chain has been the undoing of this market. Evidently, informed parties – originating banks – created low quality loans as investors were the ultimate risk bearers. Investors mainly relied on credit ratings and failed to assess the risks of these instruments as a result of the increased level of deal complexity and opacity owing to developments in structuring techniques. Rating dependent regulation and the demand for high quality repo collateral fed into the demand for mortgage backed

securities. In addition, securitised bonds paid higher yields relative to other fixed income securities of comparable quality, hence the increased demand.

7.1. Summary of Main Findings

The primary objective of this thesis has been to provide additional insights into understanding the role of reputation on the pricing and performance of mortgage backed securities. Using a unique dataset of European issuances prior to the 2007-09 financial crisis, we investigate the investors' perception of issuer and trustee reputation in relation to pricing. We also analyse the importance of reputation in predicting bond performance, measured by downgrades and delinquencies. Also, as a result of the common criticism that investors over-relied on credit ratings, we examine the potency of initial yield spreads in predicting performance. In summary, this thesis evaluates the conventional expectations of reputation as a self-disciplining mechanism, and that pricing should be a sufficient market disciplining mechanism in the financial markets.

Chapter 4 (the first empirical chapter) focuses on the importance of the issuer's reputation in the valuation of MBSs. We find that investors demand lower spreads on MBS issued by reputable institutions. This finding, however, was largely driven by our non-prime sample hence sophisticated investors in information sensitive tranches attached more value to reputation than investors in senior tranches did. Thus, this is consistent with the narrative that senior tranches were perceived to be almost riskless while investors in non-prime tranches assumed that reputable banks were less likely to engage in opportunistic behaviour. In regards to rating shopping, we note that, on average, there is a negative relationship between the number of ratings reported and the spreads required by investors. Moreover, this finding is confined to issuances by large lenders who might report only favourable ratings or are well positioned to negotiate inflated ratings, hence the importance of triangulation. We also observe that investors perceive issuances from foreign banks as riskier as they are more likely to make loans based on observable information only. According to this argument, local banks are better suited to incorporate unreported borrower characteristics as well as observable information in the origination and underwriting process. Consequently, local banks are more likely to advance better quality loans. However, this finding is only relevant to less frequent securitisers. Another key finding was that investors charge higher spreads on MBS issued by banks reporting higher loan growth, possibly due to a higher probability of softer lending standards. Also, investors demanded lower spreads on RMBSs as the underlying assets were more

granular and featured higher levels of standardisation relative to CMBSs which were much more distinctive.

The empirical analysis in Chapter 5 hinges on investor perception of engaging experienced trustees as gatekeepers in securitisations. Once more, we examine initial yield spreads to gauge investor reaction to the reputation of appointed trustees. As expected, we observe that investors demand lower spreads on issues featuring reputable trustees and this pattern was significantly prevalent during the boom period when issuances levels surged. Complex structuring practices make it difficult for investors to evaluate risk and return, especially in times of market stress. Thus, as issuance levels and complexity/opacity of issuances increased during the credit boom, risk assessment also grew exponentially difficult hence investors may have begun resorting to other avenues to mitigate losses. We argue that, in the event of default, being represented by an experienced and reputable trustee is likely to limit investor losses. Reputable trustees are deemed to be better equipped at identifying servicer negligence and effectively demanding corrective action on behalf of investors. These trustees are also typically large banks with expertise in international litigation which is essential for administering collateral liquidation in foreign jurisdictions. Consistent with the evidence reported in Chapter 4, issuances from foreign banks were sceptically received by investors and deals featuring fewer ratings commanded higher spreads, primarily from non-prime investors as the probability of rating shopping is higher. Furthermore, we find evidence indicating that complex deals were considered to be riskier, however, this finding was restricted to the AAA sample only. This finding is consistent with conventional wisdom where less sophisticated investors charge higher spreads on securities that require more effort to analyse.

In the final empirical chapter (Chapter 6), we assess whether the reputation and price mechanisms have any influence on the performance of mortgage backed securities. Our results also indicate that consistent with conventional wisdom, MBSs issued by frequent securitisers were less likely to be downgraded. However, MBSs from foreign issuers, especially reputable ones were more likely to be downgraded. As expected, notes backed by collateral with low borrower equity levels were more likely to suffer poor performance. Moreover, rating agencies were less likely to downgrade complex deals measured by the number of rating classes for a given number of tranches in a deal. Using delinquency as a secondary measure of performance, we find slightly different results. First, delinquency rates were generally much lower for reputable securitisers as expected

however these rates surged much higher for frequent securitisers during the credit boom. Thus, although delinquencies on issues by reputable banks increased more rapidly during the boom period, their deals were less likely to be downgraded. This could be as a result of the redeeming structural provisions available on these deals. Second, although RMBSs had higher delinquency rates, they were less likely to be downgraded.

The latter half of our empirical analysis hinged on the predictive value of yield spreads after conditioning on credit ratings. Theoretically, if yields are solely driven by credit ratings, then yield spreads should be redundant. Initially, we find that initial yield spreads have a high downgrade prediction ability. However, this finding is valid for spreads on non-prime tranches only. More importantly, these yields only gained predictive value during the growth period (2005-2007). In other words, primary yields had no predictive ability whatsoever during periods of low issuance.

This study contributes to the securitisation literature by providing evidence in favour of the importance of intermediary reputation in pricing and credit performance. In summary, it is evident that investors recalibrated spreads to account for increasing complexity and declining transparency during the credit boom fuelled by declining lending standards. Thus, as issues became difficult to evaluate, investors began to rely on the value of reputation as a disciplining mechanism. Our results are inconsistent with the narrative that investors relied exclusively on credit ratings as we find that, the precision of spreads increased such that they were able to predict performance. We find evidence that this calibration did occur, at least at issuance, however, our results provide no insights on the recalibration of spreads on the secondary markets. Also, the evidence on the quality of assets securitised by reputable banks is mixed. Although their issues are less likely to be downgraded, the magnitude of the decline in pool quality was much higher compared to issuances by less frequent securitisers. We attribute this occurrence to the redeeming effects of the structural features of deals issued by reputable securitisers. Also, investors consider deals from foreign banks to be riskier. However, we find that deals sponsored by frequent foreign issuers were more likely to suffer poor credit performance.

7.2. Policy Implications

The increasing importance of reputation during the boom period is consistent with the expectation that increased complexity makes risk assessment more difficult. Complexity may be the result of innovation or may be a strategic tool to conceal adverse quality. However, the difference may not be apparent to investors, especially less sophisticated

investors. Furthermore, in the pre-crisis era, originators disclosed relevant information required for investors to conduct reasonable due diligence on complex and risky transactions. However, these disclosures tended to be non-standardised and published in voluminous documents using arcane language. Hence, the regulatory drive to promote and reward simplicity, transparency, and standardisation in securitisation is a step in the right direction.[89] It is expected that the efficacy of the proposed framework should minimise the importance of fringe factors such as reputation.

Concerning trustees as well as other entities with fiduciary responsibilities, their contractual obligations, duties and responsibilities should be clearly specified in the transaction documentation. Issuers could also adopt a more proactive approach to correcting widely held investor misperceptions by defining the limits of the trustees' role and clearly outlining what trustees responsibilities do not cover. In 2014, the SEC adopted Regulation AB II to govern the disclosure, reporting, and offering process for securitisations in order to enhance transparency, and investor protection. In response to the disputes between investors and trustees over procedures governing violations of representations and warranties, this regulation requires the appointment of an asset representation reviewer, an independent third party whose role is to conduct a review of compliance with representations and warranties upon the occurrence of certain trigger events, such as delinquency triggers. The findings of this review are then reported to the trustee who in turn determines whether a repurchase request is necessary. Transaction documents must also clearly stipulate dispute resolution mechanisms for repurchase requests, such as mediation or arbitration, for repurchase requests not resolved within a 180 day period. Similarly, in Europe, the STS framework requires that an independent party verifies the disclosed quality of assets at a 95% confidence level. These proposals should dispel some of the misconceptions that investors held about the role of the trustee.

The bankruptcy-remoteness feature of securitisations decouples the credit ratings of the issuing institution from the quality of securitisation transaction. However, since many issuers tend to securitise repeatedly, their reputation is a highly valued asset hence it is less likely for banks to consistently issue low quality assets while still maintaining a viable market presence. Therefore, we propose the creation of a performance based quality index where issuers are ranked based on rating migrations of their securitised

[89] Qualifying STS securitisations attract lower capital charges and are partially eligible for inclusion in the stock of high quality liquid assets required to meet the liquidity coverage ratio requirement.

bonds and the change in collateral quality using measures such as delinquency rates. Thus, holding the initial rating or quality level constant, large or frequent unfavourable transitions would have an adverse impact on the quality index for a given issuer. The upshot is that the performance of all issuances from a particular issuer is available on a single scorecard that serves as a crude indicator of the likely performance of a new issue. The downside is that this is not a forward looking measure, and it might encourage implicit recourse, mechanistic reliance and failure to conduct investor due diligence. Nevertheless, this recommendation is more likely to be relevant for commercial data providers rather than policymakers.

Concerning ratings, it is clear that investors preferred securities with more ratings. Although we do not find any link between the number of credit ratings and performance, the requirements of the current CRA Regulation for rated transactions to report at least two credit ratings should increase the transparency of these securities. Furthermore, in order to increase competition in the CRA industry, issuers intending to appoint at least two agencies must consider appointing a small rating agency that controls no more than 10% of the market.

Also, we find that spreads on AAA tranches had no predictive ability regarding performance. This finding is consistent with the hypothesis that the rise in securitisation was driven by the demand for high quality collateral and rating dependent regulation. Consequently, to address the mechanistic reliance on ratings, regulators aim to delete all references to external credit ratings from European legislation by 2020.

7.3. Limitations

First, we conduct our analyses on MBS, one of many securitisation instruments. Therefore our findings may not necessarily apply to other instruments such as ABSs and CLOs for instance. Second, risk retention forms an essential aspect of the post-crisis securitisation regulation in the US and Europe. We attempted to control for retained tranches in our analyses, but our measure of retention is crude at best, as the data on the details of specific tranches retained were unavailable. Ideally, a more robust test of the retention hypothesis should account for effective retention rather than an indication of retention. Third, our sample comprises of floating rate tranches only and is relatively dated as the cut-off is June 2007. Also, the securitisation markets have been in a state of flux mainly due to regulatory tightening hence some of our findings may not necessarily be applicable in an environment of proactively demanded transparency.

7.4. Suggestions for Further Research

The securitisation markets have been subdued as a result of decreased issuance levels and faded investor appetite. Nonetheless, regulators and market participants have proposed a number of initiatives to reduce complexity and increase transparency levels. The revival of the securitisation markets is largely dependent on tackling the structural weaknesses revealed by the financial crisis. However, the intended effect of these new regulatory requirements remains to be seen.

Although ABSs are an important asset class, the primary and secondary pricing of pool attributes and structuring techniques is largely understudied. Furthermore, a natural extension of our work would be an investigation of the importance of the reputation of other key securitisation parties such as servicers and underwriters.

Despite the low volumes, a fraction of issuances is still privately placed hence it is reasonable to assume that sophisticated investors are still patronising securitised bonds to an extent. Ideally, this suggests that prices should now be more indicative of fundamental values. Furthermore, regulatory reforms and industry initiatives such as Prime Collateralised Securities have been introduced to promote quality, transparency and simplicity in securitisation. Therefore, analysing the impact of such efforts on the efficiency of pricing would also be a worthwhile avenue for further research.

In addition, the use of P2P lending and non-bank lending has risen to address the void in the credit markets caused by the decline in bank lending to small- and medium-sized businesses. More recently, P2P lenders have securitised their assets, and European banks are looking to securitise their exposure to direct lending funds too. Considering the role of these lenders in providing credit to the real economy, it is worth evaluating the extent to which the introduction of publicly available ratings via securitisations might reduce the flexibility of direct lenders and marketplace lenders.

Finally, as a result of the increased regulatory requirements on risk retention and transparency, it would be interesting to investigate the extent to which investors still rely on credit ratings relative to other credit factors. The market response to the torrent of post-crisis regulatory reforms was fairly mixed, therefore another avenue for further research would be investigating whether arbitrage has arisen in response to the regulatory tightening. Another appealing subject of research would be the differential performance of non-qualifying versus qualifying securitisations.

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