

The Impact of Capital Regulation on Bank
Involvement in Securitized Banking

De invloed van kapitaalregulering op de
betrokkenheid van banken bij
securitisatietransacties

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List of Acronyms

EMEs	Emerging Economies
CCF	Credit Conversion Factor
ABS	Asset-Backed Securities
SPV	Special Purpose Vehicle
G-SIBs	Global Systemically Important Banks
CET1	Common Equity Tier 1
TBTF	Too-Big-To-Fail
US	United States
SIFIs	Systemically Important Financial Institutions
UK	United Kingdom
EU	European Union
OTC	Over-The-Counter
RWA	Risk-Weighted Assets
BCBS	Basel Committee on Banking Supervision
OECD	Organisation for Economic Co-operation and Development
LCR	Liquidity Coverage Ratio
HQLA	High Quality Liquid Assets
NSFR	Net Stable Funding Ratio
ASF	Available Stable Funding

Introduction

The crucial role of money and the financial system in our economy and daily lives was never more visible than in the global financial crisis of 2007-09. It was a financial shock that started within the financial market in one country on one continent but rapidly spread to other industries, other countries and other continents; impacting not only global financial markets but also the real economy and the common man.

In the aftermath, it became evident that the crisis was not the outcome of a singular activity or event but was the consequence of numerous weaknesses within the global financial architecture. The web of financial linkages connecting financial markets and institutions locally as well as globally combined to result in a global and systemic financial shock. While weak corporate governance structures and the presence of government guarantees contributed to the chaos, financial innovation and its use in financial markets also played a significant role in the crisis.

A key financial innovation was securitized banking – the use of securitized instruments as collateral in repo transactions, which allowed financial institutions to borrow money from each other for very short periods of time, usually overnight or a few days.¹ Securitized instruments (called asset-backed securities) are the outcome of the process of securitisation, which packages numerous bank assets, mostly loans, to create privately issued securities with varying levels of credit quality. Besides the risk management and diversification benefits of securitisation, it catered to the rising demand from investors and financial markets for privately issued safe collateral.² Securitized instruments with high credit ratings represented high credit quality and hence, these securities were perceived to be safe by all market participants.³ Consequently,

¹ See chapter 1, section 1.1.1 for an explanation of a repo transaction.

² Scholars acknowledging the rising demand for privately issued collateral include Gary Gorton and Andrew Metrick, 'Regulating the Shadow Banking System' (2010) 2010 Brookings Papers on Economic Activity 261; Nicola Gennaioli, Andrei Shleifer and Robert Vishny, 'Neglected Risks, Financial Innovation, and Financial Fragility' (2012) 104 Journal of Financial Economics 452; Andrei Shleifer and Robert W Vishny, 'Unstable Banking' (2010) 97 Journal of Financial Economics 306; Viral V. Acharya and Matthew Richardson, 'Causes of the Financial Crisis' (2009) 21 Critical Review: Journal of Politics and Society 195; Gary Gorton and Andrew Metrick, 'Securitized Banking and the Run on Repo' (2012) 104 Journal of Financial Economics 425.

³ Gennaioli, Shleifer and Vishny, 'Neglected Risks, Financial Innovation, and Financial Fragility'.

these high-grade securitized instruments were considered as good substitutes for traditional securities (i.e. treasury and government securities), encouraging their use as collateral in financial transactions.

Although commercial banks have traditionally been involved in repo markets as lenders, in the years preceding the crisis, they have expanded their role as borrowers and are known to be increasingly involved in securitized banking for short-term funding.⁴ Since repo borrowing is extremely short-term and between financial institutions, it provides commercial banks with a cheaper source of short-term funding than interest-bearing retail deposits. Using privately issued securitized instruments created from banks' assets as collateral in repo markets, banks were able to develop a new source of borrowing where the creditors were financial institutions and not traditional depositors. Thus, securitized banking became analogous to a money machine for banks, providing them with an additional source of short-term funding (besides deposits) using privately issued securities which created a private liquidity cycle for banks and therefore, increased liquidity in financial markets.⁵

Motivation and Contribution

Post-crisis, bank involvement in securitized banking has gained considerable attention and is claimed to be one of the main sources of the crisis.⁶ While greater capital and liquidity of financial intermediaries can be beneficial for financial market stability, private liquidity creation can create instability and expose the financial system to risks from excessive leverage and liquidity.⁷ This was evident in the recent crisis, which illustrated the financial fragility and

⁴ Shleifer and Vishny, 'Unstable Banking'; Jeremy C Stein, 'Monetary Policy as Financial Stability Regulation' (2012) 127 *The Quarterly Journal of Economics* 57; Gorton and Metrick, 'Securitized Banking and the Run on Repo'; VV Acharya and others, 'Manufacturing Tail Risk: A Perspective on the Financial Crisis of 2007–2009' (2010) 4 *Foundations and Trends® in Finance* 247; Financial Stability Board, 'Securities Lending and Repos : Market Overview and Financial Stability Issues' (2012); Arvind Krishnamurthy, Stefan Nagel and Dmitry Orlov, 'Sizing Up Repo' (2014) 69 *The Journal of Finance* 2381.

⁵ M Odenbach, 'Mortgage Securitization: What Are the Drivers and Constraints from an Originator's Perspective (Basel I/Basel II)?' (2002) 17 *Housing Finance International* 52; Gary Gorton and Andrew Metrick, 'Securitization' [2012] NBER Working Paper No. 18611; Gorton and Metrick, 'Securitized Banking and the Run on Repo'.

⁶ Gorton and Metrick, 'Securitized Banking and the Run on Repo'; Peter Hördahl and Michael R King, 'Developments in Repo Markets during the Financial Turmoil' [2008] *BIS Quarterly*; Gary Gorton and Andrew Metrick, 'Who Ran on Repo?' [2012] NBER working paper no. 18455.

⁷ See chapter 2, section 2.2.

negative externalities from private liquidity creation through securitized banking. Current literature recognizes the harmful social welfare effects from such private liquidity creation and questions whether all creation of private money by the banking system is desirable.⁸ Although securitized banking might be a recent development, the underlying vulnerabilities are similar to other forms of short-term debt, akin to traditional banking.

Bank regulation aims to internalize the social costs of potential bank failures, which can exert sizeable negative externalities on the financial system when individual bank failure spreads to other financial institutions, financial markets and eventually, the entire economy. The Basel Accords are globally accepted standards for bank regulation, which essentially provide guidelines and recommendations of best practice for national authorities to implement in their legislation. These standards predominantly impose capital requirements on banks, which aims to restrict the build-up of leverage and constrain bank balance sheets by requiring a minimum level of equity.

The crisis highlighted the shortcomings of the global financial regulatory framework and the failure of banks and regulators to incorporate the possible risks from securitized banking in capital regulation. Regulation that aimed to internalize the social costs of potential bank failures was now considered to be inadequate in fully incorporating the true risk of banks' activities and overlooked regulatory capital arbitrage.⁹ The criticism has been primarily focused on the presence of regulatory arbitrage to reduce capital requirements through asset securitisation. However, the role of the Basel Accords in encouraging bank involvement in securitized banking, which utilizes the securitisation output, has been overlooked.

The dissertation firstly contributes to the current literature by identifying the presence of regulatory arbitrage for securitized banking in the Basel Accords. In this regard, it analyses the incentives for securitized banking in the preceding

⁸ Gennaioli, Shleifer and Vishny, 'Neglected Risks, Financial Innovation, and Financial Fragility'; Shleifer and Vishny, 'Unstable Banking'; Stein (2012).

⁹ F Vallascas and J Hagedorff, 'The Risk Sensitivity of Capital Requirements: Evidence from an International Sample of Large Banks' (2013) 17 *Review of Finance* 1947; Gerard Caprio, Asli Demirgü-Kunt and Edward J Kane, 'The 2007 Meltdown in Structured Securitization: Searching for Lessons, Not Scapegoats' (2010) 25 *The World Bank Research Observer* 125; Anat R Admati; and others, 'Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity Is Not Socially Expensive' [2013] *Max Planck Institute for Research on Collective Goods* 2013/23; *Rock Center for Corporate Governance at Stanford University Working Paper No. 161*; *Stanford University Graduate School of Business Research Paper No. 13-7*; Acharya and Richardson (2009).

Basel Accords and assesses the effectiveness of the current regulatory regime, Basel III, in regulating securitized banking. Additionally, majority of the current literature is restricted to arbitrage opportunities provided by the internal model approach for capital calculations, which allowed banks to use their in-house risk models to determine capital requirements. Most prominently, Hellwig identifies banks' use of their internal models, permitted since the Market Risk Amendment of the Basel regime, as the main source of regulatory arbitrage.¹⁰ A further contribution of this dissertation is to extend the investigation from the internal model approach and shed light on the fact that even the simpler standardised methodology for capital calculations, designed to be more stringent, had inherent significant adverse incentives for banks to engage in securitized banking.

Secondly, the dissertation contributes by focusing on Emerging Economies (EMEs). The Basel Accords are soft law and thus, not legally binding unless implemented by national authorities in their legislation. These Accords are formulated by the Basel Committee on Banking Supervision (BCBS), which was set up to promote convergence of international banking standards by proposing guidelines and recommendations of best practice for national authorities. While the Basel Accords were solely formulated and intended for BCBS member states, these standards became the benchmark for financial regulation worldwide and were transposed into national laws of member and non-member states, hence applied to banks worldwide. The global implementation of the Basel Accords implies that the regulatory arbitrage opportunities and incentives inherent in these Accords would be present in all financial markets. After the crisis, majority of the research regarding securitized banking focuses on advanced economies as they are key participants in global financial markets and thus, research involving EMEs is still in its infancy.

This contributes to the scant research that exists on the international dimension of securitized banking, specifically in EMEs, to evaluate the similarities and assess the differences in national implementation of the Basel Accords. The objective will be to identify the arbitrage opportunities which might be transposed with Basel implementation and encourage the development of securitized banking similar to that preceding the crisis. The aim is to highlight that countries implementing the Basel Accords also transpose the adverse incentives inherent in these Accords, encouraging similar bank behaviour and

¹⁰ Martin F Hellwig, 'Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage Financial Crisis' (2009) 157 *De Economist* 129 p. 44.

hence, both Basel Committee member and non-member states are similarly affected by Basel implementation.

While majority of the dissertation centres on the previous Basel Accords, the last part will provide a policy-level contribution by focusing on the current regulatory regime – Basel III. This will be the third contribution of the dissertation, which will assess the incentives for securitized banking in the Basel III Accord and provide policy implications to address whether the existing regulatory framework should be reformed. This will contribute to the current policy setting and be informative for policy-level decision makers in all countries, as it will allow them to weigh the benefits and drawbacks of Basel III implementation for securitized banking and its impact on their banking sectors.

Problem Statement and Research Questions

The inability of regulators to incorporate the possible risks from securitized banking in regulation imposed significant negative externalities on other financial institutions, and on society. The risks from bank reliance on short-term funding through securitized banking should have been accounted for in capital regulation, for banks to have sufficient equity cushion to absorb losses in case of a financial shock.

Post-crisis, the global regulatory framework has also been criticized for overlooking regulatory capital arbitrage, which refers to strategies by which regulated financial institutions evade capital requirements. The presence of regulatory capital arbitrage has been identified as a contributory factor towards the build-up of systemic risk in the recent crisis, emanating from highly leveraged financial institutions backed by insufficient equity.¹¹

The dissertation assesses the role of international capital regulation – the Basel Accords, in encouraging bank involvement in securitized banking. It focuses on the presence of any regulatory capital arbitrage that would incentivise banks to engage in securitized banking. The dissertation aims to answer the overarching question: “What is the role of the Basel Accords in encouraging bank involvement in securitized banking?”

¹¹ VV Acharya and others, ‘Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises’ [2011] ADBI Working Paper Series no. 264 41; Acharya and Richardson (2009); A Admati and M Hellwig, *The Bankers’ New Clothes: What’s Wrong with Banking and What to Do about It* (Princeton University Press 2014).

In this regard, the dissertation firstly aims to assess the incentives inherent in the Basel Accords to identify the presence (or absence) of regulatory arbitrage for securitized banking. This relates to the first contribution i.e. assessing the role of the Basel Accords in encouraging bank involvement in securitized banking. The assessment of the Basel Accords starts with Chapters 3 and 4, focusing on the pre-crisis and post-crisis Basel Accords respectively, to examine the incentives for securitized banking. These chapters answer the following sub-research questions:

Chapter 3: “Did the pre-crisis Basel Accords incentivise banks to engage in securitized banking?”

Chapter 4: “Did the post-crisis regulatory response strengthen the capital requirements for securitized banking?”

To assess the impact of global Basel implementation and investigate the international dimension of securitized banking, Chapter 5 answers the sub-research question:

“Were the incentives inherent in the Basel Accords for securitized banking transposed in all countries that implemented them, specifically Emerging Economies?”

Lastly, Chapter 6 examines the current regulatory framework – Basel III, to answer the sub-research question:

“Has the current regulation resolved the deficiencies inherent in the preceding Basel Accords for securitized banking and does it continue to provide incentives for banks to engage in securitized banking?”

Methodology

The dissertation belongs to the area of financial regulation and follows a law and economics approach, specifically focusing on the economics of regulation to evaluate the incentives inherent in banking regulation. In this regard, chapter 2 provides an overview of the relevant theoretical economic framework. The dissertation does not exclusively focus on a specific research methodology but uses several methodologies to effectively answer the research questions. First, to examine the incentives inherent in bank regulation, chapters 3, 4 and 5

conduct a legal analysis of the Basel Accords to assess the specific standards applicable to banks and evaluate how they impact bank behaviour. Secondly, to evaluate the international dimension of bank regulation and bank behaviour, chapter 5 also conducts a comparative legal analysis of the implementation of regulation within two EMEs. Thirdly, these chapters also employ an empirical approach, where descriptive empirics are used to provide data trends to support the theoretical findings of the legal analysis.

Structure of Dissertation

The remainder of the dissertation is structured as follows.

The first two chapters provide a theoretical overview of securitized banking and summarize the current literature in this regard. Chapter 1 focuses on the functioning and motivation behind bank involvement in securitized banking. It provides an overview of the repo transaction, the process of securitisation and how these combined to develop a new kind of money-like instrument through securitized banking. Chapter 2 highlights the key literature relevant for this dissertation and thus, focuses exclusively on securitized banking and its role in the crisis. The chapter centres on the negative externalities from private liquidity creation through securitized banking, which provides grounds for legal intervention through bank regulation to internalize the social costs of potential bank failures. In this regard, this chapter further elaborates on the shortcomings of the financial regulatory framework visible in the aftermath of the crisis.

These chapters are followed by an analysis of the preceding Basel Accords to evaluate the role of regulation in incentivising bank involvement in securitized banking. Chapter 3 is an analysis of the pre-crisis Basel Accords (Basel I and the Market Risk Amendment) to identify the presence of regulatory arbitrage and adverse incentives for bank involvement in securitized banking. Chapter 4 focuses on the post-crisis Basel Accords (Basel II and Basel 2.5) to assess the effectiveness of the immediate post-crisis regulatory response in eliminating the arbitrage opportunities inherent in the pre-crisis Basel Accords. The objective of both chapters is to compare the capital requirements for securitized banking under the two balance sheet dimensions (the banking book and the trading book) to identify the presence (or absence) of any regulatory capital arbitrage.

Following these analytical chapters, Chapter 5 focuses on the implementation of the Basel Accords in EMEs to evaluate the similarities and differences in

Basel implementation within these countries. The aim is to determine whether national implementation and trends in bank behaviour in EMEs conforms to the theoretical conclusions of the preceding chapters. Chapter 6 sheds light on the current Basel regime (Basel III) to evaluate its effectiveness in eliminating the previous adverse incentives for bank involvement in securitized banking. Additionally, the chapter assesses whether the current Basel regime continues to incentivise banks to engage in securitized banking and provides policy implications to address whether current regulatory framework should be redesigned or reformed more effectively.

The dissertation concludes with a summary of the research findings and provides recommendations for future research.

Chapter 1

Repo Markets, Securitisation and Securitised Banking

The global financial crisis brought to attention the hidden evolution of banking, which had transformed in several ways.

Deregulation and liberalization removed barriers between banks' lending and investment activities, allowing them to undertake an array of financial activities, both for the customer and themselves; a model that is called universal banking.¹² This was a crucial development, which not only blurred the line between banking and its activities but also supported high global interconnectedness due to growing cross-border financial activities and financial innovation. These global linkages made integrated financial markets highly susceptible to a contagion in case of a crisis. There has also been a considerable change in the financial landscape, where borrowers and lenders have shifted towards market-based financing, in which financial markets play a more significant role than banks for financial intermediation. Financial innovation has been the main factor in driving this move away from traditional bank-based markets, providing cheaper alternatives for borrowers and higher investment returns for lenders.

*'...a financial innovation represents something new that reduces costs, reduces risks, or provides an improved product/service/instrument that better satisfies participants' demands.'*¹³

In the years before the crisis, financial innovation supported the development of numerous financial instruments such as credit-default swaps, asset-backed securities and asset-backed commercial paper, derivatives, options and collateralized debt obligations. These instruments not only fulfilled market demand but also became valuable risk sharing instruments for market participants. One such innovation was securitized banking, a new kind of

¹² For a detailed overview of universal banking and its contribution to the crisis, see AE Wilmarth, 'The Dark Side of Universal Banking: Financial Conglomerates and the Origins of the Subprime Financial Crisis' (2009) 41 Connecticut Law Review.

¹³ W Scott Frame and Lawrence J White, 'Empirical Studies of Financial Innovation : Lots of Talk , Little Action ?' (2004) 42 Journal of Economic Literature 116. p. 118.

money-like instrument which was a form of debt, short-term and was backed by banks' assets.¹⁴ This became the new medium of exchange and an additional source of banks' short-term debt, but the creditors were financial institutions and not traditional depositors. Nonetheless, this innovation had its drawbacks as it obscured the lines of banking for regulators, who were not aware which firms were banks and what debt was money, as securitized banking had become an important form of money.¹⁵

Banks are known to have been increasingly involved in securitized banking prior to the crisis, using securitized instruments (i.e. asset-backed securities) as collateral in repo markets.¹⁶ It was a fundamental change in banks' traditional maturity transformation, allowing them to utilise previously illiquid loans into a new source of funding. Consequently, securitized banking became an additional source of short-term funding (besides deposits) for banks created from privately issued securities, providing a new avenue for banks' private liquidity creation. Post-crisis, this bank involvement in securitized banking has gained considerable attention as one of the main sources of the recent crisis.¹⁷

This chapter provides an overview of the repo transaction and how it developed into a new kind of money-like instrument through securitized banking. The chapter begins with the repo transaction as an important instrument for short-term financing, followed by an outline of the process of securitisation that was the critical step for the innovation of securitized banking. The last section focuses on securitized banking and how it developed as an additional source of banks' short-term funding.

¹⁴ Gorton and Metrick, 'Securitized Banking and the Run on Repo'.

¹⁵ Gary B Gorton, *Misunderstanding Financial Crises: Why We Don't See Them Coming* (Oxford University Press 2012); Gorton and Metrick, 'Securitized Banking and the Run on Repo'.

¹⁶ Shleifer and Vishny, 'Unstable Banking'; Stein (2012); Gorton and Metrick, 'Securitized Banking and the Run on Repo' (2014); Acharya and others, 'Manufacturing Tail Risk: A Perspective on the Financial Crisis of 2007–2009'; Financial Stability Board, 'Securities Lending and Repos: Market Overview and Financial Stability Issues'; Krishnamurthy, Nagel and Orlov (2014).

¹⁷ Gorton and Metrick, 'Securitized Banking and the Run on Repo'; Hördahl and King (2008); Gorton and Metrick, 'Who Ran on Repo?'

1.1. Repo Markets

Repo is a multi-trillion dollar market and has been described as the core of the financial system, providing a vital source of liquidity and short-term financing.¹⁸ Since 2002, repo markets have doubled in size, with outstanding gross amounts at year-end 2007 of approximately \$10 trillion in both US and EU repo markets, with an additional \$11 trillion in UK markets.¹⁹ Moreover, repo markets are known to have grown globally at an average annual rate of 25 percent between 2001 and 2007.²⁰

The repo market is an important part of the larger money market, a source of short-term liquidity for borrowers, with financial transaction maturity less than one year and assets that can be readily converted to cash. Repo operates as a deposit market, where market participants deposit large sums of money for very short-term periods, usually overnight or a few days. Market participants include financial institutions and non-financial firms, with commercial and investment banks being the largest participants.²¹ Central banks are also key participants in repo markets, using it to implement monetary policy by intervening in money markets to impact money supply. During normal market conditions, the scale of central bank repos as compared to repos between other market participants is relatively small.²²

Repos have been used by financial institutions since the 1980s in the United States, primarily driven by the needs of securities firms (broker-dealers and investment banks) to fund long positions in securities acquired for trading purposes.²³ As these institutions lacked access to retail or interbank deposits, their primary source of funding was restricted to unsecured markets including

¹⁸ Gorton, *Misunderstanding Financial Crises: Why We Don't See Them Coming*; Gorton and Metrick, 'Securitized Banking and the Run on Repo'.

¹⁹ Hördahl and King (2008), p. 37.

²⁰ Gorton and Metrick, 'Securitized Banking and the Run on Repo'; Hördahl and King (2008); Gary Gorton and Andrew Metrick, 'Who Ran on Repo?' *citing* International Capital Market Association (ICMA) repo survey.

²¹ Gorton, *Misunderstanding Financial Crises: Why We Don't See Them Coming*; Gorton and Metrick, 'Securitized Banking and the Run on Repo'.

²² Euroclear and Richard Comotto, *Understanding Repos and the Repo Markets* (2009).

²³ Gorton and Metrick, 'Securitized Banking and the Run on Repo'; Hördahl and King (2008); Gorton and Metrick, 'Who Ran on Repo?' *See also*, European Repo Council, 'A White Paper on the Operation of the European Repo Market, the Role of Short-Selling, the Problem of Settlement Failures and the Need for Reform of the Market Infrastructure' (2010); KTW Ong and EYC Yeung, 'Repos & Securities Lending: The Accounting Arbitrage and Their Role in the Global Financial Crisis' (2011) 6 *Capital Markets Law Journal* 92.

loans and issuing commercial paper.²⁴ The main financiers in these markets were commercial banks, providing funds at high costs due to the highly leveraged and risky nature of securities firms. Repo offered a form of secured financing, as the presence of collateral mitigates lender's risk and also eliminates the need for commercial banks as intermediaries by providing borrowers with direct access to lenders.²⁵ This lowered the cost of borrowing for securities firms, allowing them to access a cheaper source of funding and increase their level of leverage.

Consequently, repo became the primary source of funding for securities firms and other highly leveraged institutions, including hedge funds. Although commercial banks have traditionally been involved in repo transactions as lenders, over the last few decades, they have expanded their role as borrowers. This bank borrowing through repo has also provided commercial banks with a cheaper source of short-term funding than interest-bearing retail deposits.

1.1.1. The Repurchase Agreement – Repo

The repo transaction is a repurchase agreement, where one party sells securities for cash with a simultaneous agreement to repurchase these securities at a specific price at an agreed date in the future. The seller of securities *borrow*s cash and holds a *repo* or a *sale and repurchase agreement* and is called the *repo seller*. The buyer of securities *lends* cash and holds a *reverse repo* or a *purchase and resale agreement* and is called the *repo buyer*. The remainder of this dissertation will use *repo seller/borrower* and *repo buyer/lender* interchangeably, unless stated otherwise.²⁶

A repo transaction essentially consists of two transactions, the sale of securities and the repurchase of the same. In the first, the borrower sells securities to the lender and agrees to buy it back at an agreed date and price, classifying it as a 'repo'. The lender agrees to resell the same or equivalent securities at the agreed upon price and date, classifying it as a 'reverse repo'. The second transaction is the repurchase of securities, where the borrower purchases the securities with

²⁴ Euroclear and Comotto (2009).

²⁵ *ibid.*

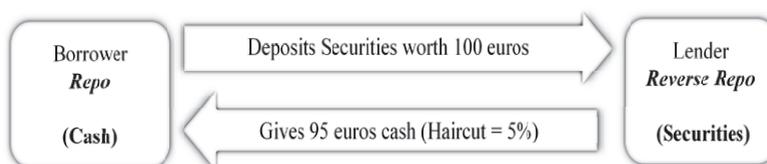
²⁶ This focus on the lending and borrowing of cash is taken in accordance with the motivation of this dissertation, which focuses on the use of repo transactions as a source of short-term funding, rather than to fulfil short positions in securities.

cash to repay the debt. The agreed upon repurchase price is higher than the purchase price (i.e. the amount of cash received by the borrower) to reflect the interest rate on the transaction. This predetermined interest rate represents the cost of borrowing and is called the repo rate.

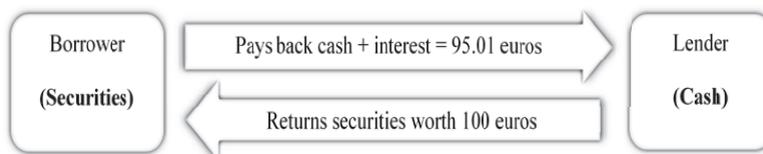
A typical repo transaction between two parties is illustrated in the figure below:

Figure 1: Repo Transaction

(a) Sale – Initiation



(b) Repurchase – Maturity (2 days later)



The hypothetical scenario represents the repo seller (borrower) selling securities with a market price of 100 euros for 95 euros and agrees to repurchase them for 95.01 in 2 days. The agreed repurchase price implies a repo rate of 2% (quoted on an annualized basis), representing the interest rate for this transaction.²⁷ The securities sold represent the underlying collateral, which usually has a haircut (or initial margin) that indicates the lender’s perceived risk of the collateral. These haircuts vary for different asset classes and credit ratings, with low haircuts for highly rated and less risky collateral.²⁸ In the scenario above, the haircut is 5%, which limits the repo seller to borrow less than the market value of the underlying collateral. This overcollateralization reduces credit risk for the

²⁷ Repurchase price = Purchase price (1 + repo rate) = 95 {1 + 2% (2/365)} = 95.01 euros.

²⁸ Bank for International Settlements, ‘Implications of Repo Markets for Central Banks’ (1999); European Repo Council (2010).

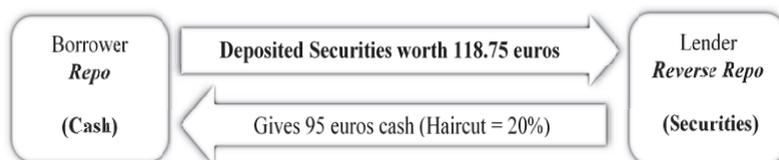
repo buyer, as he will have to sell collateral on the market if the repo seller fails to repay the borrowed funds i.e. buyback the securities.

In essence, this repo transaction is a collateralised loan to borrow 95 euros for 2 days at an interest rate of 2%. However, the collateral is not pledged but sold and repurchased at maturity. The sale of collateral represents a transfer of ownership as the legal title to the collateral passes to the lender, increasing his control and thus, reducing credit risk. On the other hand, based on economic substance, the seller retains the risk and return of the collateral.²⁹ This makes repo an ideal financing tool for the borrower, allowing him to take long positions in assets and simultaneously finance the purchase by using them as collateral in repo, while continuing to receive asset return.

An important feature of repo transactions is that they can be renewed without any additional contractual obligations. As repo transactions are short-term, not lasting for longer than two weeks, the lender can withdraw money simply by failing to renew or roll over the transaction at maturity.³⁰ Additionally, repo is analogous to a deposit system since the lending party can withdraw some funds by renewing the transaction at a higher haircut (Figure 2).³¹

Figure 2: Repo – rolled over but with a higher haircut

(a) Post additional collateral

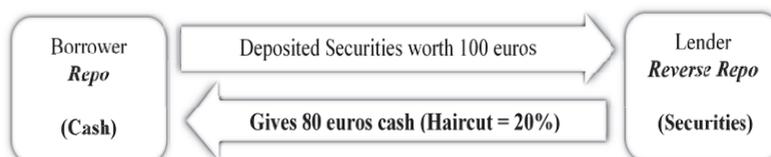


²⁹ Euroclear and Comotto (2009).

³⁰ *ibid.*

³¹ *ibid.* See also Bank for International Settlements (1999); European Repo Council (2010).

(b) Reduce borrowing



Although the repo transaction is rolled over (renewed), the lender has now increased the haircut from 5% to 20%, perhaps due to a change in the market value or an increase in the lender's perceived riskiness of collateral. The borrower can respond firstly, by posting more collateral to preserve the same level of funding. As shown in Figure 2(a), the borrower will have to post additional collateral worth 18.75 euros, the lender now in possession of collateral with a market value of 118.75 euros. Another alternative to fulfil the increased haircut requirement would be for the borrower to reduce the amount of funding. Figure 2(b) illustrates this scenario, where the borrower can now raise less funds than before with the same underlying collateral, since the increased haircut reduces the amount of funding by 15 euros. The borrower can repay 15 euros to the lender and reduce its total borrowing to 80 euros to maintain the higher haircut of 20%.

Therefore, in case of an increase in haircut, the lender has the right to claim additional funds or collateral from the borrower and withdraw funding. This is analogous to withdrawing from a bank deposit, except that this is not between a depositor and a bank but between financial institutions.³²

1.1.2. The importance of collateral and counterparty

1.1.2.1. Collateral as a risk mitigant

Collateral is the main element that hedges the lenders' credit risk in a repo transaction, providing protection against both, counterparty and collateral issuer default.³³ This makes repo attractive for lenders, since the underlying collateral

³² Euroclear and Comotto (2009).

³³ *ibid.*

acts as an insurance for the lender in case of default i.e. if the repo seller (borrower) is unable to buy back the securities. In this instance, the transfer of collateral ownership plays an important role, as it gives the lender the right to liquidate collateral in the market to recover funds. Therefore, accurate collateral valuation is crucial for the repo buyer as insufficient collateral increases the transaction's credit risk. In the same manner, collateral valuation is also vital for the borrower since excessive collateralization limits the borrower's ability to access greater funding. Thus, accurate collateral valuation at initiation and duration of the repo contract is essential for both parties.³⁴

Liquidity of the underlying collateral i.e. the ability and price at which the lender can sell collateral in the market, is critical for valuation. Collateral value varies with the degree of liquidity and is dependent on characteristics of the underlying security.³⁵ For example, traditional collateral such as government securities issued by sovereigns of high credit standing are considered to be default free and very liquid. These characteristics support an active market for these securities, allowing market participants to appropriately value them and determine their market price. Consequently, majority of collateral used in repo markets is government bonds since their characteristics can be easily incorporated in market prices and can be seen as a benchmark for valuation.³⁶ Non-government securities or alternative forms of collateral with complex characteristics and low liquidity can limit valuation accuracy and the ability of these securities to be used as collateral.

The subject of collateral liquidity and valuation should also incorporate the negative impact from adverse market conditions, which can render even high quality collateral illiquid when distorted market prices make market participants unwilling to trade. This undermines the role of collateral as a risk mitigant for the lender, as adverse market conditions can limit the ability to liquidate collateral and recover funds. The repo instrument safeguards the lender against these issues by requiring an initial margin (or haircut) and regular margin maintenance (margin call).³⁷ As the lender is giving the more liquid asset (i.e. cash), the initial margin protects him from changes in price due to inaccurate collateral valuation or market movements. Additionally, margin maintenance ensures consistent presence of sufficient collateral to minimise lender's credit

³⁴ *ibid.*

³⁵ *ibid.* See also GB Gorton and A Metrick, 'Haircuts' [2009] NBER Working Paper No. 15273.

³⁶ Euroclear and Comotto (2009).

³⁷ TV Dang, Gary Gorton and Bengt Holmström, 'Haircuts and Repo Chains' [2013] Columbia University; Gorton and Metrick, 'Haircuts'.

risk. In the instance that market prices fall below the initial margin or the issuer of collateral defaults, the lender has the right to make a margin call, requiring the borrower to place additional collateral or reduce credit exposure.

The initial margin (haircut) is the difference between the market value of the collateral and its purchase price in the repo market. The haircut serves as a buffer for the lender against a fall in collateral value if the lender has to liquidate the collateral in case of borrower default.³⁸ In the simple repo transaction in Figure 1(a), the securities worth 100 euros in the market are being sold for 95 euros in the repo market, representing a haircut of 5%. In case of default, the haircut protects the lender from liquidating the securities at a market price between 95 and 100 euros i.e. even if the price of the collateral falls by 5%, the lender can still recover the loaned funds.

The level of haircut is dependent on (i) characteristics of the collateral (illiquidity, complexity, demand and price volatility), (ii) credit worthiness of the counterparty (default risk) and (iii) the term (maturity) of the transaction.³⁹ Repo with an underlying collateral that is illiquid and not widely used or those with complex characteristics will attract a higher haircut, as the lender requires greater protection from the collateral's idiosyncratic risk. Risky counterparties (borrowers) with low credit standing or inherently risky business are subject to higher haircuts, since they increase the likelihood of counterparty failure and increased lender's credit risk. Moreover, the term (maturity) of repo also influences the haircut, with long term repo (more than a few days) attracting higher haircuts due to the increased probability of counterparty default or adverse market conditions. For example, the haircut for an overnight repo with a high credit standing counterparty and a government bond as collateral would be lower than that for the same term and counterparty but with a non-government security.

Another important feature of repo transactions, beneficial to the lender, is the re-hypothecation of collateral. The lender is allowed to use collateral given in a repo deposit in a new repo transaction with other market participants. This assures unconstrained liquidity for the lender since the collateral received can be used to access additional funds, if required. The re-hypothecation of collateral also has a positive impact on market liquidity and creates effects

³⁸ Financial Stability Board, 'Securities Lending and Repos: Market Overview and Financial Stability Issues'.

³⁹ Dang, Gorton and Holmström (2013); Gorton and Metrick, 'Haircuts'. Also Marcia Stigum, *Stigum's Money Market* (McGraw-Hill Education 2007).

analogous to the ‘money multiplier’⁴⁰, resulting in “*high levels of ‘velocity’ in repo markets*”.⁴¹ Therefore, on any given day, the same repo collateral can be used for multiple financial transactions, increasing the velocity in repo markets and resulting in an increased quantity of money.⁴²

1.1.2.2. The importance of counterparty

In essence, repo offers a ‘double indemnity’ to the lender, as he can rely on both the counterparty and the collateral to reduce credit risk.⁴³ In case of borrower default, the lender can liquidate collateral in the market to recover funds. However, if the issuer of the collateral defaults, the lender can make a margin call and obtain additional collateral from the borrower. While both scenarios are a possibility, the lender will be able to significantly diversify credit risk when the borrower and the issuer of collateral are independent entities, with credit risks that are sufficiently uncorrelated.⁴⁴

Although the presence of collateral significantly reduces the credit risk of repo, its effectiveness in case of default might be constrained by adverse market conditions. In such circumstances, the collateral value might be negatively impacted or market participants might be unwilling to trade, restricting the lender’s ability to recover funds. Thus, collateral should be treated like insurance and the primary risk should be related on the counterparty, implying that the contributions of collateral and counterparty to the diversification of credit risk are not symmetrical.⁴⁵ This asymmetry is due to the relative convenience for the lender in case of issuer default versus counterparty (borrower) default. In the former, a margin call would require the borrower to either provide new collateral or reduce credit exposure. However, with counterparty default, the lender can recover funds only by liquidating collateral

⁴⁰ The money multiplier can be explained simply as the possibility of money held in bank deposits to be used for multiple transactions. So for a given deposit, the money can be used to extend a loan and an investment, creating more money from the fixed deposit.

⁴¹ Euroclear and Comotto (2009). *See also* Financial Stability Board, ‘Securities Lending and Repos : Market Overview and Financial Stability Issues’.

⁴² Manmohan Singh, ‘Velocity of Pledged Collateral: Analysis and Implications’ [2011] IMF Working Papers 11/256.

⁴³ Euroclear and Comotto (2009).

⁴⁴ *ibid*.

⁴⁵ *ibid*; Financial Stability Board, ‘Securities Lending and Repos : Market Overview and Financial Stability Issues’; Gorton and Metrick, ‘Haircuts’.

in the market, which can be constrained in adverse market conditions that both parties cannot foresee or control.

Therefore, the risk from accepting poor quality collateral from a credit worthy borrower is lower when compared to receiving good quality collateral from a risky counterparty. Thus, lenders should not be indifferent between the two scenarios and the creditworthiness of the borrower must be the primary factor influencing their lending decision, not the underlying collateral.

1.1.3. Accounting treatment and Balance sheet impact

While harmonization of global accounting standards is currently underway, prior to the crisis, International Financial Reporting Standards (IFRS) and US Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) were the two main accounting regimes.⁴⁶ Differences in these accounting standards for recognition of an off-balance sheet transaction encouraged accounting arbitrage, allowing financial institutions to undertake repo as off-balance sheet financing and window-dress their financial statements.⁴⁷ These differences were present in the criteria to determine whether repo was a sale transaction (off-balance sheet) or a secured loan (on-balance sheet).

An off-balance sheet repo transaction would have no impact on the borrower's balance sheet as the repo seller does not record a liability to disclose its obligation to repay the borrowed funds. The repo seller reports the transfer of securities for cash by removing these securities from the balance sheet and recording a corresponding increase in cash. Therefore, the borrower is able to increase its borrowing without disclosure and hence, can achieve an artificially lower leverage ratio.⁴⁸ On the other hand, an on-balance sheet repo transaction would require the transferred securities to remain on the repo seller's balance

⁴⁶ Companies located in places such as the UK, European Union and Hong Kong, are required to adopt the International Financial Reporting Standards (IFRS), whereas for listed companies in the USA, adoption of the US Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) is mandatory. Currently, 91 jurisdictions require the adoption of IFRS as accounting standard for its listed companies, See <http://www.iasplus.com>. The Financial Accounting Standards Board (FASB) in the USA has been the designated organization in the private sector for establishing standards of financial accounting.

⁴⁷ Ong and Yeung (2010).

⁴⁸ Leverage is the relationship between a company's total debt obligations to shareholders' equity or total assets.

sheet and a corresponding repayment obligation is recorded by an increase in liabilities, expanding the borrower's balance sheet to indicate increased leverage.

However, capital regulation for banks is based on economic substance and hence, repo is treated as a secured loan, where the risk and reward remains with the repo seller. Capital regulation under the Basel Accords equalized capital requirements for both, on-balance sheet and off-balance sheet repo. This was achieved by assigning a credit conversion factor (CCF) to convert the off-balance sheet transaction into an equivalent on-balance sheet exposure, which was then used to calculate the capital requirements for repo.

The balance sheet impact of repo for both, the borrower and lender, can be seen in the following example, which illustrates an on-balance sheet or an equivalent off-balance sheet repo transaction. For the purpose of this illustration, *repo seller* refers to the borrower of cash (seller of collateral) and *repo buyer* refers to lender of cash (buyer of collateral). Figure 3 starts by showing the balance sheet of both parties prior to the repo transaction.

Figure 3: Pre-repo balance sheets

Seller				Buyer			
Assets		Liabilities		Assets		Liabilities	
Fixed	90.0	Current	90.0	Fixed	200.0	Current	100.0
Investments	20.0	Retained earnings	80.0	Investments	50.0	Retained earnings	120.0
Other current	80.0	Share capital	30.0	Other current	10.0	Share capital	80.0
Cash	10.0			Cash	40.0		
	200.0		200.0		300.0		300.0

Source: Euroclear and Richard Comotto, *'Understanding Repos and the Repo Markets'* (2009) p. 45

Consider a repo transaction involving the sale of securities with a market value of 10 million and no haircut.⁴⁹ Assuming a repurchase price of 10.1 million, the implied repo rate is 1% i.e. the repo seller (borrower) pays an interest of 0.1 million.

Repo Initiation

At initiation, the repo seller reports an increase in the assets and liabilities of 10 million as (i) securities sold are transferred from investments to collateral

⁴⁹ This zero haircut requirement is not unusual as it is usually when the underlying collateral is high quality government securities and the market participant is a core market participant i.e. financial institution with a good credit standing.

(remains on the balance sheet) and (ii) the proceeds from the sale of securities (i.e. the borrowed funds) increase cash and liabilities (collateralised borrowing) by 10 million. For the repo buyer, there is no change in the overall assets or liabilities as the cash lent is transferred from cash account and reported as a claim on the repo seller under other current assets.

Figure 4: Balance sheets at repo initiation

Seller				Buyer			
Assets		Liabilities		Assets		Liabilities	
Fixed	90.0	Current	90.0	Fixed	200.0	Current	100.0
Investments	10.0	Retained earnings	80.0	Investments	50.0	Retained earnings	120.0
Other current	80.0	Share capital	30.0	Other current	20.0	Share capital	80.0
Cash	20.0	Collat. borrowing	10.0	Cash	30.0		
Collateral	10.0						
	210.0		210.0		300.0		300.0

Source: Euroclear and Richard Comotto, *'Understanding Repos and the Repo Markets'* (2009) p. 45

The repo seller's balance sheet expands due to the increase in liabilities from reporting the repurchase obligation on repo, indicating an increase in borrowing. The repo buyer's balance sheet remains unchanged as there was only a redistribution on the asset side to show a claim on the repo seller and record a reverse repo.

Repo Maturity

At maturity, the repo seller repurchases the securities at the predetermined repurchase price of 10.1 million. The repo seller now reports a decrease in assets and liabilities as (i) the collateral item is reduced (extinguished in this case) and investments increase as the securities are returned, (ii) cash is reduced by the repurchase price of 10.1 million and (iii) liability of repo under collateralised borrowing is reduced by 10 million (extinguished entirely in this case) and retained earnings reduced by 0.1 million to account for the repo rate.

The repo buyer records the return of securities to the repo seller with an increase in cash of 10.1 million and a simultaneous reduction in current assets of 10 million, indicating the settled claim on the repo seller. The receipt of 0.1 million on the transaction is reported as an increase in retained earnings to represent the return earned on reverse repo.

Figure 5: Balance sheets at repo maturity

Seller				Buyer			
Assets		Liabilities		Assets		Liabilities	
Fixed	90.0	Current	90.0	Fixed	200.0	Current	100.0
Investments	20.0	Retained earnings	79.9	Investments	50.0	Retained earnings	120.1
Other current	80.0	Share capital	30.0	Other current	10.0	Share capital	80.0
Cash	9.9			Cash	40.1		
	199.9		199.9		300.1		300.1

Source: Euroclear and Richard Comotto, *Understanding Repos and the Repo Markets* (2009) p. 45

At maturity, the repo seller's balance sheet shrinks while the repo buyer's balance sheet expands, representing the return paid by the borrower for using the lender's cash.

The inflow and outflow of cash is also reported in the cashflow statement of both parties. For the repo seller, the obligation to repurchase the securities sold is reported as a financing activity, where the recorded liability expands the balance sheet. Thus, repo transactions are used as a source of funding to finance the purchase (long position) through cash proceeds from repo. For the repo buyer, who holds a reverse repo, the commitment to resell and the claim it holds on the counterparty is reflected as a collateralized loan (an asset) on the balance sheet and is reported as an investing activity. Therefore, a reverse repo can be used either to cover short positions (receive specific collateral) or as a form of investment with excess cash proceeds (earn higher interest than other cash investments).

1.1.4. Why use repo?

In essence, repo is economically similar to a secured loan, with the seller of securities (or borrower of cash) using it as a source of short-term funding and the buyer of securities (or lender of cash) using it as a short-term investment.

From the repo seller's perspective, repo is a cheaper source of financing than unsecured borrowing as the presence of collateral reduces the lender's credit risk. Thus, lenders are subject to lower regulatory capital requirements and hence, are willing to lend more cash and at lower rates than in unsecured markets (such as deposits or commercial paper).⁵⁰ Repo sellers primarily use

⁵⁰ *ibid.*

repo to fund the purchase (long positions) of securities that they hold as investments by using them as collateral in repo. Although the legal title is transferred to the lender, the repurchase commitment ascribes the risk and rewards of the underlying collateral with the borrower.⁵¹ For example, repo with a coupon paying bond or dividend paying share would transfer the ownership title to the repo buyer but the coupons and dividends would still be received by the repo seller. Similarly, any fall in price of the underlying securities during the term of the repo is borne by the seller i.e. if the price of the bond or share falls below the repurchase price, the repo seller incurs the loss.⁵² Therefore, the repo seller continues to maintain exposure to the underlying collateral and also increase leverage.

From the repo buyer's perspective, reverse repo is a short-term investment, providing reasonable returns with lower credit risk than unsecured lending, which reduces lender's regulatory requirements and improves their returns on cash. Additionally, reverse repo can be used to cover short positions in securities, as part of the repo buyer's trading activity, where required securities can be acquired to settle delivery obligations.⁵³ Moreover, the possibility of re-hypothecation of collateral provides lenders with the opportunity to restore their cash balances by using the same collateral in repo with a third party. Therefore, unlike lending in unsecured markets or using non-transferable instruments like deposits, reverse repo does not deplete lenders' liquidity.

1.2. Securitisation

Securitisation has existed since the 1970s, with the issuance of mortgage-backed securities in the United States.⁵⁴ Although several financial crises have occurred since then, the role of securitisation has gained prominence after the recent crisis. It became the most popular innovation for financial institutions, making it easier to value and trade banks' loans as securitized instruments in

⁵¹ *ibid.*

⁵² This risk pertaining to the underlying collateral is transferred to the repo buyer in case of counterparty default i.e. if the repo seller is unable to buy back the securities. This transfer of risk is explained in section 1.1.2.1.

⁵³ *ibid.*; Financial Stability Board, 'Securities Lending and Repos: Market Overview and Financial Stability Issues'; Euroclear and Comotto (2009).

⁵⁴ Allen Franklin and Douglas Gale, *Financial Innovation and Risk Sharing* (The MIT Press 1994).

secondary markets.⁵⁵ In aggregate, securitisation worldwide grew from \$767 billion at year-end 2001 to a peak of \$2.7 trillion at year-end 2006.⁵⁶

Securitisation is the process of packaging a number of assets, mostly loans (such as credit cards, mortgages, auto loans and corporate debt), to create various forms of securitized instruments called asset-backed securities (ABS).⁵⁷ The value of these securities is derived from the quality and expected future income of the underlying assets. For instance, a mortgage-backed security is a securitized instrument with mortgages as the underlying asset, where the value of these securities is determined by the credit quality and expected mortgage repayments by mortgage holders.

The process of securitisation is presented in Figure 6. The main element for securitisation is the Special Purpose Vehicle (SPV), a bank-sponsored entity treated as legally separate from the sponsoring institution, usually in the form of a trust or subsidiary (e.g. investment banking subsidiary of a universal bank). Assets are transferred to the SPV, which performs the packaging on behalf of banks and issues ABS that are then sold to investors.⁵⁸ This was reported as an off-balance sheet transaction, which fulfilled the required criteria under both accounting regimes (IFRS and US GAAP). The sale of securitized instruments to final investors allows the SPV to fund the purchase of bank loans i.e. the bank sells loans to the SPV, which pays for these loans from the sale of ABS to investors. Besides being sold to investors, issuing banks can also retain securitisation tranches and in recent decades, these could be used as collateral in money markets.

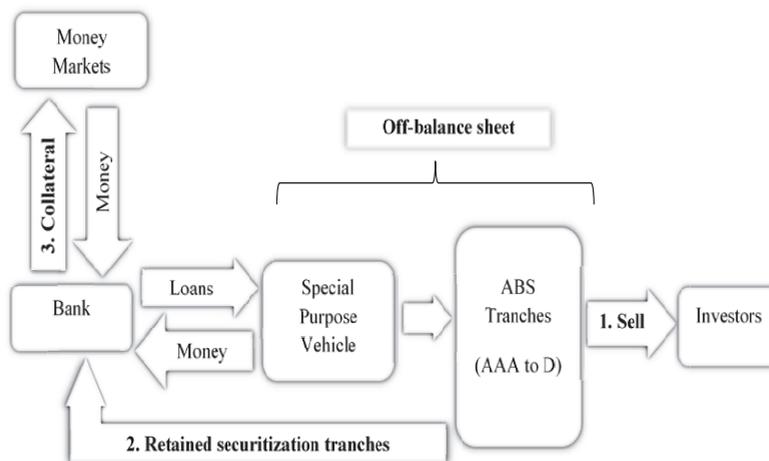
⁵⁵ Gorton and Metrick, 'Securitization'; Joshua Coval, Jakub Jurek and Erik Stafford, 'The Economics of Structured Finance' (2009) 23 *Journal of Economic Perspectives* 3; Shleifer and Vishny, 'Unstable Banking'.

⁵⁶ Acharya and Richardson (2009), p. 200.

⁵⁷ For simplicity, no differentiation is made between different types of securitized instruments and asset-backed securities will be generally used throughout the dissertation.

⁵⁸ GB Gorton and NS Souleles, 'Special Purpose Vehicles and Securitization', *The Risks of Financial Institutions* (University of Chicago Press 2007); Gorton and Metrick, 'Securitization'; Coval, Jurek and Stafford (2009).

Figure 6: Securitisation and Asset-backed Securities



The ABS are classified into different tranches according to their level of seniority and assigned specific credit ratings by authorized credit rating agencies. The credit ratings range from AAA (lowest risk) to D (highest risk) and are grouped as investment grade (AAA to BBB-) and non-investment/junk grade (below BBB-).⁵⁹ The highest grade tranche (AAA) is the least risky, structured to suffer losses only after all other tranches are negatively affected, thus carrying the highest level of certainty for investors. Therefore, high-grade securitized instruments provide lower returns as compared to the more risky BBB- tranche, as investors are compensated for accepting higher risk of the latter.

In the last decades, there has been enormous growth in the rate of securitisation in global financial markets. It was developed as an innovative tool for economic risk transfer to minimize the credit risk of banks' assets.⁶⁰ Securitisation allows effective risk management and diversification by moving large concentrated asset positions off banks' balance sheets and transferring small portions of the risk to a large number of investors.⁶¹ Moreover, since the proceeds from

⁵⁹ These ratings are based on Standard & Poor and Fitch long term ratings ranging from AAA to D. Short-term ratings range from A-1 to C by Standard & Poor and P-1 to P-3 by Moody's.

⁶⁰ Stuart I Greenbaum and Anjan V. Thakor, 'Bank Funding Modes: Securitization versus Deposits' (1987) 11 *Journal of Banking and Finance* 379; Franklin and Gale (1994).

⁶¹ Gorton and Metrick, 'Securitization'; Coval, Jurek and Stafford (2009); Odenbach (2002).

securitisation are accounted as a sale, the cash inflow can improve solvency and capital ratios.⁶²

Aside from these benefits, two key elements have been singled out as major contributors for the growth in securitisation. Firstly, it is proclaimed that securitisation grew to evade capital requirements.⁶³ The transfer of assets to a SPV fulfilled the accounting criteria for a true sale and hence, was classified as an off-balance sheet transaction. Therefore, there is no net effect as the assets sold are removed from the balance sheet and a corresponding increase in cash (proceeds from the sale of ABS by the SPV) is recorded. Consequently, this reduction in reported assets lowers banks' capital requirements, which are calculated as a proportion of total risk-weighted assets.⁶⁴

Secondly, securitisation grew to meet the rising demand from investors and financial markets for privately issued safe collateral.⁶⁵ Financial institutions engineered securities from large asset positions with varying levels of risk, the highest grade (AAA rated) tranches of these securitized instruments attracted both individual and institutional investors such as pension funds, hedge funds, mutual funds and insurance companies. Due to the high credit rating, these securities were perceived to be safe by all market participants, signalling to investors that these tranches of ABS were as safe as high-grade corporate bonds.⁶⁶ Consequently, these high-grade securitized instruments were considered as good substitutes for traditional securities (e.g. treasury and government guaranteed securities), encouraging their use as collateral in financial transactions.

⁶² Odenbach (2002).

⁶³ Gorton, *Misunderstanding Financial Crises: Why We Don't See Them Coming*; Gorton and Souleles (2007).

⁶⁴ Gorton and Metrick, 'Regulating the Shadow Banking System'; Admati and Hellwig (2014); Gorton and Metrick, 'Securitization'.

⁶⁵ Several scholars have maintained this view of rising demand for privately issued collateral, such as Gorton and Metrick, 'Regulating the Shadow Banking System'; Gennaioli, Shleifer and Vishny, 'Neglected Risks, Financial Innovation, and Financial Fragility'; Shleifer and Vishny, 'Unstable Banking'; Acharya and Richardson (2009); Admati and Hellwig (2014); Gorton and Metrick, 'Securitized Banking and the Run on Repo'; Financial Stability Board, 'Securities Lending and Repos: Market Overview and Financial Stability Issues'.

⁶⁶ Gennaioli, Shleifer and Vishny, 'Neglected Risks, Financial Innovation, and Financial Fragility'. For the role of credit rating agencies and the potential conflicts of interest in the recent financial crisis, see Lawrence J White, 'The Credit-Rating Agencies and the Subprime Debacle' (2009) 21 *Critical Review: A Journal of Politics and Society* 389.

1.3. Securitized Banking

Prior to the crisis, repo markets in non-traditional ‘alternative’ collateral were growing, which included innovative instruments such as covered bonds and ABS, as these were considered good collateral by market participants.⁶⁷ Although the relative size of alternative collateral repo market is smaller when compared to repo with traditional securities, it represents a significant portion of private liquidity creation by market participants.⁶⁸ Securitized banking was one such form of alternative collateral repo transaction where ABS were used as collateral in repo.

Banking is all about debt. Minsky saw bankers as entrepreneurs engaged in an innovative and profit driven business, describing them as “*merchants of debt who strive to innovate in the assets they acquire and the liabilities they market*”.⁶⁹ Banks act as financial intermediaries between depositors and borrowers, the former providing funds to make loans and banks providing expertise in assessing borrower credit risk. Banks earn through maturity transformation i.e. the process of using short-term debt to fund long-term investments. This is core to banks’ earnings as they borrow short-term (usually in the form of deposits) and use these funds to offer long-term loans. Deposits are a form of debt since depositors have the right to withdraw their funds at any time. Hence, they are short-term, backed by the banks’ assets and are classified as banks’ short-term debt.

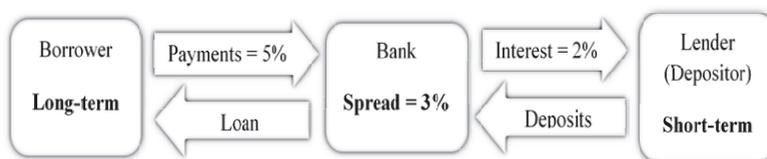
In the traditional banking model, deposits are the main source of short-term funds and banks earn from the interest rate spread between the rate offered to attract deposits and the higher rate paid by borrowers when these deposits are loaned out. Figure 7 illustrates traditional maturity transformation, where a bank offering a deposit rate of 2 percent and a loan with an interest rate of 5% earns the interest rate differential of 3%. This interest rate differential is called the “spread” and is an essential component of banks’ earnings. The higher the short-term debt and thus leverage, the greater the banks’ earnings from credit intermediation.

⁶⁷ Euroclear and Comotto (2009).

⁶⁸ *ibid.*

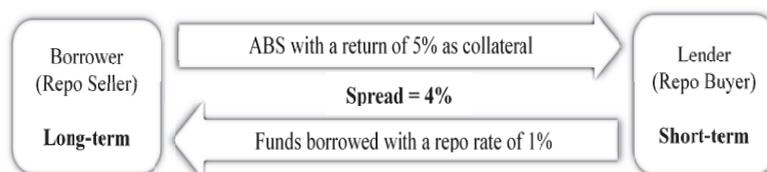
⁶⁹ Hyman P Minsky, ‘The Financial Instability Hypothesis’ [1999] The Jerome Levy Economics Institute Working Paper No. 74, p. 6.

Figure 7: Traditional banking – Maturity transformation



Securitized banking is the combination of securitized instruments and repo, where short-term funds from the repo market are used to make long-term investments. Therefore, securitized banking is also maturity transformation but with repo as the main source of short-term funds and financial institutions as borrowers and lenders. Figure 8 shows maturity transformation under securitized banking, where repo is used to fund a long position in an ABS.

Figure 8: Securitized banking – Maturity transformation



As the risk and return of the transferred security remains with the repo seller, the borrower receives the 5% return on the security. With a cost of borrowed funds of 1% (repo rate), the repo seller earns a spread of 4%.

Therefore, *“Traditional banking is the business of making and holding loans, with insured demand deposits as the main source of funds. Securitized banking is the business of packaging and reselling loans, with repo agreements as the main source of funds.”*⁷⁰

Some key aspects are visible when comparing traditional banking and securitized banking. Firstly, the impact on the balance sheet assets differs between the two, with loans kept on the balance sheet in the former and loans securitized in the latter. Secondly, traditional banking uses interest rates to attract deposits whereas securitized banking uses repo rates to attract

⁷⁰ Gorton and Metrick, “Securitized Banking and the Run on Repo”, p. 1.

counterparties when funds are low.⁷¹ Thirdly, deposits are guaranteed by the governments under deposit insurance whereas the funds lent in securitized banking are guaranteed by the underlying collateral, suggesting that deposit insurance is analogous to the collateral used in securitized banking. Collateral can be cash, treasury securities or securitized instruments, the reliability of these is essential to prevent a ‘run’ by market participants and thus, crucial for the functioning of securitized banking.⁷²

Moreover, securitized banking played a key role in moving banks away from traditional collateral, which includes instruments such as treasury securities, agency securities (issued by government sponsored entities), bank certificates of deposit and bankers’ acceptances.⁷³ These traditional securities were considered safe, riskless and highly liquid as they could be easily converted into money. Securitized banking used innovative collateral i.e. high-grade securitized instruments, which were perceived to carry the lowest risk and were considered as good substitutes for traditional collateral. This perception of safety increased demand for privately issued collateral in order for banks to access an additional source of funds.

Securitized banking therefore, became an additional source of short-term funding (besides deposits), created from banks’ privately issued securities, thereby converting long-term illiquid assets into a source of liquidity. This use of privately issued securities to access another source of short-term funding created a private liquidity cycle for banks, expanding their ability to refinance debts.

Banks are said to have an advantage in private liquidity creation as compared to non-banks, since they hold diversified loan portfolios and are thus able to create “...*riskless, interest-bearing, transactions media*”.⁷⁴ In recent years, financial institutions pooled and tranced different kinds of loans to engineer ABS that were considered as safe as government securities, both by investors and the

⁷¹ *ibid* figure 3.

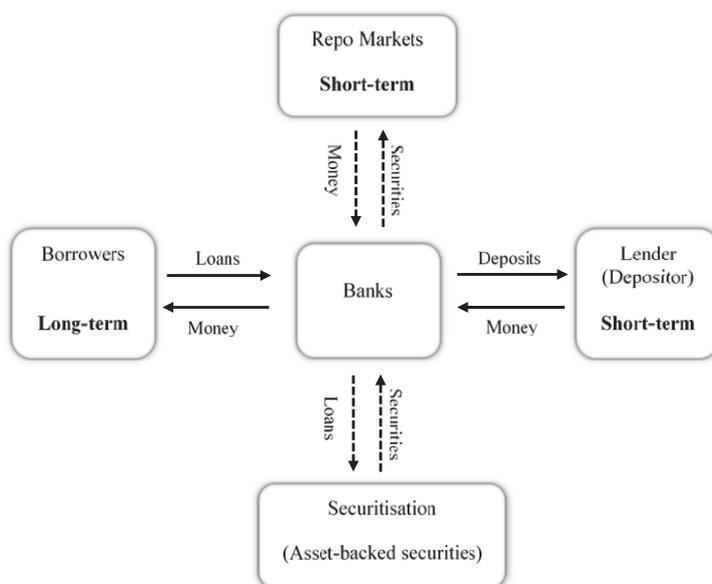
⁷² *ibid*.

⁷³ Gorton and Metrick, ‘Regulating the Shadow Banking System’; Financial Stability Board, ‘Securities Lending and Repos : Market Overview and Financial Stability Issues’.

⁷⁴ Gorton, “Bank Regulation When ‘Banks’ and ‘Banking’ Are Not the Same”, p. 117. *On private liquidity creation, see also* Gary Gorton and George Pennacchi, ‘Financial Intermediaries and Liquidity Creation’ (1990) 45 *The Journal of Finance* 49; Stein (2012); Nicola Gennaioli, Andrei Shleifer and Robert W Vishny, ‘A Model of Shadow Banking’ (2013) 68 *The Journal of Finance* 1331.

intermediaries themselves.⁷⁵ As market participants perceived them to be safe, due to the high credit ratings, they began borrowing against them as collateral, often with very low haircuts.⁷⁶ This was a key transformation, with the chain of securitisation allowing regulated commercial banks to securitize long-term loans into high-grade securities that could be used as collateral for short-term borrowing in repo markets, using one kind of long-term debt as collateral for another short-term debt.⁷⁷ Thus, securitized banking became analogous to a money machine for banks (Figure 9), providing them with an additional source of short-term funding (besides deposits) created from banks' privately issued securities.

Figure 9: Securitized Banking



⁷⁵ Gennaioli, Shleifer and Vishny, 'Neglected Risks, Financial Innovation, and Financial Fragility'.

⁷⁶ Shleifer and Vishny, 'Unstable Banking'; Stein (2012); Henry CK Liu, 'The Global Economy in Transition', *Invited lecture at the ERC/METU International Conference on Economics, Ankara, Turkey, September 6. (2003)*; Gorton and Metrick, 'Securitized Banking and the Run on Repo'; Financial Stability Board, 'Securities Lending and Repos: Market Overview and Financial Stability Issues'.

⁷⁷ Gorton, *Misunderstanding Financial Crises: Why We Don't See Them Coming*.

Comparing the figure above with traditional banking (Figure 7), securitized banking was a critical change in traditional maturity transformation as banks were now able to utilise previously illiquid long-term loans into a new source of short-term funding, creating a new avenue for banks' private liquidity creation and therefore, increasing liquidity in financial markets.⁷⁸

1.3.1. Commercial banks, shadow banking and repo

The shadow banking system gained prominence after the crisis and is defined as “*credit intermediation involving entities and activities (fully or partially) outside the regular banking system or non-bank credit intermediation in short.*”⁷⁹ This system evolved to provide bank-like deposit taking services without being subject to the same level of regulation as the traditional banking sector. The growth of shadow banking is highlighted by the fall in financial sector assets held by depository institutions, which dropped from 60% in 1950 to less than 30% in 2006.⁸⁰

The shadow banking sector was the result of structural and regulatory changes of the last few decades including private financial innovation, competition from the non-banking sector and its activities, de-regulation and liberalization of local and global financial markets.⁸¹ These changes led to the decline of the traditional banking model and gradually, traditional banks withdrew from the regulated banking sector and became heavily involved in the unregulated shadow banking sector.⁸² A primary reason for this withdrawal was binding capital requirements that made equity capital more expensive for banks, especially when increased competition from non-banks had adverse effects on traditional banks' profits.⁸³ Banks were able to shift their activities to unregulated sectors through non-bank subsidiaries providing bank-like services and off-balance sheet securitisation that had little or no requirements for regulatory capital.

⁷⁸ Gorton and Metrick, ‘Securitized Banking and the Run on Repo’; Odenbach (2002); Gorton and Metrick, ‘Securitization’.

⁷⁹ European Central Bank, ‘Enhancing the Monitoring of Shadow Banking’ (2013) p. 89. *See also* Financial Stability Board, ‘Strengthening Oversight and Regulation of Shadow Banking: An Integrated Overview of Policy Recommendations’ (2012).

⁸⁰ Acharya and others, ‘Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises’ p. 11.

⁸¹ Gorton and Metrick, ‘Regulating the Shadow Banking System’.

⁸² *ibid*; Gorton, ‘Bank Regulation When “Banks” and “Banking” Are Not the Same’.

⁸³ *ibid*.

The main element that differentiates shadow banks from traditional banks is the exclusion of the former from central banks' discount window and deposit insurance.⁸⁴ These regulatory instruments are crucial in preventing bank runs in the traditional banking sector by insuring bank deposits and providing traditional banks with emergency liquidity in times of a crisis. Shadow banks include financial institutions such as investment banks, Money Market Mutual Funds (MMFs), hedge funds and mortgage brokers. These entities perform financial intermediation similar to banks i.e. maturity transformation using short-term funding, but their main funding source is the money market and not depositors. Therefore, shadow banks do not benefit from the regulatory support provided by deposit insurance or central banks' discount window. Consequently, the shadow banking sector remained largely unregulated and the entities operating within were highly vulnerable to runs.

The growth of the shadow banking sector is a combination of demand and supply forces. On the supply side, competition and de-regulation eroded the competitive advantage of banks as the ultimate financial intermediaries.⁸⁵ A stronger force came from the demand side, where both market participants and financial institutions demanded high quality collateral for financial transactions, driving the growth of securitisation and its subsequent use in repo transactions as a money-like instrument.⁸⁶

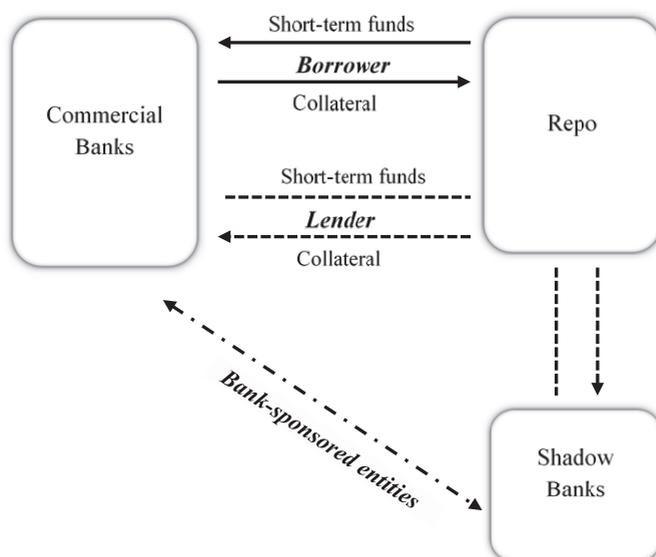
While money market instruments like repo were the main source of short-term funding for shadow banks, in the last decades, traditional banks also became involved in repo markets through securitized banking. This created linkages between the traditional and shadow banks as they both became heavily involved in raising short-term funds via repo markets. Figure 10 shows two channels of traditional bank involvement in the shadow banking sector.

⁸⁴ Gorton and Metrick, 'Regulating the Shadow Banking System'. *See also* Z Pozsar and others, 'Shadow Banking' [2010] Federal Reserve Bank of New York Staff Reports, no. 458.

⁸⁵ Gorton and Metrick, 'Regulating the Shadow Banking System'.

⁸⁶ *ibid.* *See also* supra note 65.

Figure 10: Shadow Banking and Repo Markets



First, traditional banks took on the role of borrowers, using securitized banking to raise short-term funds and increase leverage. Second, they participated as lenders in the shadow banking sector, providing shadow banks with short-term funds and keeping the securities as part of their trading portfolios. More importantly, a critical linkage was created through securitisation, where traditional banks used bank-sponsored SPVs to package loans into securitized instruments to be sold to investors in money markets. Thus, banks were now also acting as intermediaries between investors and borrowers. Moreover, shadow banks include bank-sponsored entities e.g. an investment subsidiary of a large universal bank. This traditional bank involvement in both repo markets and the shadow banking sector was a crucial development as it created complex linkages between financial institutions in different financial markets.

To conclude, securitisation grew to meet the rising demand for privately issued safe collateral in the form of high-grade securitized instruments. These were considered as good substitutes for traditional securities by all market participants, hence encouraging their use as collateral in financial transactions. The use of these securitized instruments in repo transactions developed into a

new kind of money-like instrument through securitized banking. Banks were now able to utilise previously illiquid assets into a new source of funding, which created a new avenue for banks' private liquidity creation. Post-crisis, this bank involvement in securitized banking has gained considerable attention as one of the main sources of the recent crisis. The next chapter explores the role of securitized banking in the crisis, emphasizing on the negative externalities from private liquidity creation in financial markets.

Chapter 2

Securitized Banking, Financial Fragility and Market Failure

This chapter starts with an overview of the market failures underlying the recent financial crisis. However, the scope of this review is limited to key literature relevant for this dissertation, which does not aim to provide an all-inclusive account of the recent financial crisis but focuses exclusively on securitized banking and its role in the crisis. The core emphasis is on the negative externalities from private liquidity creation through securitized banking. In this instance, the second section focuses on the financial fragility from bank involvement in securitized banking and the vulnerabilities of such short-term debt. The last section deals with the role of regulation, which aims to internalize the social costs of potential bank failures but was considered to be inadequate in fully incorporating the true risk of banks' activities and overlooked regulatory capital arbitrage.

2.1. Global Financial Crisis and Market Failures

“A financial crisis leads to an economic crisis.”⁸⁷

The global financial crisis of 2007-09 was a systemic crisis with widespread failures of financial institutions and freezing up of capital markets, with negative impacts on the real economy. The crisis can be seen as the result of several key market failures: mispriced government guarantees that induced risk-taking, information asymmetry creating conflicts of interest and externalities from the failure of individual financial institutions.

⁸⁷ Shleifer and Vishny, 'Unstable Banking'; Stein (2012).

2.1.1. Moral Hazard and Too-Big-To-Fail

Moral hazard is “*the greater tendency of people who are protected from the consequences of risky behavior to engage in such behavior.*”⁸⁸ With regards to financial institutions, it refers to banks engaging in risky activities for personal gain to an extent that they would have otherwise not pursued. In the aftermath of the crisis, the significant moral hazard prevalent in implicit and explicit government guarantees through deposit insurance and Too-Big-To-Fail (TBTF) provided banks with substantial risk-taking incentives.⁸⁹

The moral hazard underlying deposit insurance was not novel, as it was well understood that it would incentivize banks to undertake greater risk than they would without the insurance. Counteracting barriers were implemented such as mandatory payments for access to the deposit insurance system, fencing risky activities by separating commercial and investment banking and minimum capital requirements that served as a buffer against the risk-taking incentives arising from deposit insurance.⁹⁰ However, the recent financial crisis revealed that the counteracting barriers were ineffective and moral hazard prevailed. Introduction of the universal banking model eroded the previous separation of activities between commercial and investment banking.⁹¹ Mandatory payments for access to the deposit insurance system were inadequate, specifically with regards to the US where majority of banks paid little or no insurance premiums and consequently, the US financial system was running with insufficient protection.⁹² Thus, capital requirements remained the only barrier against moral hazard but these too were deemed inadequate against the backdrop of risky activities undertaken by financial institutions.⁹³

Implicit government bailouts also supported moral hazard and encouraged banks to allocate huge sums of insured deposits to generate profits from risky

⁸⁸ Steven L Schwarcz, ‘Regulating Complexity in Financial Markets’ (2009) 87 Washington University Law Review 211 *supra note* 34, p. 218. Moral hazard arising from information asymmetry and opportunities provided by regulation will be discussed in the forthcoming sections.

⁸⁹ Acharya and others, ‘Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises’ p. 12.

⁹⁰ *ibid* p. 10.

⁹¹ Wilmarth (2009); Acharya and others, ‘Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises’.

⁹² Acharya and others, ‘Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises’.

⁹³ For a discussion of capital requirements and regulatory capital arbitrage, *see* section 2.3.

activities, allowing them to grow in size and become highly leveraged.⁹⁴ Post-crisis, financial institutions that have grown exponentially are referred to as TBTF, as they have acquired too large and significant a position in the economy to have a silent assurance of government support in the event of a crisis.⁹⁵ These TBTF banks were taking on excessive risks without being directly responsible for the consequences and relied on the government's safety net in case of failure. The size and activities of these TBTF banks also made them systemically important financial institutions (SIFIs), where the failure of one can lead to successive failures of other interlinked institutions and could lead to the collapse of the whole financial system.

Prior to the crisis, systemically important commercial banks were highly leveraged with an insufficient capital cushion, making them susceptible to huge losses and posing a systemic threat to the financial system.⁹⁶ The large size and extensive linkages of a SIFI to other market participants increases the probability that its failure would lead to subsequent failures of other financial institutions, making it systemically important and more likely to be bailed out. Thus when the crisis hit, these SIFIs were bailed out with huge amounts of taxpayer's wealth since their failure would have led to the collapse of an entire economy.

There is concern over declaring financial institutions SIFIs publicly and treating them as TBTF, since it will further fuel the moral hazard prevalent in these institutions instead of restricting their behaviour.⁹⁷ But the massive bailouts in the US, UK and EU during the crisis have already confirmed the status of these financial institutions as being too-big and too-important to fail.⁹⁸ Moreover, empirical evidence shows that even before the crisis made the TBTF guarantee explicit, the TBTF policy was effectively in force and distorted market pricing for more than two decades before the onset of the crisis.⁹⁹

⁹⁴ Arthur E Jr Wilmarth, 'Reforming Financial Regulation to Address the Too-Big-to-Fail Problem' (2010) 35 *Brook. J. Int'l L.* 707.

⁹⁵ Emiliios Avgouleas, 'The Reform of "Too-Big-To-Fail" Bank: A New Regulatory Model for the Institutional Separation of "Casino" from "Utility" Banking' [2010] *SSRN Electronic Journal* 1; Wilmarth (2010).

⁹⁶ Adrian Blundell-wignall, 'Restoring Confidence in Financial Systems' [2009] *OECD Forum: The crisis and beyond*, figure 1, p. 2; Avgouleas (2010); Wilmarth (2010).

⁹⁷ Wilmarth (2010).

⁹⁸ *ibid.*

⁹⁹ Acharya and others, 'Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises'. *supra note* 18, p. 14 *citing* Donald P Morgan and Kevin J Stiroh, 'Too Big to Fail after All These Years' [2005] FRB NY Staff Report No. 220; Maureen O'Hara and Wayne

The global financial crisis also brought to forefront the moral hazard underlying employee compensation schemes in the financial industry. In this instance, moral hazard denotes an individual's willingness to take excessive risks since they benefit from the upside but do not bear any negative consequences of their actions. In the years before the crisis, bankers were increasingly paid through short-term bonuses based on volume and current profits rather than on the long-term profitability from their actions.¹⁰⁰ Thus, employees in the finance industry were handsomely compensated when there was an upside but bore no responsibility for adverse outcomes in case of a failure. The presence of such an environment encouraged excessive risk-taking and actions that could have significant downside but at the expense of the company and more broadly, the society.

2.1.2. Information Asymmetry

Information asymmetry arises from informational differences, where one party knows more than the other, leading to conflicting incentives which can cause market failure.¹⁰¹ In the recent crisis, information asymmetry was prevalent through the universal banking model, corporate governance and self-regulation that aimed to promote market discipline.

As financial intermediaries, banks are relied upon by retail investors for appropriate investment decisions since banks possess superior skills in obtaining and assessing relevant financial information. However, retail investment can be categorized as a credence good since customers cannot judge ex-ante or ex-post the quality of financial product(s) or service(s).¹⁰² Thus, investors are completely dependent on the information provided by their advisors, creating information asymmetry that can lead to a principal-agent

Shaw, 'Deposit Insurance and Wealth Effects: The Value of Banking "Too Big to Fail"' (1990) 45 *The Journal of Finance* 1587.

¹⁰⁰ N Roubini and S Mihm, *Crisis Economics: A Crash Course in the Future of Finance* (Penguin Books 2011) ch 3; Raghuram Rajan, 'Bankers' Pay Is Deeply Flawed' [2008] *Financial Times*; Acharya and others, 'Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises'.

¹⁰¹ For an overview of information asymmetry and market failure, see George A Akerlof, 'The Market for "Lemons": Quality Uncertainty and the Market Mechanism' (1970) 84 *The Quarterly Journal of Economics* 488.

¹⁰² Falko Fecht, Andreas Hackethal and Yigitcan Karabulut, 'Is Proprietary Trading Detrimental to Retail Investors?' [2013] Bundesbank Discussion Paper No. 42/2013 p. 1. A credence good is a type of good with qualities that cannot be observed by the consumer after purchase, making it difficult to assess its quality.

problem whereby banks can exploit their informational advantage. This information asymmetry was particularly rife within universal banks, as commercial banks actively trading on their own accounts had conflicting incentives to take advantage of uninformed customers by ‘mis-selling’ stocks and other trades.¹⁰³ Empirical evidence reveals the presence of these conflicting incentives where banks push private customers into underperforming stocks that the banks plan to sell from their proprietary portfolios to avoid adverse market impacts.¹⁰⁴ The presence of this conflict of interest in universal banks such as Bank of America and Citigroup and also investment banks such as Goldman Sachs was well-publicised after the crisis. Significant evidence showed how these banks had put their own interests ahead of the customers, particularly in marketing risky mortgage-related securities while the banks were placing bets against the mortgage market.¹⁰⁵

Internal and external corporate governance also suffered from information asymmetry. Internal corporate governance refers to the principal-agent problem underlying the relationship between shareholders (the principals) and company management (the agents). In this liaison, the agents possess superior information about the company and its operations, which can incentivize management to pursue their own self-interests for rapid growth and profits through excessive risk-taking.¹⁰⁶ Moreover, the increasing complexity and opaqueness of activities undertaken by large financial institutions weakened the external governance that operates through accurate pricing in capital markets, takeovers and mergers for corporate control and board management.¹⁰⁷ Besides financial activities, the existence of opaque financial instruments and financial markets also created significant information asymmetry. The functioning of the complex and unregulated over-the-counter (OTC) market for derivatives provided no information about counterparty exposures, at both the regulatory and market level.¹⁰⁸ Financial institutions participating in these markets amplified financial shocks when a single institution failed, as the opacity of institutional linkages raised concerns about the solvency of all others.¹⁰⁹

¹⁰³ *ibid.*

¹⁰⁴ *ibid.*

¹⁰⁵ Financial times at <https://www.ft.com/content/72183cf2-0004-11e6-ac98-3c15a1aa2e62?mhq5j=e5>.

¹⁰⁶ Roubini and Mihm (2011) ch 3.

¹⁰⁷ Acharya and others, ‘Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises’.

¹⁰⁸ *ibid.*

¹⁰⁹ *ibid.*

Financial regulation also had inherent information asymmetry, most prominently under the Basel II Accord, which allowed banks to rely on their proprietary risk models for determining capital requirements.¹¹⁰ It was not only limited to commercial and universal banks but comparable regulation governing investment banks also allowed the use of internal models to determine capital charges for market and credit risk.¹¹¹ This was an attempt at self-regulation to bring market discipline by incentivising banks to improve their internal risk management practices. However, banks were able to take advantage of the underlying information asymmetry as these models were built on banks' own information, allowing them to effectively set their own capital requirements. This delegation of power provided banks with significant discretion and incentivized them to reduce their capital charges through selective reporting and limited disclosure of exposures.¹¹² In this instance, banks possessed superior information than regulators concerning their activities and the assumptions underlying their proprietary risk models, thus providing an opportunity for regulatory arbitrage. After the crisis, this internal model approach has been heavily criticized for being biased towards banks' self-interests to benefit from lower capital requirements and incentivized the production of biased and inaccurate risk metrics.¹¹³

2.1.3. Externalities

An externality refers to the direct effect of the actions of a firm (or a person) on other firms (or people) in the form of additional costs or benefits. This results in a loss or gain in the welfare of one party from the activity of another, without compensation for the losing party. In the case of financial firms, significant negative externalities exist when banks, and other financial institutions, engage in activities that do not take into account the external costs to other firms and the society. This limits the incentives of financial firms to internalize the full social costs of their actions. Negative externalities from individual bank failure has five key sources: indirect externalities through loss of future funding and credit rationing and direct externalities through informational contagion, highly

¹¹⁰ For an overview of the Basel II Accord, *see* chapter 4, section 4.1.1.

¹¹¹ *ibid*; Acharya and Richardson (2009).

¹¹² Matthew C Plosser and João AC Santos, 'Banks' Incentives and the Quality of Internal Risk Models' [2014] FRB of New York Staff Report No. 704; Roubini and Mihm (2011) ch 3.

¹¹³ Hellwig (2009); Plosser and Santos (2014); Admati and Hellwig (2014); Acharya and Richardson (2009).

interconnected bank activities and liquidity issues that can turn to solvency concerns.¹¹⁴

Indirect negative externalities from bank failures are those that spill over to the real economy. There is a loss of access to future funding for customers of the failed bank, as specific relationship and information links from financial intermediation are lost and might be difficult to re-build with another financial institution. A key externality arises from credit rationing, where banks or other financial intermediaries restrict new credit extension by increasing margins (or haircuts) for interbank lending or by raising interest rates for borrowers. Restricting credit intermediation through this channel negatively impacts the real economy through lower output and prices, raising the probability of default for all other borrowers, which leads to further credit restrictions – a self-amplifying spiral.¹¹⁵

Direct negative externalities from bank failure are those that impact other financial institutions and financial markets. An individual bank failure can lead to an informational contagion, particularly if the failing bank is (or is perceived as) similar to other banks, suggesting that the cause of failure will have a similar impact on other banks. Another externality arises from the highly interconnected network of interactions between financial institutions, through financial markets such as the interbank market, money markets and increasingly in the derivative markets. The failure of one bank within this network creates uncertainty about the health and risks of its creditors, which are other financial institutions, further supporting the externality from informational contagion. Lastly, negative externalities can arise from liquidity problems at one bank, which might be triggered by a fall in asset values and a run on the bank¹¹⁶, causing it to sell assets (fire sales) which drives down market prices of similar assets held by other banks (when valued on a mark-to-market basis). In the case of a widespread liquidity problem, fire sales will lead to further declines in asset values, creating solvency concerns, even though they did not exist before.

¹¹⁴ Markus Brunnermeier and others, 'The Fundamental Principles of Financial Regulation' [2009] Geneva London: International Center for Monetary and Banking Studies Centre for Economic Policy Research, p. 4-6.

¹¹⁵ *ibid.*

¹¹⁶ A bank run occurs when all depositors demand withdrawal of their money from the bank at the same time. However, banks at any time do not hold sufficient cash to repay all its depositors since money is lent out for long-term loans. Hence, the bank can become insolvent, which can be transmitted to other banks as depositors panic, resulting in a loss of confidence in the solvency of other banks.

*“In short, there is an internal amplifying process (liquidity spirals) whereby a falling asset market leads banks, investment houses, etc., to make more sales (deleveraging), which further drives down asset prices and financial intermediaries’ assessed profit and loss and balance sheet net worth.”*¹¹⁷

Scholars believe that this self-amplifying dynamic was at the core of the recent financial crisis, predominantly caused by market dynamics and not by external shocks, although these shocks may have been the trigger.¹¹⁸ The global financial crisis was not a traditional bank run but a quiet run in the shadow banking sector, where repo and commercial paper balances were withdrawn; hence, it was not people but firms that ran on other firms.¹¹⁹ While the fall in value of securitized instruments was the trigger, the self-amplifying spiral from negative externalities from bank failures spread to other financial institutions and financial markets, resulting in a full-blown crisis.

This section reviewed key market failures underlying the recent financial crisis. Moral hazard encouraged excessive risk-taking and was prevalent in the explicit government guarantee provided by deposit insurance, the implicit guarantee of government bailouts for TBTF financial institutions and employee compensation schemes based on short-term profitability. Information asymmetry present in retail investment and proprietary activities of universal banks and between shareholders and company management created conflicts of interest while external corporate governance also suffered due to opaque activities and markets. Also, introduction of the internal model approach for capital calculations provided banks with information advantages as it allowed them to use their proprietary risk models to determine capital requirements. Lastly, significant negative externalities existed from the failure of individual banks that spread to other financial institutions and financial markets. These externalities are the focus of the next section, which outlines the negative externalities from private liquidity creation through securitized banking.

¹¹⁷ *ibid* p. 5.

¹¹⁸ *ibid*.

¹¹⁹ Andrei Shleifer and Robert Vishny, ‘Fire Sales in Finance and Macroeconomics’ (2011) 25 *Journal of Economic Perspectives* 29; Gorton, *Misunderstanding Financial Crises: Why We Don’t See Them Coming*; Pozsar and others (2010).

2.2. Securitized Banking and Financial Fragility

Several academics have noted the importance of greater capital and liquidity of financial intermediaries for financial market stability and the benefits of privately issued securities to meet investor demand.¹²⁰ However, there is also agreement on the instability caused by private security issuance which increases private liquidity but exposes the financial system to the risks of financial meltdown due to socially excessive leverage and liquidity.¹²¹

Literature recognizes the harmful social welfare effects from private liquidity creation through securitized banking and questions whether all creation of private money by the banking system is desirable. In some instances, private securities which owe their existence to neglected risks have proved to be false substitutes for traditional securities and have harmful social welfare effects, even without excessive leverage.¹²² Moreover, excessive leverage can lead to fire sales by financial intermediaries during adverse market conditions, resulting in depressed security prices that can lead to credit rationing and spill over to the real economy.¹²³

2.2.1. Neglected Risks and Financial Fragility

“It is not only that banks may engage in new activities which are risky, they may also engage in old activities which are riskier than previously...”¹²⁴

The financial innovation of securitisation grew to meet the strong demand from market participants for securities with a safe pattern of cash flows.¹²⁵ Financial intermediaries catered to these demands by creating securities from existing assets, which were perceived to be safe but were more risky than anticipated.

¹²⁰ See supra note 65. Also Alan S Blinder, ‘The Squam Lake Report: Fifteen Economists in Search of Financial Reform’ (2010) 57 *Journal of Monetary Economics* 892; Stein (2012).

¹²¹ Shleifer and Vishny, ‘Unstable Banking’; Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’; Stein (2012); Gorton and Metrick, ‘Securitized Banking and the Run on Repo’.

¹²² Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’.

¹²³ Shleifer and Vishny, ‘Unstable Banking’; Stein (2012).

¹²⁴ Gorton, ‘Bank Regulation When ‘Banks’ and ‘Banking’ Are Not the Same’, p. 114.

¹²⁵ See supra note 65.

Traditionally, securitisation was primarily undertaken for prime mortgages, whereby large concentrated positions in these assets were converted to high-grade mortgage-backed securities. However, prior to the crisis, banks extended the prime-mortgage securitisation model to riskier asset classes, including sub-prime mortgage loans.¹²⁶ These sub-prime mortgage-backed securities were structured investments which separated the asset position into different tranches. The tranches were structured according to their ability for loss absorption, with riskier tranches subject to losses before less risky tranches, hence investors holding riskier tranches received higher returns.¹²⁷ The least risky tranche (AAA rating) received lower return but would only suffer losses after all the other tranches were wiped out from non-performance i.e. through widespread delinquency or default.¹²⁸

Although the high-grade (AAA) tranche was a signal of safety for investors, the underlying assets were not necessarily prime loans but the tranche represented the least risky arrangement of numerous subprime loans.¹²⁹ The high-grade tranches were structured to only incur losses in the *rare* event that a large number of subprime mortgages defaulted at once, adversely impacting the least risky tranche. This was an extremely low probability event that could only arise in case of a systemic shock that would impact all markets and is claimed to have been overlooked by all market participants.¹³⁰

Scholars have proclaimed this disregard for a systemic market shock as intentional by banks, proposing the view that, “*The banks were betting that this would not happen—or perhaps the bank decision makers’ time horizons were too short for them to care if it did happen.*”¹³¹ Therefore, financial intermediaries who engineered these new structured subprime securities deliberately overlooked the risk of systemic failures in markets, undermining the perception of safety of these privately issued securities. Additionally, the

¹²⁶ Acharya and Richardson (2009).

¹²⁷ *ibid*; Coval, Jurek and Stafford (2009). For a detailed overview of the process of securitisation, *see* chapter 1, section 1.2.

¹²⁸ Caprio, Demirgü-Kunt and Kane (2010); Acharya and Richardson (2009); Coval, Jurek and Stafford (2009).

¹²⁹ Caprio, Demirgü-Kunt and Kane (2010); Acharya and Richardson (2009).

¹³⁰ Coval, Jurek and Stafford (2009); Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’.

¹³¹ Acharya and Richardson (2009), p. 205.

credit ratings assigned to high-grade subprime securities did not sufficiently incorporate the risks from systemic shocks in financial markets.¹³²

An opposing view centres on neglected risks, both by investors and financial intermediaries that created these securities, which surprised all market participants at the onset of the crisis.¹³³ These risks refer to the neglect of low probability risks (rare events) and certain states of the world in models, which were based on expectations that historical patterns of low mortgage default rates and growing housing prices will continue to persist.¹³⁴ Based on these prospects and using diversification, tranching and insurance, these new securities were perceived to be safe by all market participants and considered to be good substitutes for traditional securities, consequently issued and bought in great volumes.¹³⁵

“...when investors neglect certain risks, financial innovation creates a false substitutability between new and traditional [instruments]. This false substitutability explains both the excessive volume of innovation ex ante and the ex post flight to quality occurring as investors come to realize that the new [instrument] exposes them to previously unattended risks.”¹³⁶

Whether these vital risks were intentionally overlooked or unintentionally neglected, underestimation of the true risks inherent in privately issued securities created a false perception of safety, resulting in excessive security issuance.¹³⁷ Consequently, these privately issued securities were accepted by market participants as good collateral and fuelled banks’ private liquidity cycle through securitized banking, creating excessive liquidity in financial markets.¹³⁸

The unexpected and overlooked shock to the housing market revealed the true risks pertaining to these privately issued securities, placing the reliability and safety of even the high-grade securitized instruments in doubt. Markets became fragile from two sources. First, due to the sharp decline in security prices as

¹³² Admati and Hellwig (2014). For the role of credit rating agencies in the global financial crisis, See White (2009).

¹³³ Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’.

¹³⁴ *ibid.*

¹³⁵ *ibid.*

¹³⁶ *ibid.*, p. 461. Flight to quality refers to market participants moving away from risky investments to those considered to be the safest possible alternative.

¹³⁷ *ibid.*; Stein (2012).

¹³⁸ *ibid.* See also M Dewatripont, JC Rochet and J Tirole, *Balancing the Banks: Global Lessons from the Financial Crisis* (Princeton University Press 2010).

investors seek to sell these false substitutes and move back to traditionally safe securities.¹³⁹ Second, fragility arises from the subsequent losses suffered by financial institutions left holding an excess supply of these undesirable securities, which is further exacerbated if these institutions are highly leveraged and resort to fire sales, distressing security prices further.¹⁴⁰ Thus, ex-ante over issuance of securities is at the core of financial fragility as financial intermediaries are unable to fulfil the excessive claims ex-post, particularly if they are highly leveraged and funding liquidity dries up in the short-term debt market.

In the recent financial crisis, short-term claims on banks were excessive precisely because there was excessive reliance on innovation and borrowing up to a point where there existed significant negative externalities in case of a shock.¹⁴¹ As financial institutions had relied heavily on short-term repo funding from each other using similar collateral, a shock in collateral value affected all market participants alike, transmitting weakness in one bank to other financial institutions. Not only did the health of financial institutions that issued these securities come to question but highly interconnected financial markets also created doubts about other financial institutions. This led to a ‘run’, where not only investors ran on banks but financial institutions ran on each other.

2.2.2. Vulnerabilities of Short-Term Debt

The crisis was a quiet run in short-term debt markets, centred on entities that were heavily dependent on short-term debt and held portfolios of securitized instruments, such as asset-backed commercial paper conduits and structured investment vehicles that purchased securitized instruments and financed them with short-term debt.¹⁴² Securitization banking has grabbed considerable attention for its role in the crisis, as financial institutions ran on each other by increasing haircuts and withdrawing from repos, termed as a ‘run on repo’.¹⁴³ The

¹³⁹ Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’.

¹⁴⁰ *ibid*; Shleifer and Vishny, ‘Fire Sales in Finance and Macroeconomics’.

¹⁴¹ Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’.

¹⁴² Krishnamurthy, Nagel and Orlov (2014); Acharya and others, ‘Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises’; Gorton and Metrick, ‘Regulating the Shadow Banking System’.

¹⁴³ Gorton and Metrick, ‘Securitized Banking and the Run on Repo’; Hördahl and King (2008).

importance of collateral in securitized banking is akin to deposit insurance, the reliability of which is essential to prevent a ‘run’ by market participants.¹⁴⁴

A repo transaction (Figure 1) is economically equivalent to a collateralised loan, where the collateral aims to protect the lender from counterparty default i.e. if the borrower fails on the promise to buy back the securities (repaying the borrowed funds). In case of default, the lender has the right to sell the collateral in the market. While repo transactions can be rolled over or renewed without any additional contractual obligations, the lender has discretion to withdraw completely by failing to roll over the transaction when it expires. Additionally, the lender can withdraw funds by increasing the haircut, owing to an increase in the perceived risk of the collateral or claim repayment due to a fall in collateral market value. This is analogous to withdrawing from a bank deposit, except that this is between financial institutions and not between a depositor and a bank.¹⁴⁵

Short-term debt markets, including repo, are highly vulnerable to runs since a change in the perceived risk of the underlying collateral or its market value can lead to withdrawal by lenders. Although the lender can liquidate collateral in case of counterparty default, market conditions may adversely impact collateral liquidity, especially during a crisis, which might have been the initial reason for default. Given that the value of collateral remains unchanged, the repo can be automatically rolled over. However, risk arises when the value or riskiness of the underlying collateral changes. The lender can increase the haircut or claim repayment to reduce the level of funding. Consequently, the borrower has to deleverage and fulfil the lender’s claim by raising liquid funds either by refinancing or in worst case, by resorting to asset sales. Scholars have maintained that this rollover risk inherent in short-term debt i.e. the inability of investors to refinance, was overlooked both by the banks and regulators.¹⁴⁶

Another important feature of repo transactions is the re-hypothecation of collateral i.e. the ability of lenders to use the collateral in another repo transaction, with other market participants. This creates effects similar to the money multiplier and results in high levels of velocity in repo markets.

¹⁴⁴ Gorton and Metrick, ‘Securitized Banking and the Run on Repo’.

¹⁴⁵ Gorton and Metrick, ‘Haircuts’; Dang, Gorton and Holmström (2013).

¹⁴⁶ VV Acharya, Douglas Gale and Tanju Yorulmazer, ‘Rollover Risk and Market Freezes’ (2011) 66 *The Journal of Finance* 1177; MK Brunnermeier, ‘Deciphering the Liquidity and Credit Crunch 2007-08’ (2009) 23 *Journal of Economic Perspectives* 77; Pozsar and others (2010).

Therefore, on any given day, the same repo collateral can be used for multiple financial transactions, increasing the velocity and liquidity in repo markets. However, “... [w]hen haircuts rise, the money multiplier works in reverse, causing a massive deleveraging process.”¹⁴⁷ This was visible during the crisis, when sharply rising haircuts required repo borrowers to significantly deleverage their positions. Unable to raise additional funding or roll over debts, borrowers had to resort to fire sales, pushing asset prices down, which spread to other bank assets.¹⁴⁸ Since financial institutions relied heavily on short-term repo funding from each other using similar collateral, changes in the perception of collateral quality and value affected all market participants alike, triggering a ‘run on repo’.

In the build-up to the recent crisis, mortgage-backed securities were the securitized instruments used as collateral to raise funding in short-term debt markets. As news surfaced of the underlying risks of these securities, financial institutions and investors holding them suffered losses. The shock in collateral value led lenders to sharply increase haircuts, triggering a bank run but not by traditional depositors. Short-term money markets froze due to the sharp increase in haircuts and financial institutions were unable to rollover their debts, resorting to fire sales of assets and spreading the shock to other asset classes as well, pushing asset prices lower.¹⁴⁹ This shock in asset prices spread to the balance sheet of other banks, increasing their losses to an extent where the whole financial system was on the brink of insolvency. Therefore, excessive leverage resulting from private liquidity creation can exacerbate the impact of unwinding security holdings in distress.¹⁵⁰

Although securitized banking might be a recent development, the underlying vulnerabilities are similar to other forms of short-term debt, akin to traditional banking. The failure of banks and regulators to incorporate the possible risk arising from a ‘run on repo’ underestimated the expected losses and hence,

¹⁴⁷ Gorton and Metrick, ‘Securitized Banking and the Run on Repo’ p. 5. *See also* Singh (2011); European Central Bank (2013); Admati and Hellwig (2014); Shleifer and Vishny, ‘Fire Sales in Finance and Macroeconomics’; Gorton and Metrick, ‘Haircuts’.

¹⁴⁸ Shleifer and Vishny, ‘Fire Sales in Finance and Macroeconomics’; Shleifer and Vishny, ‘Unstable Banking’; Stein (2012). Fire sale refers to a forced sale of an asset since the seller cannot pay its creditors otherwise. The assets are sold at prices below value in best use, causing severe losses to sellers. *See also* Dang, Gorton and Holmström (2013); Brunnermeier (2009); Gorton and Metrick, ‘Haircuts’.

¹⁴⁹ Gorton and Metrick, ‘Securitized Banking and the Run on Repo’.

¹⁵⁰ Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’.

imposed negative externalities on other financial institutions, and on society. These risks should have been accounted for in capital regulation, for banks to have sufficient equity cushion to absorb losses when funding liquidity dried up in short-term debt markets.

2.3. The Importance of Capital Regulation and Regulatory Capital Arbitrage

Traditional economic theory suggests that the primary reason for financial regulation is due to the sizeable externalities from the financial system. The Coase theorem states that in the presence of externalities and under certain market conditions i.e. free markets and an absence of transaction costs, resource allocation will be efficient through negotiations between parties.¹⁵¹ However, in the case of financial markets, transaction costs are high since negative externalities from individual bank activities affect not only other institutions but also the entire economy. Thus, wealth-maximizing economic agents do not undertake bargaining as the cost of carrying out the transactions is higher than the expected benefit and hence, externalities persist and negatively affect resource allocation.¹⁵²

In the presence of negative externalities and high transaction costs, regulation plays an important role to indirectly control an externality and make firms (or people) internalize the harmful social effects from their activities.¹⁵³ Since the failure of banks involve systemic externalities, which can spread to other financial institutions and subsequently to the wider economy, bank-like financial institutions are subject to more stringent regulation than non-financial institutions. Bank regulation aims to internalize the social costs of potential bank failures through restrictions such as reserve requirements, capital requirements, limitations and prohibition of certain activities whereas subsidies include deposit insurance, restrictive entry into banking and access to the

¹⁵¹ RH Coase, 'The Problem of Social Cost' (1960) 3 *The Journal of Law and Economics* 1.

¹⁵² Carl J Dahlman, 'The Problem of Externality' (1979) 22 *The Journal of Law and Economics* 141.

¹⁵³ The law and economics literature suggests that negative externalities can be addressed through liability rules, coasean negotiations, taxation and regulation. However, the magnitude of negative externalities in case of financial institutions points to regulation as the most suitable approach and hence, it remains the focus of this dissertation. See Steven Shavell, 'Liability for Harm Versus Regulation of Safety' (1984) 13 *The Journal of Legal Studies* 357 on the choice between liability and regulation.

discount window.¹⁵⁴ Restrictions for banks are akin to taxes, specifically when entry into banking is not restricted, so binding capital and reserve requirements become costly as banks face increased competition. However, these restrictions serve the social function of aligning banks' incentives with that of the society and discourages risk taking.¹⁵⁵

*“Regulation that ignores externalities encourages financial institutions to pass their risks in an unfettered manner throughout the system and on to unregulated entities.”*¹⁵⁶

The financial crisis highlighted the fact that financial regulation has been more micro-prudential and has insufficiently incorporated macro-prudential concerns, which stem from the systemic risk of a sufficiently large bank failing and leading to the failures of others and/or freezing of capital markets.¹⁵⁷ While individual bank behaviour might not be potentially destructive, collective bank behaviour can have significant adverse impacts, especially when all banks face similar incentives and engage in similar behaviour.

In banking, equity is referred to as bank capital and is considered to be an all shock absorbing cushion due to its ability to withstand all kinds of losses. However, equity capital can be expensive and maintaining prescribed capital requirements are usually seen by financial institutions as a form of tax.¹⁵⁸ Besides the fact that these capital buffers cannot be lent out at interest, capital regulation usually prescribes only equity and retained earnings as appropriate capital. Boosting capital through new equity issuance dilutes the value of existing shares and is a signal for investors that retained earnings will be insufficient to meet capital requirements.¹⁵⁹

¹⁵⁴ Gorton, 'Bank Regulation When "Banks" and "Banking" Are Not the Same'.

¹⁵⁵ *ibid.*

¹⁵⁶ Acharya and others, 'Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises' p. 15.

¹⁵⁷ Brunnermeier and others (2009); Acharya and others, 'Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises'.

¹⁵⁸ Robert C Merton, 'Financial Innovation and the Management and Regulation of Financial Institutions' (1995) 19 *Journal of Banking and Finance* 461; Acharya and Richardson (2009); Gorton, 'Bank Regulation When "Banks" and "Banking" Are Not the Same'.

¹⁵⁹ Stewart C Myers, 'Determinants of Corporate Borrowing' (1977) 5 *Journal of Financial Economics* 147; Stewart C Myers and Nicholas S Majluf, 'Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have' (1984) 13 *Journal of Financial Economics* 187 *in* Acharya and Richardson (2009).

Capital regulation aims to restrict the build-up of leverage and constrain banks' balance sheet by requiring a minimum level of equity. The Basel Accords are globally accepted standards that impose minimum capital requirements calibrated to banks' total risk-weighted assets. Risk weights indicate how much capital the bank needs to carry certain assets (loans and securities) on its balance sheet and are dependent on the assets' perceived level of riskiness. Higher risk-weighted assets indicate higher levels of risk and require banks to hold greater amounts of equity capital for that particular asset exposure. Therefore, equity capital not only provides a buffer against losses but also aims to discourage risk taking behaviour by aligning banks' incentives with that of the society.¹⁶⁰

In the aftermath of the crisis, shortcomings of the financial regulatory framework became visible. Firstly, financial regulation was unable to keep pace with evolving financial markets and gaps in the regulatory framework left some financial institutions and markets unregulated, now known as the shadow banking sector. It consists of financial institutions outside the traditional banking system that provide similar services but are not subject to similar regulations as they do not have access to deposit insurance.¹⁶¹ However, these shadow banks relied heavily on short-term funds through money markets and remained vulnerable to bank-like runs. The unregulated shadow banking sector thrived but its recourse to the financial sector left systemically important pockets in the financial system with little or no regulatory oversight.¹⁶²

Secondly, the regulatory failure underlying the Basel Accords left financial institutions weakly regulated. These capital requirements have been considered inadequate in fully incorporating the true risk of banks' activities and have been criticised for overlooking regulatory capital arbitrage.¹⁶³ Regulatory capital arbitrage refers to strategies by which regulated financial institutions evade capital requirements. The use of risk weights for calculation of capital requirements allowed banks to circumvent regulation, primarily by employing strategies to reduce total risk-weighted assets, either by holding less assets on the balance sheet or by holding assets with lower risk weights.

¹⁶⁰ Thomas F Hellmann, Kevin C Murdock and Joseph E Stiglitz, 'Liberalization , Moral Hazard in Banking , and Prudential Regulation : Are Capital Requirements Enough ?' (2000) 90 American Economic Association 147; Gorton, 'Bank Regulation When 'Banks' and 'Banking' Are Not the Same'; Wilmarth (2010).

¹⁶¹ For an overview of the shadow banking sector and its activities, see chapter 1 section 1.3.1.

¹⁶² Acharya and others, 'Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises'.

¹⁶³ Vallascas and Hagendorff (2013); Admati; and others (2013); Acharya and Richardson (2009); Caprio, Demirgü-Kunt and Kane (2010).

The presence of regulatory arbitrage to evade capital requirements has been identified as a contributory factor towards the build-up of systemic risk in the recent crisis, emanating from highly leveraged financial institutions backed by insufficient equity.¹⁶⁴ The main source of inadequacy was the perception of safety of privately issued securities. When rated high enough, these were considered as safe as traditional government securities, not only by the issuers and investors, but also by regulators.¹⁶⁵ Because a large part of securitisation output received high credit ratings, the corresponding lower capital requirements applicable to these securities allowed banks to reduce their equity capital. Post-crisis, securitisation was recognized as a key instrument for regulatory capital arbitrage, allowing banks to reduce total risk-weighted assets, and hence capital requirements.¹⁶⁶

The strategy for regulatory capital arbitrage was firstly, to reduce the total amount of assets held through off-balance sheet securitisation and secondly, reduce total risk-weighted assets by holding high-grade asset-backed securities (ABS) that received low risk weights as they were perceived to be safe by both, market participants and regulators. For instance, capital arbitrage through mortgage securitisation is evident under the Basel I and II Accord, both assign higher risk weights for mortgages (50% and 35% in Basel I and II, respectively) than for high-grade mortgage-backed securities (20% under both Basel I and II).¹⁶⁷ Thus, banks were able to reduce total risk-weighted assets, and capital requirements, through mortgage securitisation by reducing their asset base with off-balance sheet securitisation and by replacing the high risk-weighted asset with a low risk weight security.

In conclusion, securitisation and ABS became a tool for banks to avoid holding costly capital by reducing the total amount of assets held on their balance sheet and lowering the corresponding amount of additional capital required for these exposures. In the aftermath of the crisis, most of the criticism of the Basel Accord has been primarily focused on the presence of regulatory arbitrage to

¹⁶⁴ Acharya and Richardson (2009); Acharya and others, 'Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises'; Admati and Hellwig (2014).

¹⁶⁵ Gennaioli, Shleifer and Vishny, 'Neglected Risks, Financial Innovation, and Financial Fragility'; Coval, Jurek and Stafford (2009); Acharya and Richardson (2009).

¹⁶⁶ Acharya and Richardson (2009).

¹⁶⁷ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel I)' (1998) annex 2 and The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel II)' (2006) pt 2, II.A.8.72 and pt 2, sec IV.D.3.(ii).567.

reduce capital requirements through asset securitisation. However, the role of these Accords in encouraging bank involvement in securitized banking, which utilizes the securitisation output, has been overlooked. The use of high-grade (low risk weight) ABS as collateral in securitized banking allowed banks to further increase leverage. Thus, banks were able to maintain significantly low levels of equity, high levels of leverage and borrowing while undertaking activities with substantial risks.¹⁶⁸ This is the primary contribution of the dissertation, which analyses the Basel Accords to identify the presence of regulatory arbitrage that incentivized banks to utilise the securitisation output to increase their borrowing through securitized banking. The next chapter aims to identify the presence of regulatory arbitrage for securitized banking in the pre-crisis Basel Accords while chapter 4 assesses the effectiveness of the post-crisis regulatory response in eliminating any arbitrage opportunities.

¹⁶⁸ See Dewatripont, Rochet and Tirole (2010); Admati and Hellwig (2014); Acharya and Richardson (2009).

Chapter 3

Pre-crisis – Basel Accords, Incentives and Securitized Banking

The Basel Accords are standards of best practice, aimed at promoting stability of international financial institutions and have become the benchmark for banking regulation worldwide. These standards prescribe minimum capital requirements which are calculated on the basis of risk-weighted assets. After the crisis, the standards have been considered inadequate in fully incorporating the risks of banks' activities. Criticism has been primarily focused on the presence of regulatory arbitrage to reduce capital requirements through asset securitisation, which allows banks to hold less assets on the balance sheet, lowering total risk-weighted assets and hence, reducing capital requirements.

However, the role of these Accords in encouraging bank involvement in securitized banking, which utilizes the securitisation output, has been overlooked. Additionally, majority of the current literature is restricted to arbitrage opportunities provided by banks' internal models for capital requirement calculations. Most prominently, Hellwig identifies banks' use of their internal models, permitted since the Market Risk Amendment of the Basel Accord, as the main source of regulatory arbitrage.¹⁶⁹

This chapter, along with the forthcoming Chapter 4, contributes to the existing literature by identifying the presence of regulatory arbitrage for securitized banking in the Basel Accords. A further contribution is to extend the investigation from the internal model approach and shed light on the fact that even the simpler standardised methodology, designed to be more stringent, had inherent significant adverse incentives for banks to engage in securitized banking.

This chapter aims to assess the incentives inherent for securitized banking in the pre-crisis Basel Accords to answer the first sub-research question: **Did the pre-crisis Basel Accords incentivise banks to engage in securitized banking?**

¹⁶⁹ Hellwig (2009), p. 44.

One of the main sources for regulatory arbitrage was identified to be the separation of banks' balance sheets into the banking book and trading book, whereby banks could hold assets in the latter solely by declaring a trading intent. The trading book includes financial instruments in bank's proprietary trading portfolios held for short-term trading strategies. This highly subjective 'intent-based' asset allocation was determined by banks' internal risk management procedures, overlooking the liquidity of the asset itself. Therefore, banks were given significant discretion for asset allocation between the two dimensions of the balance sheet, providing an opportunity for regulatory arbitrage.

This is the core of the analysis in this chapter (and the next), where the objective will be to compare the capital requirements for securitized banking in both the banking book and the trading book. The assessment methodology centres on banks' rationale for minimising their capital requirements for a given transaction by minimising the risk-weighted assets. The focus will be to assess the risk weights applicable firstly, to an incremental position in a securitized instrument and secondly, for securitized banking (long securities positions funded using repo). The analysis aims to assess differences between the capital charges for securitized banking through the two balance sheet dimensions to identify the presence (or absence) of any capital relief.

The chapter begins with an overview of the Basel Committee of Banking Supervision, its objectives and members, along with a brief introduction to the Basel Accords and what they represent. The second section provides a detailed overview of the pre-crisis Basel Accords, not in their entirety but limited to the key standards applicable to securitized banking. The third section provides a detailed analysis of relevant capital requirements for securitized banking to illustrate the presence of any regulatory arbitrage. The last section provides descriptive data trends that support the outcomes of the analysis in this chapter.

3.1. The Basel Committee on Banking Supervision and The Basel Accords

The Basel Committee on Banking Supervision (BCBS) was established in 1974 by the central bank governors of G-10 countries and consists of central bank representatives and banking supervisors. Founding members of the Basel

Committee included Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the UK and the US. The Committee meets and is funded by the Bank for International Settlements (BIS) in Basel, Switzerland where its permanent Secretariat is located.

The BCBS was set up to promote convergence of international banking standards by proposing guidelines and recommendations of best practice for national authorities. The goal was to combine domestic and regional expertise to develop a common supervisory approach applicable to large cross-border banks. The objectives of the Basel committee were twofold. Firstly, to strengthen the stability of the international banking system and secondly, it aimed at consistent application to eliminate competitive inequality among banks in different countries.¹⁷⁰

The proposed guidelines are essentially consensus-based documents, founded on the collective opinion of BCBS members regarding best practices for banking regulation and supervision.¹⁷¹ The most significant and influential of these documents is the Basel Accord, which not only represents the shared opinion but also an agreement by the BCBS members to incorporate the Basel guidelines in their national legislation. As a consensus-based document, the Basel Accord has a large impact on the national regulation of BCBS member states, particularly on issues where agreement was achieved.

Therefore, the guidelines provided in the Basel Accord are soft law and not legally binding, even on BCBS member states, unless implemented by national authorities in their legislation. The formulation and implementation of the Basel Accord in the European Union (EU) can be presented as an example. The process for formulation of the first Basel Accord (Basel I) was underway since 1987, approved and agreed upon by the BCBS member countries and released to banks in July 1988. These standards were required to be implemented by banks in G10 countries by the end of 1992. Subsequently, Basel I was implemented in EU legislation in 1993 with the Capital Adequacy Directive (CAD) 1993/6/EEC. The Basel Committee published the Basel II Accord in June 2006, after almost six years of preparation and consultation, with a planned implementation by end 2007. However, all BCBS member countries agreed to adopt the Basel II standards with varying timelines. In the EU, implementation

¹⁷⁰ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel I)' p. 1.

¹⁷¹ Roel Theissen, *EU Banking Supervision* (Eleven International Publishing 2013).

of the Basel II Accord was already underway in 2006 through the Capital Requirements Directive I (CRD I) 2006/48/EC and 2006/49/EC.

While the Basel Accords were formulated by and intended for its member countries (G-10), supervisory authorities worldwide were encouraged to adopt these standards for banks with significant international activities. Gradually, these standards of best practice became the benchmark for financial regulation, signalling regulatory strength and financial stability. Soon enough, the Basel Accords were transposed into national laws of BCBS member and non-member states, hence applicable to banks worldwide.

In the aftermath of the financial crisis, the BCBS expanded its membership to include G20 countries to complement the evolution and importance of global financial markets. The BCBS now consists of central banks and supervisory authorities from 28 countries. The Committee expanded its membership in March 2009 with Australia, Brazil, China, India, Korea, Mexico and Russia.¹⁷² In June 2009, it extended its membership to the remaining G20 members including Argentina, Indonesia, Saudi Arabia, South Africa, and Turkey along with Hong Kong SAR and Singapore.¹⁷³

The Basel Accord focuses on the capital adequacy of banks and provides standards for capital requirements, supervisory review and disclosures. The core component of the Basel Accord is the calculation and maintenance of capital requirements which incorporates the credit risk, market risk and operational risk from banks' activities. These capital requirements serve as a minimum, where national authorities have discretion to adapt higher capital levels but little discretion on the methodology of capital calculations.

Since the first version of the Basel Accord (Basel I), several revisions and amendments have been made to keep pace with evolving financial markets. In essence, the Basel Accord is one comprehensive document consisting of the original text (Basel I) along with a series of revisions and major amendments, which have been implemented up to the current revisions (Basel III).¹⁷⁴ As the global financial crisis of 2007-2008 is the core of this dissertation, the remainder of it is organized into three distinct phases of the Basel regime. The pre-crisis phase focuses on the Basel standards before 2007 while the post-crisis phase

¹⁷² Press Release dated 13 March 2009, available at www.bis.org/press/p090313.htm.

¹⁷³ Press Release dated 10 June 2009, available at www.bis.org/press/p090610.htm.

¹⁷⁴ *ibid.*

(2007-2011) centres on the immediate regulatory response following the crisis. Lastly, the current regime (2013 to date) refers to the existing Basel III standards. A timeline of these three phases, with the Basel Accords and their corresponding implementation dates is presented in Appendix 1.

The forthcoming sections in this chapter focus on the pre-crisis Basel Accords – Basel I and the Market Risk Amendment – which were the standards in force before 2007. The aim is to describe and then analyse these pre-crisis Basel Accords, not in their entirety, but primarily focusing on key components relevant for securitized banking.

3.2. Pre-crisis Basel Accords

3.2.1. Basel I

The first set of Basel standards, Basel I, was released in July 1988 with a target implementation in member countries by year end 1992. Thereafter, several improvements were made to the Accord and Basel I was finalized in April 1998. These Basel standards focused primarily on capital adequacy requirements which were based solely on credit risk i.e. the risk of counterparty failure or default from borrower's failure to repay a loan or fulfil contractual obligations. Accountability for other risks, such as interest rate or market risk were left at the discretion of national authorities.¹⁷⁵

Basel I set minimum capital requirements at 8% of total risk-weighted assets (RWA).¹⁷⁶ Risk weights indicate the amount of capital a bank needs to carry assets (e.g. loans and securities) on its balance sheet. The risk weights in Basel I were divided into five fixed categories: 0, 10, 20, 50 and 100%. These weights were dependent on the assets' perceived level of riskiness. High risk weights indicated higher levels of risk and therefore, required banks to hold greater level of equity capital for that particular asset exposure.

¹⁷⁵ Interest rate and market risk refers to adverse impacts on investment values due to changes in interest rates or market disruptions.

¹⁷⁶ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel I)' sec III, para 44.

Besides credit risk, the risk weights also incorporated country transfer risk i.e. the risks of investments and assets in foreign countries. The differential risk weights for assets with country transfer risk was determined by whether countries were part of the OECD or not.¹⁷⁷ For example, claims on OECD central governments and central banks, including those collateralised by OECD government securities, were considered riskless and assigned a risk weight of 0%. Whereas, the applicable risk weights for short-term and long-term claims on banks incorporated outside the OECD were 20% and 100%, respectively. Additionally, the risk weights incorporated both on and off-balance sheet activities. The latter was required to be converted into credit-equivalents using a credit conversion factor (CCF).

The Basel I capital requirements can be summarised as:

$$\text{On – balance sheet RWA} = \text{Exposure Value} * RW_{(\text{counterparty})}$$

$$\text{Off – balance sheet RWA} = (\text{Exposure Value} * \text{CCF}) * RW_{(\text{counterparty})}$$

Where, RWA = risk-weighted assets, RW = risk weight and CCF = credit conversion factor. These abbreviations will be used henceforth.

Repo transactions were treated as on-balance sheet transactions, regardless of the accounting treatment. Moreover, similar capital requirements were imposed on both sides of the transaction – repo and reverse repo. If a repo transaction fulfilled the required accounting criteria to be classified as an off-balance sheet transaction, Basel I standards required the exposure to be converted to an equivalent on-balance sheet transaction by using a 100% credit conversion factor. This converted exposure was then multiplied by the risk weight of the counterparty to determine the total RWA for that repo transaction.

The Basel I standards duly acknowledged the importance of collateral in mitigating credit risk for collateralised transactions, as collateral can be used for recourse in case of counterparty default. Risk mitigation refers to the reduction in capital charge for credit risk, reducing total RWA and therefore, lowering overall capital requirements. The standards used a substitution approach, which replaced the risk weight of the counterparty with that of the issuer of collateral, altering the RWA as below:

¹⁷⁷ Basel I defined OECD countries as those which were full members of the Organisation for Economic Co-operation and Development (OECD) or had concluded special lending arrangements with the International Monetary Fund (IMF).

$$\text{On – balance sheet RWA} = \text{Exposure Value} * RW_{(\text{issuer of collateral})}^{178}$$

The collateral issuer was deemed to represent the collateral quality, where high quality issuers such as OECD central governments and central banks were assigned a zero risk weight. Therefore, the applicable risk weight for collateralized transactions (such as repo) was determined by the quality of underlying collateral rather than the counterparty. For instance, repo transaction with a risky counterparty (non-OECD incorporated bank – 20% risk weight) but with high quality collateral (OECD government security – zero risk weight) received a zero risk weight, representing the lower risk and higher quality of collateral. Consequently, the presence of collateral reduced the RWA, lowering credit risk and thus, decreasing capital requirements.

However, the Basel I standards provided limited collateral recognition for credit risk mitigation. Collateral was primarily restricted to traditional assets such as loans against cash (e.g. lien on deposits), securities issued by OECD governments, public sector entities or multilateral development banks.¹⁷⁹ These assets were considered safe and assigned a zero risk weight as they were readily convertible to cash and carried little or no default risk.

The prescribed minimum capital requirements was based on the Basel ratio of 8%, which was applied to total RWA, as below:

$$\text{Capital Requirement}_{\text{minimum}} = 8\% * RWA_{(\text{on+off balance sheet})}$$

3.2.2. The Market Risk Amendment

The fixed risk weight buckets of Basel I faced criticism for being highly risk-insensitive, as they did not differentiate between credit quality and overlooked the risk diversification of banks' portfolios.¹⁸⁰ For example, all mortgages were assigned a risk weight of 50%, regardless of the credit quality of individual

¹⁷⁸ *ibid* annex 3, 4. ft 1.

¹⁷⁹ *ibid* pt II, (iv).39.

¹⁸⁰ James R Barth, Gerard Caprio and Ross Levine, *Rethinking Bank Regulation: Till Angels Govern* (Cambridge University Press 2008); Bryan J Balin, 'Basel I , Basel II , and Emerging Markets : A Nontechnical Analysis' [2008] SSRN Electronic Journal; DM Nachane and others, 'Capital Requirements and Bank Behaviour: An Empirical Analysis of Indian Public Sector Banks' (2003) 15 *Journal of International Development* 145; Caprio, Demirgü-Kunt and Kane (2010).

loans. This also provided banks with the opportunity to reduce total RWA through cherry-picking i.e. securitizing loans with the least risk while more risky loans remained on the balance sheet with the same risk weight.¹⁸¹

Consequently, the Basel Committee along with the International Organization of Securities Commissions (IOSCO) formulated the Market Risk Amendment in January 1996, with a target implementation by year end 1997. The main objective was to incorporate market risk i.e. the risk of loss arising from fluctuations in market prices from banks' trading activities. The minimum capital requirement now incorporated both credit and market risk as below:

$$\begin{aligned} \text{Capital Requirement}_{min} &= 8\% * \{ \text{Credit RWA (excludes trading book)} \\ &+ \text{Market RWA} \}^{182} \end{aligned}$$

In order to accommodate the diverse risk profile of banks' activities, this Amendment combined various risks under the umbrella of market risk. It incorporated risks pertaining to interest rate related debt instruments and equities in the trading book along with foreign exchange and commodities risk throughout the bank.

$$\begin{aligned} \text{Market RWA} &= \{ \text{Trading book [Interest rate + Equity]} \} + [\text{Foreign Exchange} \\ &+ \text{Commodities}] \end{aligned}$$

An important modification was made to the calculation methodology for market risk. The Amendment introduced two approaches, a standardised method and an internal model approach. The main difference between the two methods was the level of discretion allowed to banks for their market risk calculations. The standardised method assigned fixed risk weights calibrated to external credit ratings assigned by authorized credit rating agencies. These credit ratings were a signal of the level of riskiness of financial instruments. On the other hand, the internal model approach allowed banks with advanced risk management processes to use their in-house proprietary risk models to assess their market risk capital requirements. Although this method required explicit approval by supervisory authorities, it was an attempt at self-regulation to bring market

¹⁸¹ Balin (2008).

¹⁸² The Basel Committee on Banking Supervision (BCBS), 'Amendment to the Capital Accord to Incorporate Market Risks' (1996) pt I, sec (b).13.

discipline by incentivising banks to improve their internal risk management practices.¹⁸³

While supervisory approval for the use of internal model approach was limited to large banks with advanced risk management systems, the standardised approach was applicable to and implemented by all banks. Therefore, the remainder of this chapter focuses on the standardised approach and outlines key standards relevant for this dissertation. As the underlying instrument in securitized banking are traded debt securities – asset-backed securities (ABS) – the most relevant risk factor is interest rate risk i.e. the risk of loss in investment value due to changes in interest rates.

Under the standardised method, total interest rate risk was the summation of a capital charge for risk arising from individual security movements (specific risk) and a charge for broader risk arising from market interest rate movements (general risk).¹⁸⁴

$$\text{Interest Rate Risk} = \text{Specific Risk} + \text{General Risk}$$

The specific risk charge refers to the risk of a change in price of an instrument due to factors related to its issuer. For debt securities, it was calculated by applying fixed risk weights to specific issuer categories, namely government, qualifying and other.¹⁸⁵ The first category included all types of securities issued by governments and received the lowest risk weight of zero. The ‘Qualifying’ category comprised of securities rated investment grade by authorized credit rating agencies. The applicable risk weights were dependent on the maturity of individual securities, with weights ranging from 0.25%-1.60% for short-term to long-term securities, respectively. The ‘Other’ category included all remaining debt instruments (non-investment grade and unrated) and received the highest fixed risk weight of 8%. The specific risk charge incorporated idiosyncratic risk and was applicable to individual security positions.

General risk is the risk of a price change in securities due to a change in the level of interest rates. For traded debt instruments, two calculation methods were available – the maturity method and the duration method – both dependent

¹⁸³ For an overview of the information asymmetry inherent in this approach to self-regulation, see chapter 2, section 2.1.2.

¹⁸⁴ *ibid* pt A, sec A.1.

¹⁸⁵ *ibid* sec A.1.1.6.

on security characteristics. The maturity method assigned fixed risk weights based on coupon payments and residual maturity whereas the duration approach used a pre-specified formula to determine a precise risk weight dependent on various security specific characteristics. The general risk charge concerned the entire trading book and was applicable to all securities positions.

3.2.2.1. *Asset allocation between the banking book and trading book*

The most significant development in the Basel standards, introduced by the Market Risk Amendment, was the separation of the balance sheet into the banking book and the trading book. The banking book consisted of exposures that were typically held to maturity whereas the trading book included financial instruments either held with a trading intent or to hedge exposures. The main criteria for asset allocation between these two dimensions of the balance sheet was the trading intent i.e. exposures held with the intent for short-term resale and/or benefitting from price or interest-rate differences.¹⁸⁶ Trading book exposures included debt and equity instruments from banks' proprietary trading, client servicing and market-making and were required to be kept on the balance sheet at current market prices.

This distinction between the two balance sheet dimensions was primarily based on asset liquidity. Assets in the trading book were considered to be highly liquid as they were primarily held for short-term trading whereas those held in the banking book were to be kept until maturity and hence, deemed illiquid. Thus, the main risk for trading book exposures stems from liquidating positions at the prevailing market price, making these positions highly susceptible to market risk. Banking book exposures were predominantly long-term investments held until maturity and hence more at risk of counterparty default, exposing these assets to credit risk. These differences in asset characteristics were incorporated by differentiating capital requirements for exposures held in the banking and trading book, where assets held in the latter received lower capital charges. For instance, a higher credit risk charge was applicable to mortgages in the banking book while government securities held in the trading book for short-term resale were subject only to the lower market risk requirement.¹⁸⁷

¹⁸⁶ *ibid* pt I, sec(a).2.

¹⁸⁷ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel I)' annex 2 *and* The Basel Committee on

These differential capital requirements needed an explicit criteria for monitoring banks' asset allocation to prevent regulatory arbitrage, whereby the standards stated:

*"...In particular, they will seek to ensure that no abusive switching designed to minimise capital charges occurs and will be vigilant in seeking to prevent "gains trading" in respect of securities which are not marked to market. ...In both cases, there must be a clear audit trail created at the time such transactions were entered into to enable supervisory authorities to monitor the bank's compliance with its established criteria by which items are allocated to the trading or banking book."*¹⁸⁸

However, these were vague guidelines with an ex-post monitoring approach that was aimed at promoting self-regulation. Firstly, asset allocation was determined by banks' internal risk management policies and procedures. Secondly, the intent-based criteria was highly subjective as banks were allowed to hold assets in the trading book solely by declaring a trading intent, overlooking the liquidity of the asset itself. The stipulation that asset allocation was based on an 'intent to trade' did not require any proof of trade since that would impose a mandatory requirement which could result in losses. For example, a bank may hold a security in the trading book with the intent to benefit from sale due to expected price appreciation. However, short-term market volatility might negatively impact security value, discouraging the bank from trading to avoid losses. Therefore, 'intent to trade' did not incorporate market conditions, which could adversely impact banks' ability to trade and hence, asset liquidity. Consequently, absent a clear and objective criterion for asset allocation and consistent monitoring, the standards gave banks significant discretion for asset allocations between the two dimensions of the balance sheet.

The balance sheet division between the banking and trading book had similar consequences for repo transactions. *Banking book repo* referred to repo

Banking Supervision (BCBS), 'Amendment to the Capital Accord to Incorporate Market Risks' sec A.1.1.6.

¹⁸⁸ The Basel Committee on Banking Supervision (BCBS), 'Amendment to the Capital Accord to Incorporate Market Risks' pt I, sec (a).4.

transactions with securities held in the banking book (under the accounting item *available for sale securities*) whereas *trading book repo* represented repo transactions with securities held in the trading book (under the accounting item *securities held for trading*). However, the criteria of ‘trading intent’ was irrelevant for determining the balance sheet allocation of repo transactions as repo is a short-term transaction to fund long positions in securities, regardless of the underlying security characteristics. For instance, the same overnight repo transaction can be undertaken with a security held until maturity in the banking book or that held for short-term transactions in the trading book. The ‘intent-based criteria’ primarily determined initial asset allocation but the balance sheet dimension for repo transactions was guided by the differential capital requirements for exposures in the banking and trading book.

3.3. Assessment Methodology

Post-crisis, most of the criticism regarding the Basel Accords concerned the internal model approach, which was claimed to be biased towards banks’ self-interests to benefit from lower capital requirements.¹⁸⁹ However, this chapter aims to assert that even the simpler standardised method for capital calculation provided banks with significant adverse incentives for securitized banking. Therefore, the proceeding analysis pertains solely to the standardised methodology prescribed in the Basel Accords.

The most important sub-section of the Basel Accords is the minimum capital requirements, which are calculated on the basis of total RWA. This emphasis on risk weights can be a source of regulatory arbitrage to reduce capital requirements, either by asset securitisation (holding less assets on the balance sheet) or through asset substitution (holding assets with lower risk weights). The analysis in the forthcoming sections focuses on the latter since the aim is to assess banks’ incentives for securitized banking and not asset securitisation. The key opportunity for asset substitution was provided by the separation of the balance sheet into the banking and trading book. Thus, the objective is to compare the capital charges for securitized banking under these different balance sheet dimensions to identify the presence (or absence) of any capital relief.

¹⁸⁹ See Admati and Hellwig (2014); Hellwig (2009); Dewatripont, Rochet and Tirole (2010); Plosser and Santos (2014); Acharya and Richardson (2009); Caprio, Demirgü-Kunt and Kane (2010).

The analysis centres on banks' rationale for minimising their capital requirements for a given transaction by minimising the RWA. In this regard, one specific scenario will be examined under the pre-crisis regulatory regime between the two balance sheet dimensions. The focus will be to assess the risk weights applicable firstly, to an incremental position in a securitized instrument and secondly, for securitized banking (long securities positions funded using repo). The analysis assumes a high-grade ABS (AAA to AA- or A-1/P-1)¹⁹⁰ since high credit ratings receive the lowest risk weights and hence, minimum capital charge. An ABS will be used broadly to include all securitized instruments, similar to the Basel Accords, which do not differentiate between these instruments and treats them collectively as securitisation exposures.¹⁹¹

Additionally, the analysis will be restricted to the first leg of the repo transaction (the funding side), where the asset remains on the balance sheet as if it was still owned by the borrower and a corresponding liability is recorded. This approach is consistent with the dissertation's emphasis on the use of repo as a funding source. Moreover, similar capital requirements are applicable on either side of a repo transaction (repo and reverse repo), so concentrating on one has no material impact on the outcome.

It is important to emphasize that the capital charge in the following analysis refers to the risk weight applicable to an incremental position for the calculation of RWA. The actual capital required to be held against such exposures is much lower and corresponds to the Basel ratio of 8% of RWA, as below:

$$\text{Capital Requirement}_{\text{minimum}} = 8\% * RWA \{ \text{Exposure value} * RW \}$$

This emphasis on risk weight is justified as it is the only parameter that changes the capital requirements, while the exposure value and 8% Basel ratio remains constant. Therefore, the incremental effect on the total capital requirement can be analysed by looking at the change in the applicable risk weight. Lastly, while in reality the trading book refers to a bank's securities portfolio, the analysis

¹⁹⁰ The credit rating represents the highest credit quality in case of a long-term exposure (AAA to AA-) or a short-term exposure (A-1/P-1). These ratings are based on Standard & Poor and Fitch long term ratings ranging from AAA to D. Short-term ratings represent those by Standard & Poor and Fitch (A-1 to D) and Moody's (P-1 to P-3).

¹⁹¹ Asset-backed securities can be differentiated according to the underlying assets. For example, a mortgage-backed security is a securitized instrument with mortgages as the underlying asset whereas credit card asset-backed securities are based on credit card debt.

will treat transactions on a stand-alone basis since determining the effect of a transaction on the entire portfolio is beyond the scope of this dissertation.

3.4. Banks' Incentives under the Pre-crisis Basel Accords

The pre-crisis regulatory regime consisted of Basel I (banking book) and the Market Risk Amendment (trading book). Consequently, banking book repo was subject to Basel I standards whereas the treatment laid out in the Market Risk Amendment was applicable to trading book repo.

A simple stylized balance sheet with the risk weights that would be assigned to an incremental securitisation exposure highlights the incentives present for asset allocation and securitized banking. It is pertinent to mention here that asset allocation refers to the *initial* allocation of securities and thus, repo transactions. Moreover, as the analysis centres on banks' rationale for minimising RWA to lower capital requirements, the emphasis will be on the *minimum* risk weights that banks can achieve.

Figure 11: Pre-crisis balance sheet

Banking Book Basel I (Credit Risk)		Trading Book Market Risk Amendment (Market Risk)	
Asset Allocation			
Asset Backed Security (AAA to AA-/A-1/P-1)	20%	➔	Asset Backed Security (AAA to AA-/A-1/P-1) 0.25 - 14.10%
Securitized Banking			
Repo	20%	➔	Repo 0.25 - 14.10%

3.4.1. Banking book

The applicable standards accounted for the credit risk of assets held in the banking book. Basel I did not incorporate external credit ratings for banking

book exposures. Therefore, a high-grade securitisation exposure would be equivalent to claims on and securities issued by OECD banks or securities firms.

The minimum risk weight for holding a long position in a high-grade ABS in the banking book was 20%.¹⁹² Under Basel I standards, this investment represented a claim on banks and securities firms, specifically those incorporated in the OECD as they were considered less risky than others and hence, received lowest risk weights.

For repo transactions, the standards recognised the risk mitigating effect of collateral and the relevant risk weight was that applicable to the issuer of the underlying asset (and not the counterparty). For securitized banking, the collateral is the underlying asset and hence, the transaction received the weighting of the ABS – 20%.¹⁹³

3.4.2. Trading book

The trading book standards accounted for the market risk of positions held in the trading portfolio.

The interest rate risk charge applicable to debt instruments combined a specific risk and general risk charge, both dependent on security specifics such as residual maturity and coupon payments. Given the numerous alternatives for security characteristics, a range of all possible risk weights for a security position is determined, since calculating a precise risk weight is beyond the scope of this dissertation.¹⁹⁴

The specific risk charge applicable to an ABS was that assigned under the Qualifying category, which included investment grade securities (rated AAA-BBB). The relevant risk weight was dependent upon the residual term to maturity of the security, ranging from 0.25% (maturity less than 6 months) to 1.60% (maturity greater than 24 months).

The general risk charge is calculated using the maturity method, which assigned fixed risk weights for securities dependent upon coupon payments and residual maturity bands. This is consistent with the assessment methodology which

¹⁹² See Appendix II, part I, (a).1

¹⁹³ Appendix II, part I, (a).2.

¹⁹⁴ For a detailed overview of the calculations, see Appendix II, part I, (b).1.

focuses solely on risk weights. Moreover, the general risk charge was applicable to securities positions in the entire trading book. This strengthens the analysis as the actual charge applicable to an incremental position will be much lower than that determined in this analysis. The possible risk weights for general risk, dependent on residual maturity and coupon payments, ranged from 0% (maturity less than one month) to 12.50% (maturity over 20 years).

Therefore, the total interest rate risk charge for holding a high-grade ABS (with varying security characteristics) would be a minimum risk weight of 0.25% and a maximum of 14.10%.

For repo transactions, the standards required that securities sold under repo be treated as if they were still owned by the repo seller, since the seller continues to bear the risk and reward of the underlying asset.¹⁹⁵ Therefore, repo transactions were treated similar to other security positions and the risk weight for a securitized banking transaction would be that corresponding to the underlying ABS – ranging from 0.25% to 14.10%.¹⁹⁶

3.4.3. Discussion

The key consideration in determining the incentives inherent in the pre-crisis Basel Accords for asset allocation and securitized banking is the presence of any capital relief between the two dimensions of the balance sheet. This is represented by differing risk weights for similar exposures, specifically the asset allocation that results in lowest risk weights and hence, maximum capital relief. It should be noted that incentives for asset allocation precede those for securitized banking i.e. the initial allocation of ABS determine the balance sheet dimension for securitized banking (whether banking or trading book securities will be used for repo funding). The decisive factor will be the applicable risk weights that determine banks' capital requirements. Therefore, asset allocation will favour the balance sheet dimension with lower risk weights for securitized instruments and hence, securitized banking will primarily occur through the same dimension.

The incentive for asset allocation for securitized instruments is readily visible and favours the trading book. For a long position in an ABS, banks could reduce

¹⁹⁵ See chapter 1, section 1.1.4 for an explanation.

¹⁹⁶ Appendix II, part I, (b).2.

the applicable risk weight from 20% in the banking book to a *maximum* of 14.10% in the trading book. This corresponds to a reduction in risk weight of 5.9 percentage points (pp) and a *minimum* capital saving of approximately 30 percent. On the other hand, banks could achieve even higher capital savings if security-specific characteristics allowed banks to reduce the risk weight to the *minimum* of 0.25% in the trading book. In this instance, the reduction in risk weight would be 19.75 pp with a corresponding capital saving of approx. 99%. Thus, incorporating the entire range of possible risk weights that influence the initial allocation of securitized instruments, banks could achieve a *minimum* capital saving of 30% (20% to 14.10%) and a *maximum* capital saving of approximately 99% (20% to 0.25%) from allocating securitized instruments to the trading book.

Similar incentives were also present for securitized banking. The standards equalized the risk weights for long positions and securitized banking in both the banking and trading book. A long position in the securitized instrument or funding it through repo both received the same risk weight of 20% in the banking book and a possible range of 0.25 – 14.10% in the trading book. However, the main arbitrage opportunity is whether banks undertake securitized banking using ABS in the banking book or the trading book. Repo using a securitized instrument in the banking book was subject to the risk weight of 20% whereas the applicable risk weights for a similar transaction through the trading book was lower, with a range of 0.25 – 14.10%. Banks could achieve capital savings similar to that for long positions in the security i.e. a *minimum* reduction in the risk weight of 5.9 pp with a capital relief of approx. 30 percent and a *maximum* risk weight reduction of 19.75pp with a capital relief of approx. 99%.

The range of possible risk weights and corresponding capital savings sheds light on the *adverse incentives* inherent in the pre-crisis Basel Accords. The standards allowed similar assets and transactions to receive different risk weights and were subject to different capital requirements. Even the *minimum* possible capital relief of 30% is significant enough to encourage asset allocation and securitized banking towards the trading book, regardless of the underlying risks in the transactions. This misalignment of capital requirements for similar assets between the banking and trading book created significant *adverse incentives* for banks to allocate assets towards the latter.

Therefore, both initial asset allocation and securitized banking favour the trading book due to the lower risk weights that allow banks to reduce total RWA

and corresponding capital requirements. With asset allocation incentives favouring the trading book, majority of banks' holdings of securitized instruments would be in the trading book and their subsequent use in securitized banking would be undertaken primarily through the same dimension.

3.4.4. Data trends

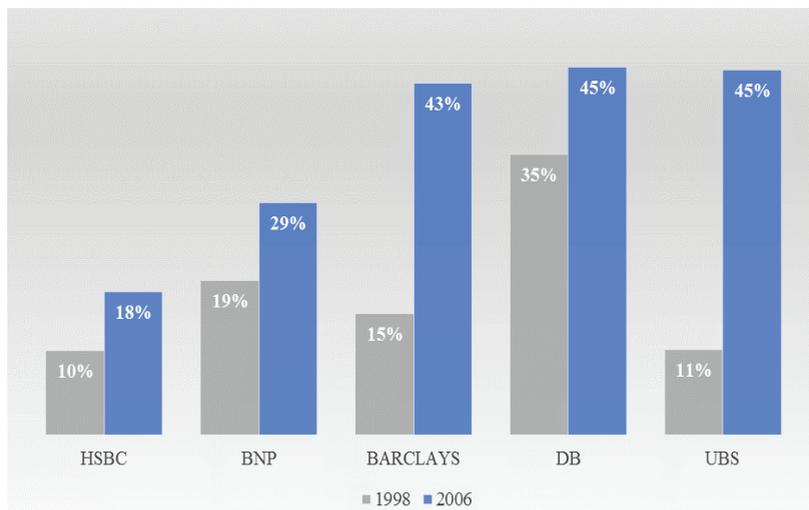
This section uses a new approach to assess whether the hypothesis of the preceding analysis is correct. It looks at data trends in some of the largest European banks using annual financial statements to examine banks' trading book exposures and repo transactions.

Trading book exposures are represented by the percentage of debt securities held in the trading book (excluding government securities). Total trading book exposures consist of debt and equity securities held for trading purposes (excluding derivative positions). This data is an approximation for the proportion of securitized instruments held in the trading book since precise data for ABS is not consistently disclosed by the banks under review.

Repo transactions as a percentage of total short-term borrowings is used as an indicator of bank reliance on repo as an additional source of short-term funding. Total short-term borrowing excludes customer deposits and consists of interbank deposits, commercial paper, securities loaned and repo transactions. This demonstrates banks' use of repo transactions in aggregate and therefore, also includes securitized banking.

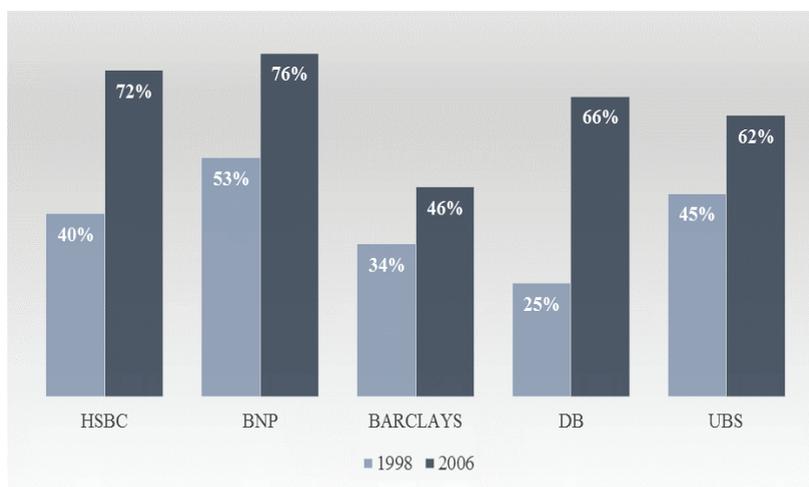
The trends below suggest that the hypothesis from the previous analysis may be correct. Similar increases can be seen in the percentage of debt securities held in the trading book and bank reliance on repo transactions as an additional source of short-term borrowing. This highlights the increased asset allocation towards the trading book and an increase in bank reliance on repo transactions in the years before the crisis.

Figure 12: Debt securities held in the trading book



Source: Annual financial statements of respective banks. The figure shows trading book debt securities (excluding government securities) as a percentage of total trading book securities.

Figure 13: Bank reliance on repo funding



Source: Annual financial statements of respective banks. The figure shows repo transactions as a percentage of total short-term borrowing.

While there might be other driving factors for these trends, it is consistent with the analysis in this chapter. The pre-crisis Basel accords encouraged bank holdings of securitized instruments and involvement in securitized banking primarily through the trading book. The main source of adverse incentives was the introduction of the Market Risk Amendment, which provided banks with the opportunity for regulatory arbitrage through asset allocation between the two dimensions of the balance sheet. The conclusions regarding capital saving for securitized banking is crucial, since this is what made securitized banking ‘cheaper’ in the trading book and therefore, could be suggestive of the increased bank involvement in securitized banking prior to the crisis.

Conclusion

This chapter analysed the incentives inherent in the pre-crisis Basel Accords for banks to engage in securitized banking. The objective was to examine differences between the capital charges for securitized banking through the banking book and trading book to identify the presence (or absence) of any capital relief. The analysis was centred on banks’ rationale for minimising their capital requirements. Thus, asset allocation of securitized instruments will favour the balance sheet dimension with lower capital requirements and hence, securitized banking will primarily occur through the same dimension.

The chapter finds that the presence of significant adverse incentives in the pre-crisis Basel Accords encouraged banks to engage in securitized banking. Similar adverse incentives existed for asset allocation of securitized instruments and securitized banking, both favouring the trading book. The Basel Accords allowed similar assets and transactions to receive different risk weights, with those in the trading book subject to lower capital requirements. This misalignment of capital requirements for similar assets between the banking book and trading book created significant adverse incentives for banks to allocate assets towards the latter, allowing them to reduce their total capital requirements. Data trends in some of the largest European banks before the crisis also suggest that this hypothesis may be correct. Similar increases can be seen in the percentage of debt securities held in the trading book and bank reliance on repo transactions as an additional source of short-term borrowing. These trends highlight the increased asset allocation towards the trading book and an increase in bank reliance on repo transactions in the years before the crisis.

Therefore, the pre-crisis Basel accords encouraged bank holdings of securitized instruments and bank involvement in securitized banking primarily through the trading book. The main source of adverse incentives was the introduction of the Market Risk Amendment, which separated banks' balance sheets into the banking book and trading book, providing banks with significant discretion for asset allocation between these two dimensions. Most importantly, the finding regarding capital savings for securitized banking is vital, as these lower capital requirements made securitized banking cheaper in the trading book and an inexpensive source of funding for banks.

Chapter 4

Post-crisis – Basel Accords, Incentives and Securitized Banking

The previous chapter analysed the pre-crisis Basel Accords and found that preceding the crisis, the presence of adverse incentives for asset allocation between the two dimensions of the balance sheet supported securitized banking primarily through the trading book. The underlying principle was the lower capital charge applicable to trading book exposures, as these short-term positions were not susceptible to credit risk, such as those in the banking book. This differentiated treatment of similar assets between the banking and trading book created significant incentives for banks to allocate assets towards the latter. The corresponding capital savings from lower capital requirements reduced the costs for securitized banking through the trading book.

This chapter focuses on the post-crisis regulatory response, the Basel 2.5 standards, to assess its effectiveness in eliminating the arbitrage opportunities inherent in the pre-crisis Basel Accords. Similar to the preceding chapter, this chapter contributes to the existing literature by identifying the presence of regulatory arbitrage for securitized banking in the Basel Accords. An additional contribution is to highlight that even the simpler standardised methodology for capital calculation provides banks with significant adverse incentives for securitized banking.

This chapter aims to assess the incentives inherent for securitized banking in the post-crisis Basel Accords to answer the second sub-research question: **Did the post-crisis regulatory response strengthen the capital requirements for securitized banking?**

This chapter follows the structure and methodology of the previous chapter since the purpose of the analysis remains the same i.e. to compare the capital requirements for securitized banking under both the banking book and the trading book. In this regard, differences between the capital charges for securitized banking through these two balance sheet dimensions will be assessed to identify the presence (or absence) of any capital relief.

The chapter begins with an overview of the post-crisis Basel Accords, not in their entirety but limited to the key standards applicable to securitized banking. The second section provides a detailed analysis of relevant capital requirements for securitized banking to illustrate the presence of any regulatory arbitrage. The last section provides descriptive data trends that support the outcomes of the analysis of the post-crisis Basel Accords.

4.1. Post-crisis Basel Accords

4.1.1. Basel II

The standards received another overhaul with the Basel II Accord, which was aimed at strengthening and aligning banks' capital requirements in pace with growing financial innovation. Basel II was introduced in June 1999, revised in June 2004 and after several consultations, finalised in June 2006, with planned implementation by year end 2007. The framework now comprised of three pillars: 1) minimum capital requirements that followed a more risk-sensitive approach than the original Basel I framework, 2) supervisory review of capital adequacy and 3) disclosure requirements and market discipline.

The Basel II Accord shared some similarities with the previous standards. The minimum capital requirements were kept the same (Basel ratio at 8%) and the structure of the Market Risk Amendment remained unchanged. However, the capital requirements now incorporated three risks: credit, market and operational risk (i.e. risks from banks' failed internal processes, people and systems).¹⁹⁷ The revised capital requirements were:

$$\begin{aligned} \text{Capital Requirement}_{min} &= 8\% * \{ \text{Total RWA} \\ &= RWA_{Credit Risk} + RWA_{Market Risk} + RWA_{Operational Risk} \} \end{aligned}$$

Where, RWA = risk-weighted assets and RW = risk weight. These abbreviations will be used henceforth.

Additionally, the new Accord introduced a few significant changes. Firstly, it extended the use of alternative methods for measurement of market risk to other

¹⁹⁷ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel II)' pt 2, sec I.B.44.

risk categories. Banks were now allowed the choice between a standardised and an internal model approach for both credit risk and operational risk. Subsequently, the risk weighting mechanism was also altered for credit risk in the banking book, which replaced the previous Basel I fixed-bucket risk weights with those calibrated to external credit ratings. While the risk weights still ranged from 0-100%, these weights were now linked to credit ratings assigned by authorized rating agencies. Higher credit ratings (AAA or A-1/P-1) reflected lower risk and therefore, received lower risk weights.¹⁹⁸

Secondly, Basel II introduced the securitisation framework, which recognised the growing securitisation activities of banks. The framework was only applicable to securitisation exposures in the banking book and gave banks the same choice between methods for capital calculations i.e. a standardised method (based on external credit ratings) and an internal model approach (using banks' in-house risk models). Under the standardised approach, the applicable risk weights for securitized exposures were dependent on their credit rating, with investment grade securities (AAA to BBB-) subject to lower risk weights than those falling within the speculative/junk category (BBB- or lower). Regardless of banks' choice of the calculation approach, an originating bank was allowed to exclude the securitized exposures from capital calculations (only under full credit risk transfer).¹⁹⁹ However, retained or repurchased exposures needed to be accounted for in regulatory capital.²⁰⁰ Furthermore, banks were required to hold regulatory capital against all securitisation exposures, whether they resulted from private origination or investment in asset-backed securities (ABS).²⁰¹

The capital treatment for repo transactions was similar to that applicable to banking book repo under the Basel I Accord, where the applicable risk weight was dependant on the counterparty:

$$\text{On - balance sheet RWA} = \text{Exposure Value} * RW_{(\text{counterparty})}$$

However, the most important amendment for repo transactions was the introduction of the credit risk mitigation framework. It incorporated the risk

¹⁹⁸ These ratings are based on Standard & Poor and Fitch long term ratings ranging from AAA to D. Short-term ratings represent those by Standard & Poor and Fitch (A-1 to D) and Moody's (P-1 to P-3).

¹⁹⁹ *ibid* pt 2, sec IV.C.1-2.

²⁰⁰ *ibid* pt 2, sec IV, C.1-2 & D.1.560.

²⁰¹ *ibid* pt 2, sec IV.D.1.560.

mitigating effect of collateral in case of counterparty default by allowing banks to reduce their credit exposure to a counterparty when the transaction was secured by eligible collateral. This risk mitigation was reflected as a reduction in the capital charge for credit risk and therefore, lowered total capital requirements.

The framework widened the range of eligible collateral, which was previously restricted to traditionally safe securities such as loans against cash and securities issued by OECD governments or multilateral development banks. The Basel II standards recognised a wide range of instruments as eligible collateral in financial transactions, now including privately issued debt securities (with or without investment grade ratings), equities and convertible bonds.²⁰² Moreover, unrated debt securities were also eligible for credit risk mitigation given that they were issued by a bank, listed on a recognised exchange, fulfilled criteria regarding the credit rating of the issuer and the supervisor was confident about the market liquidity of the security.²⁰³

The credit risk mitigation framework was applicable to collateralised transactions, including repo, under both dimensions of the balance sheet i.e. banking book repo and trading book repo. It required banks to calculate a counterparty credit risk charge under either a simple or comprehensive approach. The simple approach mirrored the Basel I risk mitigation methodology, where the counterparty risk weight was replaced with that corresponding to the collateral issuer and was subject to a 20% floor, unless the collateral was cash or certain government securities.²⁰⁴

$$\text{On - balance sheet RWA} = \text{Exposure Value} * RW_{(\text{issuer of collateral})}$$

The comprehensive approach allowed for a fuller offset against collateral, applicable to the exposure rather than the risk weight, as below:

$$RWA_{\text{after risk mitigation}} = E^* \text{ adjusted exposure} * RW_{\text{counterparty}}^{205}$$

The adjusted exposure (E*) incorporated the risk mitigating effect of collateral by reducing the exposure with a discounted value of collateral. The quality of

²⁰² *ibid* pt 2, sec II.D.3.(i).

²⁰³ *ibid*.

²⁰⁴ *ibid* pt 2, sec II.D.2.(i).121.

²⁰⁵ *ibid* pt 2, sec II, D.2.(i).130 & D.3.(ii).148.

collateral was represented by haircuts²⁰⁶, which were used to reduce its market value to protect against price movements. The amount of haircut was linked to the credit rating of collateral i.e. high credit ratings represented low risk and hence, received lower haircuts. Banks could use standard supervisory haircuts provided by the Basel Committee or their internally generated estimates. Standard supervisory haircuts ranged from zero (cash) to 25% (non-main index equities) and those for debt securities were dependent on issue rating, residual maturity and issuer type (sovereigns, banks or corporates).²⁰⁷ For example, supervisory haircut assigned to a high-grade (AAA rated) debt security with a residual maturity greater than 5 years was 8%. Thus, the collateral value was discounted by 8% and the exposure could be offset against 92% of the collateral value. This reduction in original exposure reduced the corresponding risk-weighted assets (RWA), lowered credit risk and hence, capital requirements.

4.1.2. Basel 2.5

When the crisis surfaced in 2007, Basel II implementation was still underway and at the dawn of the crisis, many flaws were visible in the current state of financial architecture. The Basel trading book regime received special attention since significant losses and build-up of leverage had occurred in banks' trading books.²⁰⁸ While the rationale for lower capital charges in the trading book might have been justified, the crisis showed that in times of stress, trading positions can be impossible to sell or hedge and illiquidity can create losses exceeding the prescribed capital requirements.

As an immediate response to the crisis, the Basel Committee made adjustments to the trading book regime, which still followed the standards set out under the 1996 Market Risk Amendment. The revised trading book standards, called Basel 2.5, were finalised in July 2009 with expected implementation by year-end 2010, while Basel II implementation was also extended until the same time period. The main objective was to improve the trading book standards by

²⁰⁶ See chapter 1, section 1.1.1 for an overview of haircuts.

²⁰⁷ *ibid* pt 2, sec II.D.3.(ii).151.

²⁰⁸ The Basel Committee on Banking Supervision (BCBS), 'Revisions to the Basel II Market Risk Framework' (2009); Adair Turner, 'The Turner Review: A Regulatory Response to the Global Banking Crisis' [2009] Financial Services Authority Report.

incorporating key risks not currently included and to strengthen capital requirements that better accounted for expected losses.²⁰⁹

Changes were primarily made to the internal model approach, which now required an incremental risk capital charge that incorporated risks from counterparty default and rating migration (changes in credit ratings) for credit-risk related instruments held in the trading book.²¹⁰ The Basel Committee also recognised the presence of incentives for regulatory arbitrage between the two dimensions of the balance sheet and therefore, required similar methodology to be applied for similar exposures, regardless of where they were booked. For securitized exposures, banking book capital charges were now applicable and required to be calculated under the standardised method.²¹¹

However, Basel 2.5 made an important modification to the standardised method for market risk by differentiating the capital charge applicable to banks' securitisation portfolio from those assigned to individual positions.²¹² The main revision was made to the interest rate risk requirement, which was still the combination of a capital charge for specific risk (individual securities) and general risk (entire portfolio). Although the capital requirements for general risk remained unchanged, the specific risk charge was modified for securitized exposures and was now applicable to net positions in securitized instruments held in the trading book.²¹³

The risk weights for specific risk for securitized instruments in the trading book were still attuned to external credit ratings, although they were now higher than those prescribed under the 1996 Market Risk Amendment. The specific risk charge for securitized exposures ranged from 1.6% (highest rating) to 28% (BB+ to BB-), while securities rated below BB- required a full deduction from capital.²¹⁴ In contrast, the corresponding risk weights under the 1996 Market Risk Amendment ranged from 0.25% - 1.60%, with a charge of 8% for securities rated BBB- and below.²¹⁵ Moreover, the standards also differentiated the treatment of re-securitisation exposures i.e. instruments such as

²⁰⁹ The Basel Committee on Banking Supervision (BCBS), 'Revisions to the Basel II Market Risk Framework' 1-2.

²¹⁰ *ibid* I. 8.

²¹¹ *ibid* I. & I.9.

²¹² *ibid* IV.18.

²¹³ *ibid* IV.18.712(iii).

²¹⁴ *ibid* IV.18.712(iv).

²¹⁵ The Basel Committee on Banking Supervision (BCBS), 'Amendment to the Capital Accord to Incorporate Market Risks' pt A, sec A.1.I.4-6.

collateralized debt obligations (CDOs) of ABS where the underlying assets are securitized exposures. These exposures received higher risk weights, double than those applicable to securitisation positions, reflecting the greater risk of re-securitized exposures.²¹⁶

4.1.3. Asset allocation between the banking book and trading book

The post-crisis Basel Accords followed the principles of the 1996 Market Risk Amendment and continued the separation of the balance sheet between the banking and trading book. This distinction was now less crucial for repo transactions, as they were subject to banking book capital requirements, regardless of where they were booked.²¹⁷

Basel II and Basel 2.5 used the same definition of trading book assets and the ‘intent-based’ criteria for trading book allocation as before.²¹⁸ Additional specifications for assets held in the trading book required that these assets be free of any covenants or be hedged completely, frequently valued and actively managed.²¹⁹ The Basel Accords also remained unchanged with regard to monitoring banks’ asset allocation, stating that:

“Banks must have clearly defined policies and procedure, for determining which exposures to include in, and to exclude from, the trading book for purposes of calculating their regulatory capital, to ensure compliance with the criteria for trading book set forth in this Section and taking into account the bank’s risk management capabilities and practices. Compliance with these policies and procedures must

²¹⁶ The Basel Committee on Banking Supervision (BCBS), ‘Revisions to the Basel II Market Risk Framework’ IV.18.712(iv).

²¹⁷ The Basel Committee on Banking Supervision (BCBS), ‘International Convergence of Capital Measurement and Capital Standards (Basel II)’ pt 2, VI.A.689.(iii).

²¹⁸ The Basel Committee on Banking Supervision (BCBS), ‘Amendment to the Capital Accord to Incorporate Market Risks’ I.(a).2 and The Basel Committee on Banking Supervision (BCBS), ‘International Convergence of Capital Measurement and Capital Standards (Basel II)’ pt 2, VI.A.685-687.

²¹⁹ The Basel Committee on Banking Supervision (BCBS), ‘International Convergence of Capital Measurement and Capital Standards (Basel II)’ pt 2, VI.A.685.

be fully documented and subject to periodic internal audit."²²⁰

Therefore, the focus remained on self-surveillance, relying on banks' internal policies and procedures with periodic internal audits. However, the post-crisis guidelines concentrated on stipulating the relevant policies and procedures that banks must have in place for trading book asset allocation. The standards provided a *minimum* set of issues that must be addressed in the policies for adequate management of the trading book, specifying that these are '*... not intended to provide a series of tests that a product or group must pass to be eligible for inclusion in the trading book.*'²²¹ The guidelines recommended that the policies should outline exposures included in the trading book and the extent to which these exposures can be accurately valued and marked-to-market daily, any legal restrictions that can restrict immediate liquidation, any limitations on active risk management and the criteria for transferring risk or exposures between the banking and the trading book.²²² Additionally, detailed requirements for trading book allocation required a clearly documented trading strategy for trading book instruments or portfolio, approved by senior management, which outlined policies for active management and monitoring of positions against the bank's trading strategy.²²³

Although the post-crisis standards provided detailed guidelines for policies that should be in place for trading book allocation, the standards continued to remain subjective and relied entirely on banks' internal asset allocation and monitoring procedures. This limitation was acknowledged in the standards itself, where the guidelines represented a *minimum* set of issues that should be addressed rather than an objective criterion to determine the eligibility of assets for trading book allocation. Therefore, the post-crisis Basel Accords continued to provide banks with significant discretion for asset allocation between the two dimensions of the balance sheet.

²²⁰ The Basel Committee on Banking Supervision (BCBS), 'Amendment to the Capital Accord to Incorporate Market Risks' I.(a).4 and The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel II)' pt 2, VI.A.687.(i).

²²¹ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel II)' pt 2, VI.A.687.(ii).

²²² *ibid.*

²²³ *ibid* pt 2, VI.A.688.

4.2. Banks' Incentives and the Effectiveness of Post-Crisis Regulatory Response

This section analyses the post-crisis Basel Accords and follows the methodology of the previous chapter since the purpose remains the same i.e. to compare differences between the capital charges for securitized banking in the banking and trading book to identify the presence (or absence) of any capital relief. The focus remains on banks' rationale for minimizing their capital requirements for a given transaction by minimizing the RWA. The analysis will assess the risk weights applicable to an incremental securitisation position using the same scenario as in the previous chapter i.e. assume a high-grade ABS (AAA to AA- or A-1/P-1) and focus on the first leg of the repo transaction. Likewise, the forthcoming analysis does not cover the Basel standards in their entirety but examines the key components that were previously concluded to incentivize bank involvement in securitized banking.

The stylized balance sheet with Basel II standards for the banking book and the revised trading book regime, Basel 2.5, illustrate the continuing incentives for asset allocation. While the new standards aimed to equalize the treatment of exposures between the two dimensions of the balance sheet, the *adverse* incentives for asset allocation still persisted, although to a lesser extent, now favouring the banking book.

Figure 14: Post-crisis balance sheet

Banking Book Basel II (Credit Risk)		Trading Book Basel 2.5 (Market Risk)	
Asset Allocation			
Asset Backed Security (AAA to AA-/A-1/P-1)	20%	←	Asset Backed Security (AAA to AA-/A-1/P-1) > 20%
Securitized Banking			
Repo			Repo
Simple Approach	20%		
Comprehensive Approach	< 20%	←	Comprehensive Approach < 20%

4.2.1. Banking book

The securitisation framework dictated the credit risk requirements for holding an ABS in the banking book. Applicable risk weights were dependent on credit ratings of securitized instruments, where investment grade instruments received lower risk weights than non-investment grade ratings, due to the lower risk of the former. Thus, the corresponding risk weight for a high-grade ABS was 20%, whether long-term (AAA – AA-) or short-term (A-1/P-1).²²⁴

Repo transactions fell under the credit risk mitigation framework. Banks were required to calculate a counterparty credit risk charge that took into account the risk mitigating effect of eligible collateral, which now included privately issued debt securities. The credit risk mitigation framework provided banks with two approaches. The simple approach followed the Basel I strategy and substituted the risk weight of the counterparty with that of the underlying collateral. In this instance, the applicable risk weight was that of the underlying ABS – 20%.²²⁵

On the other hand, the comprehensive approach allowed a fuller offset of the exposure against the underlying collateral, after accounting for collateral quality by using haircuts.²²⁶ This approach calculated an adjusted exposure, as below:

$$E^* \text{ adjusted exposure} = \max\{0, [E(1 + H_e) - C(1 - H_c - H_{fx})]\}$$

Where, E = exposure value, H_e = exposure haircut, C = collateral value, H_c = collateral haircut, H_{fx} = currency mismatch haircut

In this regard, the risk weight calculation can be assessed by examining a hypothetical securitized banking transaction with an exposure of 9.8 million and collateral of 10 million, without any currency mismatch. The collateral is assumed to be a high-grade ABS with a residual maturity greater than 5 years. Using standard supervisory haircuts, the applicable haircut for the exposure and collateral was 2% (H_e) and 8% (H_c), respectively. Thus, the original exposure was allowed to be offset against 92% of the collateral value, as below:

$$E^* \text{ adjusted exposure} = \{9.8(1 + 0.02) - 10(1 - 0.08)\}$$

However, to determine the total RWA for the securitized banking transaction, this adjusted exposure was required to be multiplied by the counterparty risk

²²⁴ See Appendix II, part II, (a).1.

²²⁵ Appendix II, part II, (a).2.2.

²²⁶ For details on the calculations that follow, see Appendix II, part II, (a).2.3-2.5.

weight. The counterparty to an interbank repo transaction is primarily other banks or securities firms. Thus, the applicable counterparty risk weight was 20%, corresponding to claims on banks and securities firms with highest credit rating.

The RWA for a securitized banking transaction with and without credit risk mitigation are determined below:

$$\begin{aligned} RWA &= Exposure * RW_{counterparty} = 9.8 mn * 20\% \\ &= 1.96 million (mn) \end{aligned}$$

$$\begin{aligned} RWA_{risk\ mitigation} &= E^*_{adjusted\ exposure} * RW_{counterparty} \\ &= \{9.8(1 + 0.02) - 10(1 - 0.08)\} * 20\% \approx 0.16mn \end{aligned}$$

Therefore, the *total* counterparty credit risk charge was approximately 1.6% (RWA ÷ original exposure), significantly lower than the 20% charge without risk mitigation. Due to the range of possible scenarios, it suffices to say that under the credit risk mitigation framework, the adjusted exposure would be lower than the original, implying that the total credit risk charge for a securitized banking transaction must be lower than 20%.

4.2.2. Trading book

In the trading book, capital requirements for securitized exposures were differentiated from those applicable to other instruments in two ways. First, banking book capital charges under the standardised approach were now applicable and hence, determined by the banking book securitisation framework. In this instance, the risk weight for a high-grade ABS corresponded to that for similar exposures held in the banking book – 20%.²²⁷ Second, the interest rate risk requirement for debt securities was also applicable for holding an ABS, which included a capital charge for specific risk and general risk. Although the general risk charge remained unchanged, the specific risk of securitized exposures was differentiated from other instruments. A specific risk charge was now applicable to *net positions* in similar securitized instruments i.e. the difference between all long and short positions in a given security.²²⁸

²²⁷ Appendix II, part II, (b).1.1.

²²⁸ Appendix II, part II, (b).1.2.

Therefore, the incremental risk weight for an ABS was the same as that in the banking book – 20%. With the general risk calculations unchanged, an individual charge of 20% and an additional specific risk charge for *net position* in the security implies that the overall risk weight of holding the ABS in the trading book was likely to be greater than 20%.²²⁹

Repo transactions in the trading book were now treated similar to those in the banking book and fell under the credit risk mitigation framework. However, only the comprehensive approach to credit risk mitigation was allowed for trading book exposures. Thus, the applicable risk weight for trading book repo was similar to that for banking book repo under the comprehensive approach – less than 20%.²³⁰

4.2.3. Discussion

As in the previous chapter, the main factor for determining incentives for asset allocation and securitized banking is the presence of any capital relief between the two dimensions of the balance sheet. The focus remains on differing risk weights for similar exposures that would result in lower risk weights and provide capital relief. Moreover, incentives for asset allocation precede those for securitized banking i.e. initial asset allocation will favour the balance sheet dimension with lowest risk weights and hence, securitized banking will occur through the same dimension.

The incentive for asset allocation for securitized instruments persisted, although to a lesser extent, now favouring the banking book. While similar treatment was now applicable to securitized exposures in the banking and trading book, the new trading book regime required the risk weights to incorporate both, the credit risk and market risk of securitized instruments. A long position in a high-grade ABS was subject to a lower risk weight of 20% in the banking book as compared to a charge greater than 20% in the trading book. Given the range of possible risk weights in the trading book, banks could reduce the risk weight to a *minimum* of 20% and receive the *maximum* capital saving from allocating securitized instruments to the banking book.

²²⁹ Appendix II, part II, (b).1.

²³⁰ Appendix II, part II, (b).2.

With regard to the incentives for securitized banking, Basel II equalized the risk weights for these transactions in both the banking and trading book. The standards required similar treatment of repo transactions, regardless of where they were booked and were subject to the credit risk mitigation framework, which reduced the total credit exposure and hence, capital requirements. Although the framework provided two options in the banking book, banks would likely opt for the comprehensive approach under both dimensions of the balance sheet, as it provided a fuller offset against the collateral and did not require any prior supervisory approval. Therefore, securitized banking using ABS in the banking book or trading book received the same risk weights, which eliminated the previous opportunity for regulatory arbitrage and capital saving.

However, the post-crisis standards provided banks with an arbitrage opportunity between holding a long position in the securitized instrument and securitized banking. Under both dimensions of the balance sheet, a long position received higher risk weights (20% in banking book and >20% in trading book) while funding through repo received lower risk weights (less than 20% in both banking and trading book). Thus, banks were now more likely to rely on repo funding for holding long positions in securitized instruments due to lower applicable risk weights and hence, higher capital savings.

The range of possible risk weights and capital savings illustrate the *adverse incentives* inherent in the post-crisis Basel Accords. The standards continued the differential capital treatment of similar assets and transactions between the two balance sheet dimensions. Although the capital requirements for securitized banking were equalized, the *adverse incentives* for asset allocation still prevailed, now favouring the banking book. The *minimum* possible risk weight of 20% in the banking book was sufficient to encourage asset allocation and securitized banking towards the same dimension. Moreover, the post-crisis standards created a new arbitrage opportunity for securitized banking due to the differential risk weights for long positions in securitized instruments or funding them through repo. The latter received significantly lower risk weights, creating *adverse incentives* for banks to undertake securitized banking and reduce overall capital requirements.

Therefore, while the incentives for securitized banking were aligned between the two dimensions of the balance sheet, the *adverse incentives* for holding securitized exposures in the banking book prevailed. Banks' decision to undertake securitized banking would be dominated by the capital saving achieved through asset allocation towards the banking book and hence,

securitized banking would occur through the same dimension. Additionally, securitized banking remained cheaper for banks, due to the lower capital requirements under both dimensions of the balance sheet, irrespective of the underlying risks in these transactions.

It is pertinent to mention here that although the adverse incentives for asset allocation in this analysis might not be sizeable, their presence is also evident under the internal model approach. A study using hypothetical portfolios under the post-crisis internal model approach finds that incentives for asset allocation were reversed from those present before the crisis and post-crisis, the more lenient regime was the banking book.²³¹

Thus, initial asset allocation and hence, securitized banking now favoured the banking book due to the lower risk weights that allowed banks to reduce both total RWA and corresponding capital requirements. With asset allocation incentives favouring the banking book, majority of banks' holdings of securitized instruments would be in the same dimension and their subsequent use in securitized banking would be undertaken primarily through the banking book.

4.2.4. Data Trends

This section examines post-crisis data trends in the same European banks as in the previous chapter since the underlying objective is the same i.e. to assess whether the hypothesis of the preceding section is correct. Annual financial statements of respective banks were used to examine banks' banking book exposures and repo transactions.

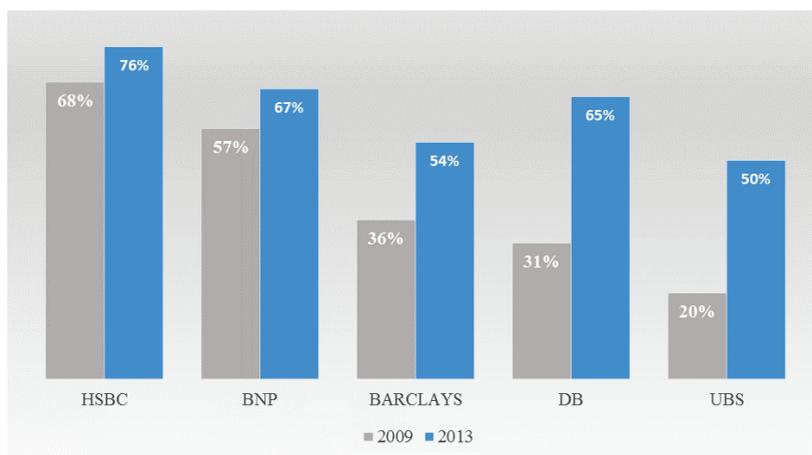
Banking book exposures are represented by debt securities held in the banking book as a proportion of total debt securities held by the respective bank. The data excludes all types of government securities. This data is used as an approximation for the proportion of securitized instruments held in the banking book since actual data for ABS is not consistently disclosed by the banks under review.

²³¹ Giovanni Pepe, 'Basel 2.5: Potential Benefits and Unintended Consequences' [2013] Bank of Italy Occasional Paper No. 159.

Bank reliance on repo transactions is represented by the same data used for pre-crisis illustrations. Repo transactions as a percentage of total short-term borrowings is used as an indicator of bank reliance on repo as an additional source of short-term funding. Total short-term borrowing excludes customer deposits and consists of interbank deposits, commercial paper, securities loaned and repo transactions. This demonstrates banks' use of repo transactions in aggregate and therefore, also includes securitized banking.

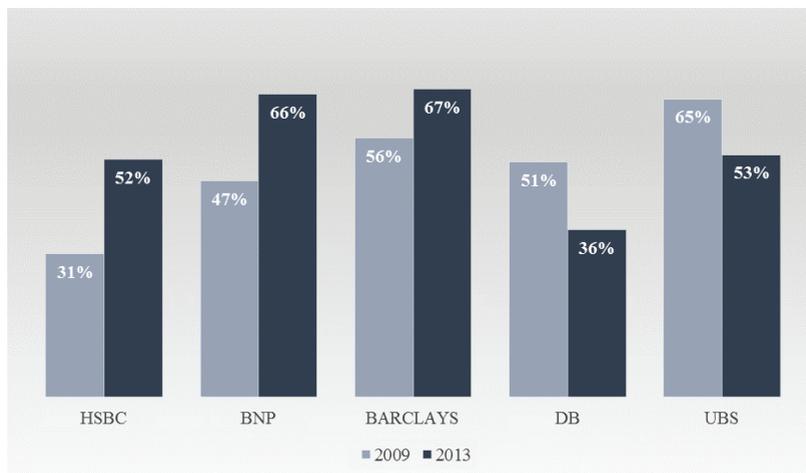
The trends below suggest that the hypothesis from the previous analysis may be correct. In majority of the banks, parallel increases can be seen in the proportion of debt securities held in the banking book and bank reliance on repo transactions as an additional source of short-term borrowing. This highlights the increased asset allocation towards the banking book and the continued increase in bank reliance on repo funding in the years after the crisis.

Figure 15: Debt securities held in the banking book



Source: Annual financial statements of respective banks. The figure shows banking book debt securities as a percentage of total debt securities (all data excludes government securities).

Figure 16: Bank reliance on repo funding (post-crisis)



Source: Annual financial statements of respective banks. The figure shows repo transactions as a percentage of total short-term borrowing.

While a parallel increase in repo transactions is not visible for all banks under review, what remains prominent is the fact that repo transactions still represent a key source of banks' short-term funding. This supports the hypothesis that repo transactions and hence, securitized banking continues to remain a cheap source of short-term funding for banks.

The pre-crisis and post-crisis Basel Accords can be compared to determine whether the post-crisis regulatory response was effective in eliminating the adverse incentives that were present before the crisis. Although the post-crisis response met its objective of strengthening the trading book regime, specifically for securitized exposures, the revisions did not eliminate the *adverse incentives* for asset allocation and bank reliance on repo funding.

Most importantly, while the post-crisis regulatory response equalized the treatment of repo transactions under both dimensions of the balance sheet, it failed to strengthen the capital requirements for securitized banking. On the contrary, the acceptance of a wide range of eligible collateral for credit risk mitigation provided banks with an opportunity to significantly lower the capital charges for securitized banking. The pre-crisis banking book regime was stricter, applying a risk weight of 20% for securitized banking²³² whereas the

²³² Appendix II, part I, (a).2.

post-crisis accords allowed banks to significantly reduce the capital charge below 20%²³³. Therefore, securitized banking remained an inexpensive source of short-term funding for banks.

Conclusion

This chapter examined the incentives inherent for securitized banking in the post-crisis Basel Accords to assess its effectiveness in eliminating the arbitrage opportunities inherent in the pre-crisis Basel Accords. Similar to the previous chapter, the objective was to assess differences between the capital charges for securitized banking between the two dimensions of the balance sheet to identify the presence (or absence) of any capital relief. The focus remained on differing capital requirements for similar exposures, where asset allocation would favour the balance sheet dimension with lowest capital requirements and hence, securitized banking would be undertaken through the same dimension.

The chapter finds that the adverse incentives for asset allocation of securitized instruments persisted, although to a lesser extent, now favouring the banking book. With regards to the incentives for securitized banking, the post-crisis standards equalized capital requirements under both the banking book and trading book, eliminating the previous opportunity for regulatory arbitrage and capital saving. Therefore, while the incentives for securitized banking were aligned between the two dimensions of the balance sheet, the adverse incentives for holding securitized exposures in the banking book prevailed. Asset allocation incentives now favoured the banking book and thus, securitized banking would be undertaken primarily through the same dimension. Post-crisis data trends in the largest European banks also suggest that this hypothesis may be correct. In majority of the banks, similar increases can be seen in the proportion of debt securities held in the banking book and bank reliance on repo transactions as an additional source of short-term borrowing. This highlights the increased asset allocation towards the banking book and the continued bank reliance on repo funding in the years after the crisis.

More importantly, the chapter finds that the post-crisis Basel standards have failed to strengthen the capital requirements for securitized banking, which remains an inexpensive avenue for banks to obtain short-term funding.

²³³ Appendix II, part II, (a).2.

Securitized banking received significantly low risk weights, creating adverse incentives for banks to reduce their overall capital requirements. Therefore, while the post-crisis regulatory response met its objective of strengthening the trading book regime, specifically for securitized exposures, the revisions did not eliminate the adverse incentives for asset allocation and bank reliance on repo funding. Securitized banking remained inexpensive for banks due to the lower capital requirements under both dimensions of the balance sheet, irrespective of the underlying risks in these transactions.

Chapter 5

Implementation of the Basel Accords in Emerging Economies

This chapter examines the implementation of Basel standards in Emerging Economies to determine whether national implementation and trends in bank behavior conforms to the theoretical conclusions of the preceding chapters, which identified the incentives inherent in the Basel Accords for bank involvement in securitized banking. Chapter 3 focused on pre-crisis Basel Accords and concluded that there were significant incentives for banks to engage in securitized banking primarily through the trading book. Analysis of the post-crisis Basel Accords in Chapter 4 illustrates the continuing incentives for asset allocation, which now favored the banking book.

The purpose of this chapter is to highlight that countries implementing the Basel Accords also transpose the adverse incentives inherent in these Accords, encouraging similar bank behavior. This chapter illustrates that emerging economies, both Basel Committee member and non-member states, were similarly affected by Basel implementation. While the coordinated implementation of Basel Accords leads to harmonization of global financial standards, it also increases the likelihood of significant negative spill overs in case of a financial shock.

The chapter contributes to the scant research that exists on the dynamics of bank behavior and securitized banking in emerging economies. In the aftermath of the financial crisis, majority of the research is focused on advanced economies, since they are major participants in global financial markets and as experienced, key transmitters of shocks worldwide. Since the Basel Accords were implemented in almost all countries of the world, the incentives inherent in these Accords were present in all financial markets. The findings of this chapter adds to current literature by investigating the international dimension of securitized banking.

This chapter aims to assess the national implementation of the Basel Accords to answer the third sub-research question: **Were the incentives inherent in the Basel Accords for securitized banking transposed in all countries that implemented them, specifically Emerging Economies?**

The following section focuses on Emerging Economies and the countries that will be examined in this chapter, preceded by an overview of Basel implementation in these countries. The third and fourth section analyses the pre-crisis and post-crisis Basel Accord implementation in the chosen countries to identify the presence (or absence) of adverse incentives for securitized banking. The last section presents descriptive data trends of the countries' national banking sectors that support the theoretical conclusions of the analysis in this chapter.

5.1. Emerging Economies under the spotlight

5.1.1. The Importance of Emerging Economies

Emerging Market Economies (EMEs) refer to developing countries with high-growth potential, accompanied with high risks and significant market volatility.²³⁴ These economies are playing an increasingly important role in the global economy, accounting for almost two-thirds of global GDP (in purchasing power parity terms) and their share of world GDP, private consumption, investment and trade nearly doubled in less than two decades.²³⁵ These countries continue to maintain a dominant presence in the world economy and have a significant impact on global growth.

In the wake of the crisis, it was expected that countries worldwide will decouple from the financial meltdown in the US as it was believed that the driving forces behind economic growth for advanced and emerging economies are different.²³⁶

²³⁴ Financial times at <http://lexicon.ft.com/Term?term=emerging-markets>.

²³⁵ European Central Bank, 'The Slowdown in Emerging Market Economies and Its Implications for the Global Economy' [2016] ECB Economic Bulletin p. 1; M Ayhan Kose and Eswar S Prasad, *Emerging Markets: Resilience and Growth amid Global Turmoil* (Brookings Institution Press 2010) p. 2.

²³⁶ Barry Eichengreen, 'Lessons of the Crisis for Emerging Markets' (2010) 7 *International Economics and Economic Policy* 49; Michael Dooley and Michael Hutchison, 'Transmission of the U.S. Subprime Crisis to Emerging Markets: Evidence on the Decoupling-Recoupling Hypothesis' (2009) 28 *Journal of International Money and Finance* 1331; Roubini and Mihm (2011) ch 5.

However, the adverse impacts of the crisis was felt by countries worldwide, revealing the increased interconnectedness and vulnerabilities amongst global financial markets and institutions. Shocks from advanced economies' financial systems rapidly spread to several EMEs during the crisis, disrupting their markets and curtailing their short-term growth prospects.²³⁷

While globalization, innovation and deregulation led to significant growth and positive economic benefits around the world,²³⁸ these factors created greater linkages across financial institutions and increased their exposure to common sources of risk, magnifying shocks and their impact on the real economy.²³⁹ *“Both increased interconnections and common exposure to risk make the banking sector more vulnerable to economic, liquidity and information shocks.”*²⁴⁰ Moreover, innovation that created new financial instruments increased the complexity of banks' balance sheets, converging banks' risk profiles and thus, creating new channels of interdependency between financial institutions.²⁴¹

Several scholars concur on the increased globalisation and interconnectedness of financial markets.²⁴² A recent empirical research investigates whether the global banking system has become more interdependent and susceptible to shocks by analysing the increase in co-dependence in default risk of commercial banks around the world.²⁴³ The research shows a significant increase in default risk co-dependence in the years prior to the crisis, highlighting the increased interdependence and fragility across financial markets and financial institutions. The study also finds that this increase in co-dependence has been greater for integrated countries with liberalized financial systems but the negative impact from financial openness can be mitigated by the presence of a strong institutional environment.

²³⁷ Kose and Prasad (2010).

²³⁸ Raghuram G Rajan, 'Has Finance Made the World Riskier?' (2006) 12 European Financial Management 499.

²³⁹ Deniz Anginer and Asli Demirguc-Kunt, 'Has the Global Banking System Become More Fragile over Time?' (2014) 13 Journal of Financial Stability 202; Kose and Prasad (2010).

²⁴⁰ Anginer and Demirguc-Kunt (2014) p. 202.

²⁴¹ *ibid.*

²⁴² Emerging Markets Committee of the IOSCO, 'Securitization and Securitized Debt Instruments in Emerging Markets' (2010); Bank for International Settlements, 'EME Banking Systems and Regional Financial Integration' (2014); Eswar S Prasad, 'Financial Sector Regulation and Reforms in Emerging Markets: An Overview' [2010] NBER Working Paper No. 16428; Anginer and Demirguc-Kunt (2014); Kose and Prasad (2010).

²⁴³ Anginer and Demirguc-Kunt (2014).

The global financial crisis raised doubts about the ability of EMEs to shield themselves from shocks in advanced economies. Although EMEs withstood the global recession from the crisis, there is variation in the degree of resilience displayed within groups of EMEs, with Asian emerging markets, especially China and India, being more resilient than European emerging markets.²⁴⁴ This variation is primarily due to differences in policy choices and structural factors, where EMEs with disciplined macroeconomic policies, less dependence on foreign finance, higher levels of foreign exchange reserves and underdeveloped financial markets were less affected by the crisis.²⁴⁵

Owing to the strong potential of sustained long-term growth of EMEs, the shift in focus towards these economies as major drivers for global growth is expected to continue.²⁴⁶ EMEs will remain an important component of the global economy, thus it is essential for these economies to maintain open and liberalized financial markets to participate in global financial markets. However, “...*liberalization and financial openness that are not accompanied by appropriate prudential regulation and supporting institutions to ensure effective monitoring, are likely to result in excessive risk-taking and higher incidence of crises.*”²⁴⁷ Efficient financial systems, supported by financial regulation suitable for the institutional and capacity constraints present in EMEs is not only essential for them to achieve their growth and development potential but also to counteract the build-up of risk-taking and spillover due to financial linkages.²⁴⁸ An appropriate incentive framework, developed and shaped by prudential regulation is crucial for ensuring systemic stability, specifically for large international banks and cross-border financial markets.

The Basel Committee was set up to promote convergence of international banking standards in order to harmonize regulation within its member states (G-10 countries), by proposing guidelines and recommendations of best practice for national authorities.²⁴⁹ These standards are soft law and therefore, not legally binding unless implemented by national authorities in their legislation. The Basel Accords were solely formulated and intended for G-10 countries,

²⁴⁴ Kose and Prasad (2010).

²⁴⁵ *ibid* p.14.

²⁴⁶ *ibid*.

²⁴⁷ Anginer and Demirguc-Kunt (2014) p. 203 *citing* Asli Demirguc-Kunt and Enrica Detragiache, ‘Cross-Country Empirical Studies of Systemic Bank Distress: A Survey’ [2005] IMF Working Papers 05/96, International Monetary Fund.

²⁴⁸ Prasad (2010).

²⁴⁹ For an overview of the Basel Committee, its objectives and member states, see chapter 3, section 3.1.

following several meetings between banking supervisory authorities of its member states, aimed at large international banks operating within member countries. The Basel Accords were not intended for non-member states, which included EMEs and other developing countries, hence these countries were not actively involved in the standard-setting process and were excluded from the formulation of the Basel Accords.

However, the Basel Accords became the benchmark for financial regulation worldwide, signaling regulatory strength and financial stability. Non-member states were encouraged and expected to implement the standards for banks with significant international activities. Consequently, the adoption of Basel Accords became a necessity for inclusion in global financial markets. Soon enough, the Basel Accords were transposed into national laws of Basel Committee member and non-member states, hence applied to banks worldwide. The main focus of the Basel Accords is prescribing minimum capital requirements based on risk-weighted assets (RWA). While national authorities have the option to stipulate higher capital levels for their banking system, they have little discretion on the calculation of RWA. Thus, national implementation of the Basel Accords can be considered as an exogenous legal change for non-member states, which have limited options to deviate from the structure and methodology of these standards.

Although the Basel Accords state their unsuitability as the optimal emerging market banking reform, the standards have been criticized for exerting undue pressure on EMEs in order to participate in global financial markets.²⁵⁰ Thus, Basel implementation within EMEs could create a false sense of security within their financial sector while creating new, less obvious risks for its banks.²⁵¹ An empirical study examined the impact of Basel implementation by comparing the behaviour of banks in emerging and developed countries (G-10) i.e. non-BCBS member states and BCBS member states.²⁵² The results show that EMEs commercial banks prefer excessive risk-taking and under-capitalized banks take risky decisions to boost capital whereas banks within BCBS member states appear to act more consistently with regulators' expectations.²⁵³ Even Basel II, which was supposed to be more risk-sensitive, was not tailored for EMEs and faced criticism for the flexibility and discretion provided to banks for complex

²⁵⁰ Balin (2008).

²⁵¹ *ibid.*

²⁵² Zied Saadaoui, 'Risk-Based Capital Standards and Bank Behaviour in Emerging and Developed Countries' (2011) 12 *Journal of Banking Regulation* 180.

²⁵³ *ibid.* p. 189.

capital requirement calculations which could overwhelm EMEs regulatory systems.²⁵⁴ In the instance that EMEs lack sufficient skills and resources, central bankers may become laidback and allow private banks to manage their risks without proper oversight, incentivizing banks to take upon risks that might increase the possibility of collapse.²⁵⁵

The evolution and interconnectedness of financial markets emerged during the crisis, revealing the importance of EMEs as major contributors to the global economy. To complement these developments in global financial markets, the Basel Committee extended its membership after the crisis and it now comprises of 28 members. The membership expanded to include many EMEs such as South Africa, Brazil and India. These economies are now actively involved in the standard setting process, most recently for the current regulatory framework, Basel III. However, the earlier Basel Accords (Basel I and II) still represent an exogenous legal change for EMEs, thus the focus remains on these countries.

5.1.2. Countries under review

There is currently no consensus on the exact parameters or a precise set of countries that are classified as EMEs. However, institutions such as the International Monetary Fund (IMF) and the World Bank along with big market index makers use detailed methodologies to classify these economies, which are widely accepted as being representative of EMEs. Therefore, the countries under review are those that are classified as EMEs by major institutions and market indices.²⁵⁶ The countries classified as EMEs are the BRICS i.e. Brazil, Russia, India, China, South Africa and Chile, Colombia, Hungary, Indonesia, Malaysia, Mexico, Philippines, Poland, Thailand, Turkey. Some countries could not be examined due to informational limitations (unavailability of historical data and regulations) and language barriers (inability to access required data). These countries are Brazil, Russia, Chile, Colombia, Mexico and Turkey.

Securitisation markets are still at an early stage of development in majority of EMEs, although some markets exhibit a significant level of development in

²⁵⁴ Barth, Caprio and Levine (2008).

²⁵⁵ *ibid.*

²⁵⁶ These include IMF, World Bank, FTSE, MSCI, S&P, EM Bond index, Dow Jones and Russell.

terms of size and complexity of securitized instruments.²⁵⁷ Majority of EMEs, even those with relatively large markets, use plain vanilla securitized instruments and the largest securitisation markets operate in Brazil, Chile, India, Malaysia and South Africa.²⁵⁸

Two criteria have influenced the choice of countries for this chapter. The first criterion concerns the *availability of securitized collateral* in the national banking system. Since securitized instruments are the fundamental ingredient for securitized banking, an active securitisation market should be the premise for country selection. While Hungary has no securitisation market at all, emerging economies like Poland, China and Philippines have developed banking sectors but the securitisation market is either insignificant or was insufficiently developed before the crisis.²⁵⁹ For instance, securitisation activity in most of these countries started in 2005 and hence, was at an early development stage when the crisis hit. As the aim is to assess bank behavior before and after the crisis, a relatively young securitisation market preceding the crisis would be insufficient to support bank involvement in securitized banking.

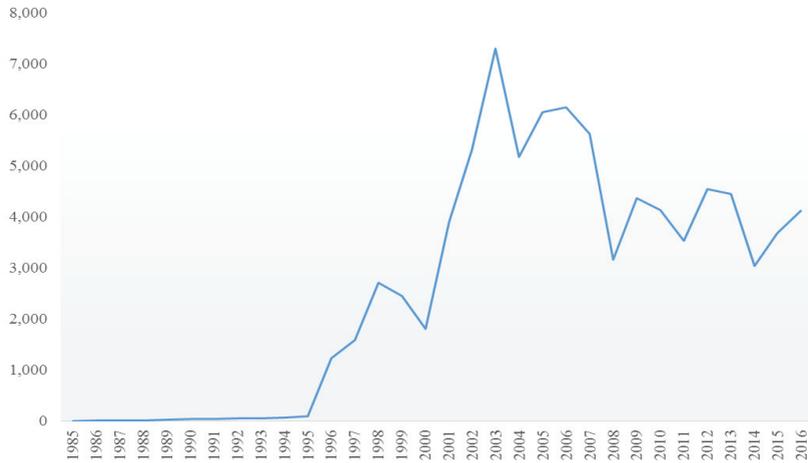
A first step is to look at the securitisation market in advanced economies before and after the crisis. Observing the trends for new issuance of securitized instruments in US and EU, it is visible that while the magnitude of securitisation differs between the economies, similar data trends prevail. In the years before the crisis, securitisation issuance grew steeply to reach peak levels, followed by a decline in post-crisis issuance. It must be noted that the graphs show the entire securitisation market and includes issuance of *all* types of asset-backed securities (ABS). The recent financial crisis was primarily centered on mortgage-backed securities, thus the steep declines during 2007-2008 indicate the negative impact on the securitisation market from these securities. However, issuance of other types of securitized instruments continues.

²⁵⁷ Emerging Markets Committee of the IOSCO (2010).

²⁵⁸ *ibid.*

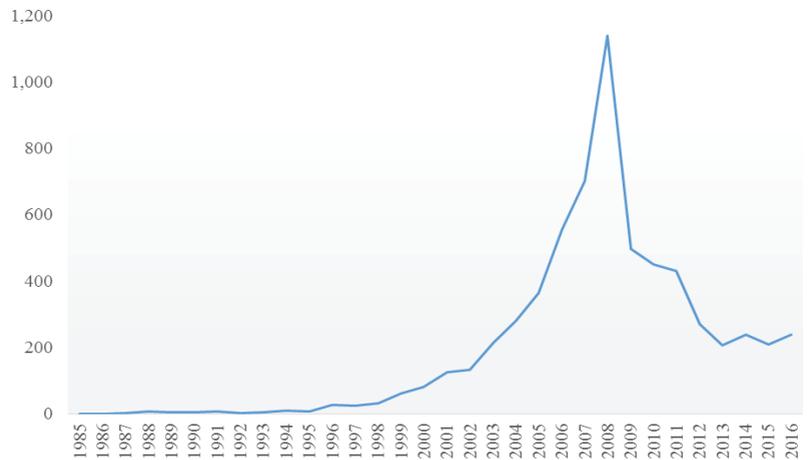
²⁵⁹ See *ibid supra* note 20, p. 15. for Hungary, OECD Publishing, *OECD Economic Surveys - Poland* (Organisation for Economic Co-operation and Development 2008) p. 124 for Poland, Takeshi Jingu, 'Significance of Restart of Asset Securitization in China' (2013) 176 Nomura Research Institute Ltd. p. 1-2 for China, <https://asianbondsonline.adb.org/philippines/structure/rules/specialist.php> and <http://www.bsp.gov.ph/financial/financial/fixcd.asp> for Philippines.

Figure 17: United States – Total Asset-backed Securities Issuance (USD Billion)



Source: Securities Industry and Financial Markets Association (SIFMA)

Figure 18: European Union – Total Asset-backed Securities Issuance (USD Billion)



Source: Securities Industry and Financial Markets Association (SIFMA) in combination with the Association for Financial Markets in Europe (AFME). European data has already been converted to dollars by the source.

The second criterion concerns the *eligibility of securitized instruments as collateral* for repo transactions. Restrictions on the use of securitized instruments as collateral is effectively a restriction on securitized banking. Hence, EMEs like India, Indonesia and Thailand which primarily allow government securities and do not permit the use of privately issued securities as collateral in transactions are excluded.²⁶⁰

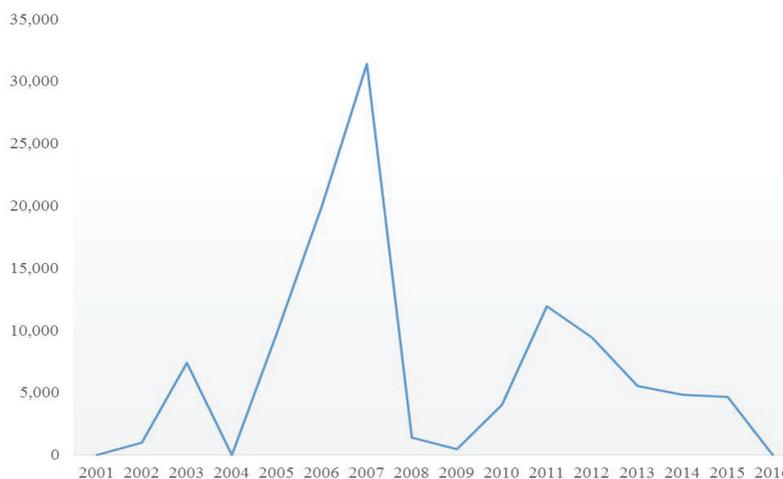
Following these criteria, EMEs that are suitable candidates are South Africa and Malaysia. Both countries have an active securitisation market since the early 2000s and also allow the use of private securities as collateral in repo transactions. While the banking system and securitisation market for these countries differ in scale, Malaysia being smaller, they both provide banks with the necessary elements for securitized banking.

The active securitisation market in South Africa is demonstrated by Figure 19, which presents total ABS issuance, which started in 2002 and followed a steep development in the years before the crisis.²⁶¹ Post-crisis, the level of securitisation issuance has declined but the securitisation market still remains active, with total new issuance of 35 million (Rand) in 2016. Thus, even after the crisis, the securitisation market in South Africa continues to provide banks with securitized instruments that are available for use in securitized banking.

²⁶⁰ See Reserve Bank of India, *Guidelines for Uniform Accounting for Repo/Reverse Repo Transactions* (IDMC3810/110810/2002-03 2003) pt. 4 for India, <https://www.set.or.th/tsd/en/service/repo.html> for Thailand and <https://asianbondsonline.adb.org/indonesia/structure/instruments.php> for Indonesia.

²⁶¹ The reason behind the decline in issuance in 2004 could not be identified from the available information.

Figure 19: South Africa – Total Asset-backed Securities Issuance (Rand Million)

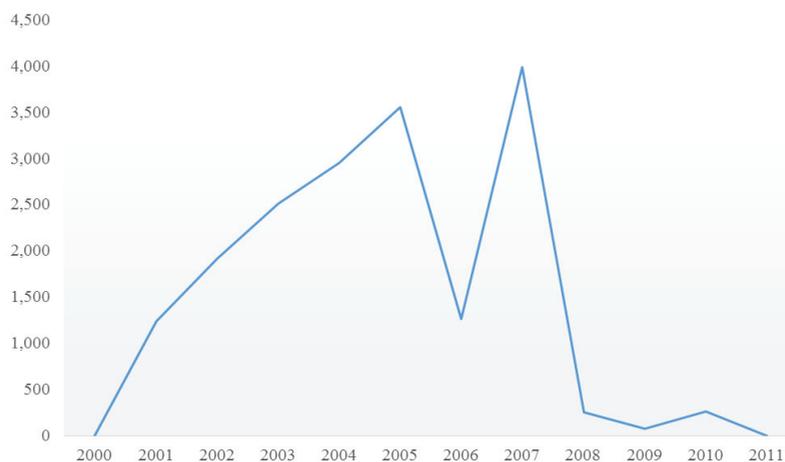


Source: The Banking Association of South Africa

The securitisation market in Malaysia (Figure 20) follows a similar trend. The market has been active since early 2000s with a steady increase in the years preceding the crisis but with a sharp fall during 2006, which the market immediately recovered from in the following year. Total securitisation issuance was severely affected by the financial crisis, with the market unable to recover from the decline in activity and new securitisation issuance remains halted since 2011.²⁶²

²⁶² The reasons behind the sharp decline in 2006 and the current standstill in securitisation issuance could not be identified from the available information.

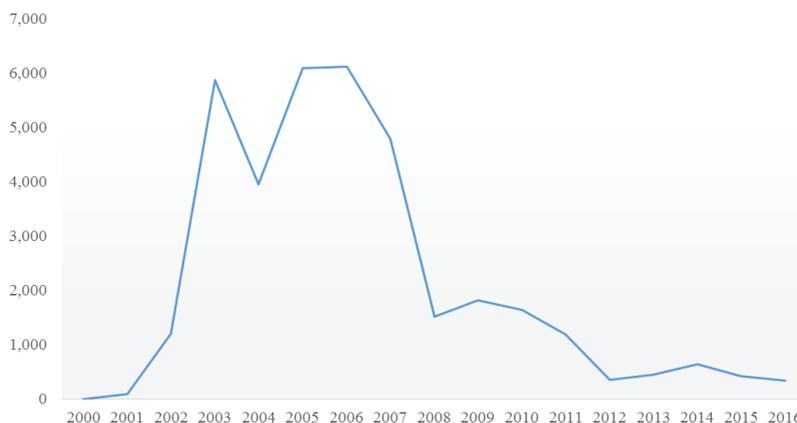
Figure 20: Malaysia – Total Asset-backed Securities Issuance (Ringgit Million)



Source: Bond Info Hub Malaysia

Although there has been no improvement in the issuance of ABS since 2011, the securitisation market is still active when considering sale/purchase transactions of outstanding securitized instruments. While these transactions of outstanding securitized instruments have followed a trend similar to ABS issuance, the demand for these instruments still exists, even if to a lesser extent than before.

Figure 21: Malaysia – Asset-backed Securities Sale/Purchase (Ringgit Million)



Source: Bond Info Hub Malaysia

The trends above concerning the availability and eligibility of securitized instruments for use in repo transactions make South Africa and Malaysia appropriate candidates for additional research. The next section outlines the implementation of the Basel Accords in these EMEs from the initial Basel I Accord to the current regulatory framework, Basel III.

5.2. Implementation of the Basel Accords

5.2.1. Implementation in South Africa

The banking sector in South Africa is regulated and supervised by the South African Reserve Bank, the Central Bank, in terms of ‘The Banks Act’ and applicable regulations are issued under the ‘Regulations Relating to Banks’.²⁶³ The Reserve Bank periodically reviews the legal framework for the regulation and supervision of banks to identify possible amendments, in order to remain in line with global banking standards. All institutions conducting the business of a bank, whether foreign or local, are subject to similar regulations.

²⁶³ “The Banks Act, 1990” (No. 94 of 1990) including the “Banks Amendment Act, 2003” (No. 19 of 2003) and “Regulations Relating to Banks”, Government Notice No. R. 628 (1996).

In the years preceding the crisis, South Africa had fully implemented both Basel I and the Market Risk Amendment for its banking sector. Although all financial institutions were subject to similar regulations, the applicable capital requirements differed if a bank had the business of trading in financial instruments.²⁶⁴ This differential treatment of capital requirements started with national implementation of the Market Risk Amendment through the ‘Regulations relating to Capital-Adequacy Requirements (CAR) for banks’ trading activities in financial instruments’, effective from October 1998 for all banks involved in trading activities.²⁶⁵ For banks not involved in significant trading activities, the Basel I Accord was applicable through the ‘Regulations relating to banks’, effective since 1996.²⁶⁶

To stimulate securitisation activity, the South African Reserve Bank introduced the ‘Securitisation Schemes’ framework in December 2001, which adhered to the securitisation standards suggested by the Basel Committee Securitisation Group. Prior to this, banks were restricted from being involved in securitisation activities, mostly due to the complexity regarding their role as originators in these transactions. However, this framework provided banks with guidelines that allowed them to not only participate in the securitisation market but also to fulfil multiple roles within these transactions.

During the global financial crisis in 2008, South Africa implemented the Basel II Accord, making it one of the first countries in the world to fully implement the Accord while most advanced economies were still in the implementation phase. The Basel II Accord was implemented through the issuance of a new set of ‘Regulations Relating to Banks’.²⁶⁷ These regulations were further amended in 2011 to incorporate the Basel 2.5 Accord in the regulatory framework, effective January 2012.²⁶⁸ The timely implementation of the Basel Accords not only highlights the importance of global financial inclusion for South Africa but also reflects the presence of a strong institutional framework underlying its banking system. Implementation of the new Basel Accord, Basel III, has been

²⁶⁴ The Banks Act (2003), section 70(2)(2A)(2B).

²⁶⁵ South African Reserve Bank, *Regulations relating to capital-adequacy requirements (CAR) for banks trading activities in financial instruments*, Government Notice No. R. 1058 (1998).

²⁶⁶ South African Reserve Bank, *Regulations relating to banks*, Government Notice No. R. 628 (1996).

²⁶⁷ South African Reserve Bank, *Regulation Relating to Banks*, Government Notice No. R. 3 (2008).

²⁶⁸ South African Reserve Bank, *Regulation Relating to Banks*, Government Notice No. R. 1033 (2011).

underway since January 2013 and follows the globally agreed implementation timeline of a gradual phase-in approach from 2013 till 2019.

A timeline of the Basel Accords implementation in South Africa is presented in Appendix III.

5.2.2. Implementation in Malaysia

The banking sector in Malaysia is regulated and supervised by Bank Negara Malaysia, the Central Bank, in terms of ‘The Central Bank of Malaysia Act’.²⁶⁹ The prudential regulation concerning the banking system is implemented through ‘The Risk-Weighted Capital Adequacy Framework’, initially issued for the implementation of the Basel I framework and subsequently amended to implement the Basel II Accords and the current Basel III regime. Besides the regulatory framework, Bank Negara Malaysia issues guidelines and circulars, as appropriate, to keep the banking system in line with global banking standards. All banking institutions are subject to similar regulations.

Malaysia remains excluded from the membership of the Basel Committee, even after the Committee’s expansion in 2009 and 2014. This reinforces the exogenous influence of the Basel Accords on EMEs, which are not actively involved in the standard setting procedure but face expectations similar to member states regarding national implementation.

Malaysia implemented the pre-crisis Basel Accords through ‘The Risk-Weighted Capital Adequacy Framework’, which included the Basel I standards and incorporated the Market Risk Amendment, the latter effective from April 2005.²⁷⁰ The Market Risk Amendment framework, applicable to trading book exposures, gave banks a choice between the standardised and internal model approach for capital calculations.²⁷¹ However, the internal model approach was not available to banks in Malaysia, regardless of the sophistication of their internal models and financial activities.

²⁶⁹“The Central Bank of Malaysia Act, 1958”, later repealed and replaced by “The Central Bank of Malaysia Act, 2009”.

²⁷⁰Bank Negara Malaysia, Prudential Financial Policy Department, *Risk-Weighted Capital Adequacy Framework (Basel I – Risk-Weighted Assets Computation)*, BNM/RH/GL 001 – 21.

²⁷¹The internal model approach allowed banks to use their own risk models to assess their capital requirements, requiring explicit approval by their national supervisory authorities.

During the crisis, Malaysia was still under the process of implementing the Basel II framework, with the standardised approach for capital calculations effective since 2008 and the internal model approach allowed only from 2010. With regards to the post-crisis regulatory response i.e. the Basel 2.5 Accord, Malaysia did not implement these standards, citing in a 2012 report that:

*‘The Basel 2.5 enhancement package, which relates mainly to strengthened capital requirements for trading book and complex securitisation exposures, has yet to be implemented in Malaysia, and is not expected to be a priority for Malaysia in the immediate term. While these markets and activities have developed more noticeably in Malaysia over recent years, such activities remain less complex with risks remaining at manageable levels (e.g. there are no re-securitisation structures in Malaysia)’.*²⁷²

Hence, following the crisis, amendments were made to the existing Basel II framework through ‘The Capital Adequacy Framework (Basel II – Risk-weighted Assets)’, effective from 2008.²⁷³ The Basel 2.5 Accord remains unincorporated and is not considered to be a priority for the Malaysian banking system. However, implementation of the new Basel III Accord has been underway since 2013, in accordance with the globally agreed timeline.

A timeline of the implementation of the Basel Accords in Malaysia is presented in Appendix IV.

5.2.3. Discretion for asset allocation between the banking book and trading book

Both countries implemented the Basel standards for asset allocation between the two dimensions of the balance sheet, following the guidelines for trading book definition, intent-based criteria for asset allocation and monitoring requirements.

²⁷²Financial Stability Institute, ‘FSI Survey: Basel II, 2.5 and III Implementation’ (2012) p. 21.

²⁷³Bank Negara Malaysia, Prudential Financial Policy Department, *Capital Adequacy Framework (Basel II – Risk-Weighted Assets)*, BNM/RH/PD 032 – 5.

Pre-crisis Basel implementation in South Africa defined the trading book to include banks' proprietary positions that are "...held for resale or that are taken on by the bank with the intention of benefitting, in the short term, from actual or expected differences between their buying and selling prices, or from other price or interest-rate variations,..."²⁷⁴ These also included repo transactions in the trading book and all exposures were required to be marked to market. With regards to monitoring standards, the regulations required that banks have a board approved written policy, which "...specifies the criteria for determining which on balance sheet items and off balance sheet items are classified as part of the bank's trading activities and which of the said items are classified as part of the bank's banking activities".²⁷⁵ In contrast, Malaysia did not specify any guidelines or requirements for the trading book, neither the criteria for trading book asset allocation nor for monitoring these exposures.

Absent any asset allocation guidelines in Malaysia, those provided in South Africa followed the pre-crisis Basel Accords by relying on the intent-based criteria for asset allocation and monitoring requirements based on banks' internal policies. Aside from the requirement of a board approved asset allocation policy, no specific monitoring guidelines were provided.

Post-crisis implementation in both South Africa and Malaysia was similar to the post-crisis Basel Accords. The regulations focused primarily on the guidelines for policies and procedures that should be in place for management of the trading book.

Guidelines in South Africa required that banks have written board approved policy and procedures, specifying the criteria for determining asset allocation, the bank's appetite for trading and should incorporate the bank's risk management capabilities which ensure that "...any transfer of instruments, items or assets between the bank's trading book and banking book is duly documented and subject to audit verification" and "shall be reviewed by the bank on a regular basis but not less frequently than once a year".²⁷⁶

On the other hand, given the absence of any pre-crisis guidance, post-crisis Basel implementation in Malaysia followed the Basel standards in its entirety. The regulations specified the trading book definition with asset allocation following the intent-based criteria.²⁷⁷ A trading book policy statement was

²⁷⁴ CAR for banks trading activities in financial instruments (21 August 1998) p. 6-7.

²⁷⁵ Regulations Relating to Banks (8 November 2000), Regulation 26(7).

²⁷⁶ Regulations Relating to banks (15 December 2011), Regulation 28(6)(j).

²⁷⁷ Capital adequacy framework (Basel II – Risk-weighted Assets), D.1.2, 5.24 – 5.27.

required, with clearly defined policies and procedures for determining asset allocation in the trading book, including the extent to which these exposures can be accurately valued and marked-to-market daily, any legal restrictions that can hamper immediate liquidation, any limitations on active risk management and the criteria for transferring risk or exposures between the banking and the trading book.²⁷⁸ These guidelines did not aim to provide an objective criteria, stating that these “...*should not be treated as an exhaustive and rigid set of tests that a product or group of related products must pass for eligibility in the trading book. Rather, the list should serve as minimum or most fundamental areas for considerations for overall management of a banking institution’s trading book.*”²⁷⁹ Moreover, as in the Basel Accords, the focus remained on self-surveillance with the responsibility for monitoring asset allocation and the presence of clear audit trails assigned to banks’ compliance officers, risk manager and/or internal auditors.²⁸⁰

Although the post-crisis asset allocation requirements in both countries, similar to post-crisis Basel Accords, were more detailed than those prior to the crisis, they remained unchanged with regard to monitoring banks’ asset allocation. It continued to focus on self-surveillance and relied on banks’ internal asset allocation and monitoring procedures. Moreover, the post-crisis standards lacked an objective criterion to determine the eligibility of assets for trading book allocation. Consequently, absent a clear and objective criterion for asset allocation and consistent monitoring, the implementation of Basel Accords in both, South Africa and Malaysia, gave banks significant discretion for asset allocation between the two dimensions of the balance sheet.

5.3. Assessment Methodology

The primary focus in the forthcoming sections is to identify the similarities and differences between the Basel Accords and their national implementation in South Africa and Malaysia. The aim is to identify whether key components in the Basel Accords that incentivize securitized banking were also similarly implemented, suggesting that incentives inherent in the Basel Accords were also transposed into national banking sectors.

²⁷⁸ *ibid* D.1.2, 5.21 – 5.22.

²⁷⁹ *ibid* D.1.2, 5.23.

²⁸⁰ *ibid* D.1.2, 5.33 – 5.34.

This chapter follows the structure and methodology of the previous chapters (Chapter 3 and 4) since the purpose of the analysis remains the same. The aim is to assess any differences between the capital charges for securitized banking through the two balance sheet dimensions, banking book and trading book, to identify the presence (or absence) of any capital relief. The focus remains on banks' rationale for minimizing capital requirements for a given transaction by minimizing the risk-weighted assets (RWA).

The methodology is to compare the capital requirements for securitized banking under different balance sheet allocations, under the pre-crisis (before 2007) and post-crisis Basel Accords (2007-2011) in both countries. Similar to the analysis in the previous chapters, one specific scenario under the pre-crisis and post-crisis regulatory phases will be examined. The risk weights applicable to an incremental securitisation position under the two balance sheet dimensions will be assessed, assuming a high-grade ABS (AAA to AA- or A-1/P-1) and focusing on the first leg of the repo transaction.

The forthcoming analysis of the Basel Accords does not cover the standards in their entirety but focuses on the simpler standardised methodology for capital calculations and the key components that were previously concluded to incentivize bank involvement in securitized banking. The analysis is based on legal documents pertaining to Basel Accord implementation in both South Africa and Malaysia to examine the set of standards adopted from the Basel Accords and those that are unique to the countries' national legislation. However, the legal analysis follows the same procedure as in the preceding chapters. Thus, explanations pertaining to standards similar to the Basel Accords will be kept concise to avoid repetition but references to the corresponding sections in the previous chapters will be provided for clarification.

5.4. Pre-crisis Implementation

The pre-crisis Basel Accords include the Basel I Accord for credit risk and the Market Risk Amendment for market risk. South Africa and Malaysia both implemented these standards in their national legislation. These regulations created a separation between the banks' banking and trading book,²⁸¹ the former

²⁸¹ Banking book exposures are long-term investments typically held to maturity and hence, more susceptible to borrower default. On the other hand, trading book consists of banks' short-term trading strategies, where the main risk stems from liquidating positions in the market.

following the Basel I framework while the latter calculated through the Market Risk Amendment.

The simple stylized balance sheets below, with the risk weights that would be assigned to an incremental securitisation exposure in South Africa and Malaysia highlight the incentives present for asset allocation and securitized banking between the two balance sheet dimensions.

Figure 22: South Africa (Pre-crisis)

Banking Book Basel I (Credit Risk)		Trading Book Market Risk Amendment (Market Risk)	
Asset Allocation			
Asset Backed Security (AAA to AA-/A-1/P-1)	20%	➔	Asset Backed Security (AAA to AA-/A-1/P-1) Simplified Approach 10 - 30% Building-block Approach 0.25 - 14.10%
Securitized Banking			
Repo	20%	➔	Repo < 20%

Figure 23: Malaysia (Pre-crisis)

Banking Book Basel I (Credit Risk)		Trading Book Market Risk Amendment (Market Risk)	
Asset Allocation			
Asset Backed Security (AAA to AA-/A-1/P-1)	20%	➔	Asset Backed Security (AAA to AA-/A-1/P-1) 0.25 - 9.60%
Securitized Banking			
Repo	20%	➔	Repo 0.25 - 9.60%

5.4.1. Banking book

In both countries, standards applicable to the banking book followed those prescribed under the Basel I Accord in their entirety.

In both South Africa and Malaysia, similar risk weights were applicable to a long position in a high-grade ABS in the banking book – 20%.²⁸²

Moreover, both countries recognized the risk mitigating effect of collateral and applicable risk weight corresponded to the underlying asset (not the counterparty). Hence, a securitized banking transaction, where the underlying asset was the ABS, received the risk weight of the securitized instrument – 20%.²⁸³

5.4.2. Trading book

The standards applicable to the trading book were in accordance with the Market Risk Amendment, with small deviations in both countries.

In South Africa, the trading book capital requirements provided banks with the discretion to operate under either the simplified or building-block approach. The simplified approach followed the Basel I methodology and assigned fixed risk weights to marketable securities, dependent on residual maturity. The applicable risk weights under this approach ranged from 10 to 30%. Thus, a typical securitized instrument (long-term maturity) received a risk weight of 30%.²⁸⁴ On the other hand, as explained below, the building-block approach allowed banks to significantly reduce the applicable risk weights for the same asset, encouraging them to adopt this approach. Therefore, banks had little incentive to operate under the simplified approach. This preference can be confirmed by examining the proportion of banks that were operating under the simplified approach, where only 17 percent (2 out of 12) of trading banks were operating under this method in 2006.²⁸⁵ Therefore, the following analysis focuses on the building-block approach for banks in South Africa.

²⁸² See Appendix V and VI, part I, (a).1.

²⁸³ Appendix V and VI, part I, (a).2.

²⁸⁴ Appendix V, part I, (b).1.

²⁸⁵ South African Reserve Bank, 'Annual Report' [2006] Bank Supervision Department p. 28.

The building-block approach in South Africa and the trading book standards in Malaysia prescribed risk weights for securitized instruments under the interest rate risk requirements, as these securities are sensitive to interest rate movements. The underlying methodology for interest rate risk calculation was similar in both countries. Total capital charge for interest rate risk consisted of specific risk (individual security movements) and general risk (market interest rate movements). These capital charges were sensitive to the residual maturity and coupon payments of debt securities, therefore the possible scenarios can be presented by a range of risk weights.²⁸⁶

Both countries applied risk weights similar to those prescribed in the Basel Accords for specific risk calculations, which ranged from 0.25 to 1.60%. However, while South Africa followed the Basel Accords entirely in the application of general risk, ranging from 0 to 12.50%, the range of risk weights for general risk in Malaysia were lower, ranging from 0 to 8.00%. Therefore, a high-grade ABS (with varying coupon payments and maturity) received a *minimum* risk weight of 0.25% in both countries, with a *maximum* of 9.60% in Malaysia and 14.10% in South Africa.²⁸⁷

With regards to repo transactions in the trading book, South Africa assigned different standards for repo transactions, which incorporated the risk mitigating effect of collateral.²⁸⁸ Total RWA were calculated by multiplying the exposure with the counterparty risk weight, where only the uncollateralized portion of the repo transaction was subject to a risk weight. Therefore, the applicable risk weight after risk mitigation would be lower than the counterparty risk weight of 20% (repo transactions between banks) and the total risk weight applicable to a securitized banking transaction would be less than 20%.²⁸⁹

On the other hand, Malaysia followed the Basel Accords and treated these transactions similar to other security positions. Thus, the applicable risk weight corresponded to that for the underlying ABS – 0.25 to 9.60%.²⁹⁰

²⁸⁶ For a detailed explanation of the calculation of interest rate risk under the pre-crisis Basel Accords, *see* chapter 3, section 3.4.2.

²⁸⁷ Appendix V and VI, part I, (b).1.

²⁸⁸ This is a simpler version of the credit risk mitigation framework that was later introduced under the Basel II Accord.

²⁸⁹ Appendix V, part I, (b).2.

²⁹⁰ Appendix VI, part I, (b).2.

5.4.3. Discussion

In both South Africa and Malaysia, the incentive for asset allocation for securitized instruments is readily visible and favors the trading book. A long position in a high-grade ABS in the banking book received the same risk weight in both countries – 20%. However, banks were able to reduce the capital charge by allocating the securitized instrument to the trading book. Trading book allocation received a *maximum* risk weight of 14.10% in South Africa and 9.60% in Malaysia, which corresponds to a reduction in risk weight of 5.9 percentage points (pp) and 10.4pp, respectively. Thus, banks could achieve a *minimum* capital saving of approximately 30 percent in South Africa (from 20 to 14.10%) and 48 percent in Malaysia (from 20 to 9.60%).

On the other hand, higher capital savings could be achieved in both countries if security specific characteristics allowed reduction in risk weight to the *minimum* of 0.25% in the trading book. In this instance, banks could achieve a reduction in risk weight of 19.75 pp with a corresponding capital saving of approx. 99%. Incorporating the entire range of possible risk weights, initial allocation to the trading book allowed banks to achieve a *minimum* capital saving of 30% in South Africa and 48% in Malaysia and a *maximum* capital saving of approx. 99% in both countries.

Similar incentives were also present for securitized banking in both countries. The standards equalized the risk weights for long positions in securitized instrument and funding it through repo, as both received similar risk weights. However, the main arbitrage opportunity was whether banks would undertake securitized banking using ABS in the banking book or the trading book. In Malaysia, repo using a securitized instrument in the banking book was subject to the risk weight of 20% whereas the applicable risk weights for similar transaction through the trading book was lower, with a range of 0.25 – 9.60%. Therefore, banks could achieve capital savings similar to that for long positions in the security i.e. a *minimum* reduction in the risk weight of 10.4pp with a capital saving of 48 percent and a *maximum* risk weight reduction of 19.75pp with a capital relief of approx. 99%. On the other hand, the applicable risk weight for securitized banking in South Africa was dependent only on the uncollateralized portion of the transaction, hence the risk weight would not only be lower than 20% but banks would likely be able to achieve greater capital savings.

The range of possible risk weights and corresponding capital savings sheds light on the *adverse incentives* inherent in the pre-crisis regulations in both countries, akin to those inherent in the pre-crisis Basel Accords. The misalignment of capital requirements for similar assets between the banking and trading book created significant incentives for asset allocation towards the latter. Thus, majority of banks' holdings of securitized exposures would be in the trading book and their subsequent use in securitized banking would be undertaken primarily through the same dimension. This conforms to the theoretical conclusions of the analysis of the pre-crisis Basel Accords in Chapter 3.

5.5. Post-crisis Implementation

Post-crisis regulatory response included the amendment of the Basel II Accord and introduction of Basel 2.5, which essentially made changes to the Market Risk Amendment. The aim was to eliminate the adverse incentives for asset allocation and differentiate the trading book treatment of securitized exposures from other financial instruments. While both South Africa and Malaysia implemented Basel II, only South Africa implemented the Basel 2.5 Accord whereas Malaysia made amendments to the existing Basel II framework.

The stylized balance sheets with the Basel II standards for credit risk in the banking book and the revised trading book regime for market risk, Basel 2.5 (South Africa) and amended Basel II (Malaysia), illustrate the continuing incentives for asset allocation. While the post-crisis regulatory response aimed to equalize the treatment of similar exposures between the two dimensions of the balance sheet, the adverse incentives for asset allocation persisted, although to a lesser extent than before.

Figure 24: South Africa (Post-crisis)

Banking Book Basel II (Credit Risk)		Trading Book Basel 2.5 (Market Risk)	
Asset Allocation			
Asset Backed Security (AAA to AA-/A-1/P-1)	20%	←	Asset Backed Security (AAA to AA-/A-1/P-1) > 20%
Securitized Banking			
Repo			Repo
Simple Approach	20%		
Comprehensive Approach	< 20%	↔	Comprehensive Approach < 20%

Figure 25: Malaysia (Post-crisis)

Banking Book Basel II (Credit Risk)		Trading Book Basel II (Market Risk)	
Asset Allocation			
Asset Backed Security (AAA to AA-/A-1/P-1)	20%	→	Asset Backed Security (AAA to AA-/A-1/P-1) 0.25 - 19.40%
Securitized Banking			
Repo			Repo
Simple Approach	20%		
Comprehensive Approach	< 20%	↔	Comprehensive Approach < 20%

5.5.1. Banking Book

Both countries followed the banking book standards prescribed under the Basel II Accords entirely.

Similar risk weights were applicable to a long position in an ABS in the banking book, which were dependent on external credit ratings and where high-grade instruments received lower risk weights. In both South Africa and Malaysia, the corresponding risk weight for a high-grade ABS was 20%.²⁹¹

²⁹¹ See Appendix V and VI, part II, (a).1.

Both countries also followed the same standards for repo transactions. These transactions fell under the credit risk mitigation framework to calculate a counterparty credit risk charge, which recognized the risk mitigating effect of collateral (including privately issued debt securities). The risk mitigation framework provided two approaches. The simple approach followed the Basel I strategy, substituting the risk weight of the counterparty with that of the underlying collateral. Under this method, securitized banking transactions in the banking book would receive a risk weight of 20%.²⁹²

On the other hand, the comprehensive approach allowed a fuller offset of exposure against the collateral, after accounting for collateral quality by using haircuts.²⁹³ Under the risk mitigation framework, after the exposure was adjusted to account for collateral quality, RWA were calculated as:

$$RWA_{risk\ mitigation} = E^*_{adjusted\ exposure} \times RW_{counterparty}$$

Where, RWA = risk-weighted assets, E* = adjusted exposure and RW = risk weight. These abbreviations will be used henceforth.

The applicable risk weight for the counterparty in an interbank repo transaction was 20% (repo between banks). With the exposure reduced to take into account collateral quality, the total counterparty credit risk charge would be less than 20%.²⁹⁴ Due to the range of possible scenarios, it suffices to say that under the risk mitigation framework, the adjusted exposure would be lower than the original, implying that the total credit risk charge for securitized banking would be less than 20%.

5.5.2. Trading book

Both countries amended the trading book treatment of securitized exposures and differentiated the treatment of these securities from all other financial instruments. However, the applicable standards differed in each country.

South Africa followed the Basel 2.5 standards whereby securitized instruments in the trading book were subject to both a credit risk and a market risk capital charge. Banking book capital charges under the standardised approach were now applicable along with a specific risk charge for net positions in securitized

²⁹² Appendix V and VI, part II, (a).2.1.

²⁹³ For detailed calculations, see Appendix V and VI, part II, (a).2.

²⁹⁴ For a detailed explanation of the process of risk mitigation under the post-crisis Basel Accords, see chapter 4, section 4.2.1.

instruments. Thus, the incremental risk weight for a high-grade ABS was the credit risk charge of 20% and an additional specific risk charge to the net position in the security, implying that *total* risk weight would be greater than 20%.²⁹⁵

On the other hand, Malaysia amended the Basel II framework to strengthen the risk weights assigned to securitized exposures. The total interest rate risk charge for securitized instruments was increased, with higher risk weights for both specific risk and general risk. The specific risk charge ranged from 0.25 to 3.00% while the general risk charge ranged from 0 to 16.40%. Thus, a high-grade ABS (with varying coupon payments and maturity) received a *minimum* risk weight of 0.25% and a *maximum* of 19.40%.²⁹⁶

Both South Africa and Malaysia followed the same trading book treatment for repo transactions. Capital requirements for trading book repo were similar to those applicable to repo in the banking book and were hence subject to the same counterparty credit risk charge. However, only the comprehensive approach to credit risk mitigation was allowed for trading book exposures. Thus, in both countries, the applicable risk weight for securitized banking in the trading book was that applicable to banking book repo under the comprehensive approach – less than 20%.²⁹⁷

5.5.3. Discussion

In both South Africa and Malaysia, the continuing incentives for asset allocation of securitized instruments is visible, as risk weights differed between the two dimensions of the balance sheet. In South Africa, similar treatment was now applicable to individual securitisation exposures in the banking and trading book. However, the new trading book regime required an additional specific risk charge, implying that the total capital charge would be greater than 20%. In this instance, banks could achieve *maximum* capital saving by allocating securitized instruments to the banking book for a *minimum* risk weight of 20%. Therefore, in South Africa, the incentive for asset allocation for securitized instruments persisted, although to a lesser extent, now favoring the banking book.

²⁹⁵ Appendix V, part II, (b).1.

²⁹⁶ Appendix VI, part II, (b).1.

²⁹⁷ Appendix V and VI, part II, (b).2.

On the other hand, banks in Malaysia were still able to reduce the capital charge by allocating securitized instruments to the trading book. A long position in a securitized instrument in the trading book received a *minimum* risk weight of 0.25% and a *maximum* of 19.40%, corresponding to a reduction in risk weight of 19.75pp and 0.60pp, respectively. Incorporating the entire range of possible risk weights, initial allocation to the trading book allowed banks to achieve a *minimum* capital saving of 3% (20 to 19.40%) and a *maximum* of 99% (20 to 0.25%).

With regard to the incentive for securitized banking, both countries implemented the Basel II standards entirely for repo transactions. These transactions were required to be treated similarly, irrespective of the balance sheet dimension and were subject to the credit risk mitigation framework. This framework recognized the risk mitigating effect of collateral by reducing the total credit exposure and hence, capital requirements. Although the framework provided two options in the banking book, banks would likely opt for the comprehensive approach since it provided a fuller offset against collateral and did not require any supervisory approval. Therefore, the standards equalized the risk weights for securitized banking as repo using ABS in the banking book or the trading book received the same risk weights.

However, in both countries, banks were provided with a new arbitrage opportunity between holding a long position in the securitized instrument and securitized banking. In South Africa, under both dimensions of the balance sheet, a long position received higher risk weights (20% in banking book and >20% in trading book) while funding through repo received lower risk weights (less than 20% in both banking and trading book). While the banking book regime in Malaysia provided the same incentives, those in the trading book are more difficult to estimate. On the whole, banks were now more likely to rely on repo funding rather than holding long positions in securitized instruments due to lower applicable risk weights and hence, higher capital savings.

The analysis sheds light on the *adverse incentives* inherent in the post-crisis regulations in both countries, similar to those inherent in the post-crisis Basel Accords. While the incentives for repo transactions were aligned between the two dimensions of the balance sheet, the *adverse incentives* for asset allocation still existed, although to a lesser extent than before, dominating banks' decisions for securitized banking. Despite the fact that both countries strengthened the risk weights and differentiated the treatment of securitized instruments from all other financial instruments, South Africa applied a more *stringent* trading book

regime whereas Malaysia continued with a more *lenient* trading book regime. Therefore, banks in South Africa would undertake securitized banking primarily through the banking book whereas those in Malaysia would *continue* with securitized banking primarily through the trading book.

Most importantly, while the post-crisis standards in both countries equalized the treatment of repo transactions under both dimensions of the balance sheet, they failed in strengthening the capital requirements for securitized banking. The stricter pre-crisis banking book regime assigned a risk weight of 20% for securitized banking²⁹⁸ whereas the post-crisis Accords allowed banks to significantly reduce the capital charge below 20%²⁹⁹. Owing to these lower capital requirements, securitized banking remained an inexpensive source of funding for banks in both countries. These results conform to the theoretical conclusions of the analysis of the post-crisis Basel Accords in Chapter 4.

5.6. Supporting data trends

This section presents trends in the national banking sector of South Africa and Malaysia, in order to assess whether the hypothesis of the preceding section is correct. The aim is to illustrate that national implementation of the Basel Accords also transpose the incentives inherent in these Accords. Consequently, global implementation of the Basel Accords would support similar bank behavior and hence, similar incentives for securitized banking. Therefore, data trends in this section highlight bank involvement in securitized banking, supported by the incentives inherent in the Basel Accords.

It is pertinent to mention here that the trends in this section do not reflect *actual* bank involvement in securitized banking due to certain limitations in the available data for repo transactions. Firstly, transaction level data which would provide details of the underlying collateral are not readily available. Secondly, counterparty information is unavailable as the identity of parties involved is protected under national laws. Lastly, and most importantly, historical data is either not readily available or is inconsistent, thus data before the crisis is not comparable with that after the crisis. Therefore, the focus will be on data that illustrates the *possibility and potential* for bank involvement in securitized banking.

²⁹⁸ Appendix V and VI, part I, (a).2.

²⁹⁹ Appendix V and VI, part II, (a).2.

The timeline used in this section corresponds to the implementation of the Basel Accords, starting from the Market Risk Amendment, which is the focal point, as it created asset allocation incentives by dividing the balance sheet into the banking and trading book. For South Africa, this corresponds to August 1998 but the absence of a securitisation market makes this unsuitable. The implementation of the Securitisation Framework in December 2001 is more appropriate as it was the beginning of securitisation activity in the country. Therefore, the timeline for South Africa starts in 2002. For Malaysia, the timeline starts in 2005 since the Market Risk Amendment was implemented in 2004. The timeline ends in 2012 for both countries as it corresponds to the implementation of the Basel III Accord in January 2013.

5.6.1. South Africa

The preceding analysis and overview of the Basel implementation suggests that bank involvement in securitized banking should be consistent with the following two hypotheses:

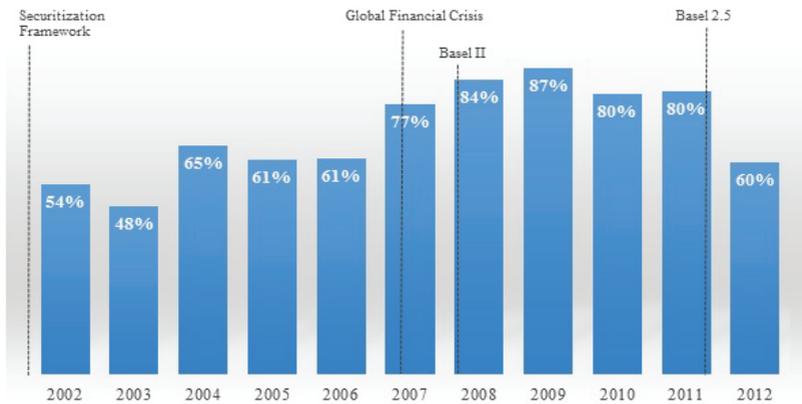
Hypothesis 1: *Pre-crisis* – Securitized banking occurs significantly through the *trading* book

Hypothesis 2: *Post-crisis* – Securitized banking occurs significantly through the *banking* book

The data used looks at aggregate repo transactions in the South African banking sector and the proportion of these transactions undertaken with securities in the trading book. Data is provided by the South African Reserve Bank where repo transactions are represented by the ‘loans received under repurchase agreements’ category under the two dimensions of the balance sheet. Trading book repo is the proportion of repo transactions undertaken through the trading book as a percentage of total repo transactions. This data highlights the likely avenue for securitized banking i.e. if majority of repo is undertaken through the trading book, then it is likely that securitized banking is undertaken through the same dimension.

Looking at the aggregate data for the South African banking sector, the trends suggest that the hypotheses above may be correct. Figure 26 shows the aggregate repo transactions undertaken in the trading book in the years before and after the crisis.

Figure 26: Aggregate Repo transactions in the trading book

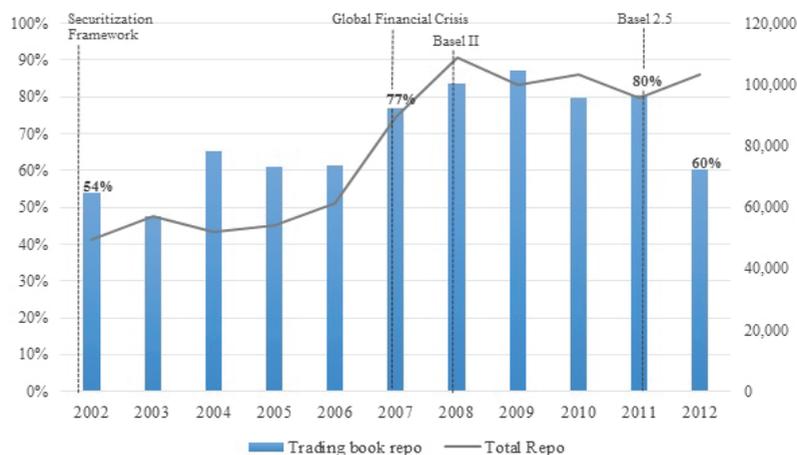


Source: South African Reserve Bank – Aggregate Banking sector data for repo transactions – Loans received under repurchase agreements (December month end balance). The graph shows repo transactions in the trading book as a percentage of total repo transactions.

With the implementation of the Market Risk Amendment and the securitisation framework in 2001, the percentage of trading book repo transactions increased by 23 percentage points (pp), an increase of approximately 43%. Looking at the post-crisis Basel Accords, what is evident is that following the implementation of the Basel 2.5 framework in 2011, trading book repo transactions fell by 20pp, a decline of 25%.

Comparing the proportion of trading book repo and the magnitude of total repo transactions in Figure 27 below also reinforces the hypotheses.

Figure 27: Trading book repo and Total repo transactions

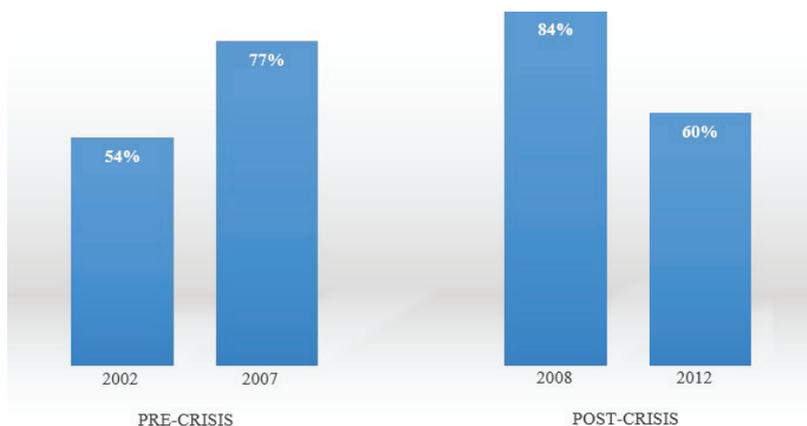


Source: South African Reserve Bank – Aggregate Banking sector data – Loans received under repurchase agreements (December month end balance). The graph shows total repo transactions (Rand Million) and percentage of repo transactions undertaken through the trading book.

Before the crisis, similar increases can be seen in the level of repo transactions and the proportion of repo transactions undertaken in the trading book. As the aggregate level of repo transactions increases, the percentage of trading book repo transactions also increases. In the years after the crisis (2009-2010), the level of repo transactions does not seem to be significantly affected, with the proportion of trading book repo transactions falling by 7 pp, a decline of approximately 8%. However, the most interesting pattern is in the years 2011-2012, with total repo transactions increasing but the level of trading book repo falling by 25%. This implies a larger increase in banking book repo, which corresponds to the implementation of the Basel 2.5 Accord in 2011, concluded to be the main source for banks to allocate repo transactions towards the banking book.

To highlight the changes in allocation of repo transactions between the two dimensions of the balance sheet, Figure 28 provides a comparison of the pre-crisis and post-crisis proportion of repo transactions undertaken through the trading book.

Figure 28: Comparison of Pre-crisis and Post-crisis repo transactions in the trading book



Source: South African Reserve Bank – Aggregate Banking sector data – Loans received under repurchase agreements (December month end balance). The figure shows percentage of repo transactions undertaken through the trading book.

The figure above shows that the hypotheses regarding the change in allocation of repo transactions between the banking and trading book might be true. Repo transactions preceding the crisis were increasingly undertaken through the trading book (Hypothesis 1) while post-crisis, there was a shift in repo transactions towards the banking book (Hypothesis 2). While there might be other driving factors for these trends, it is consistent with the preceding analysis.

Although the trends do not highlight the presence or absence of securitized banking, they do reflect the likely avenue for these transactions. Against the backdrop of an active securitisation market and regulations supporting banks' use of securitized instruments as collateral in repo transactions, the data trends show that banks in South Africa face similar incentives for securitized banking as those inherent in the Basel Accords.

5.6.2. Malaysia

The preceding analysis and overview of Basel implementation in Malaysia imply that bank involvement in securitized banking should be consistent with the following two hypotheses:

Hypothesis 1: *Pre-crisis* – Securitized banking occurs significantly through the *trading book*

Hypothesis 2: *Post-crisis* – Securitized banking *continues* to occur significantly through the *trading book*

Owing to the limited availability of aggregate data for the Malaysian banking sector, data in this section differs from that used for South Africa in two ways. First, data pertains only to local banks as they are required to provide more detailed balance sheet disclosures than foreign banks. This comprises all 8 local banks³⁰⁰ of the Malaysian banking system, which has a total of 27 banks. Data from the remaining 19 foreign banks is not included due to limited data disclosure. However, this foreign bank exclusion does not significantly impact the trends or conclusions of this section as local banks represent majority of the Malaysian banking sector. Local bank assets comprised 76% and 75% of the total commercial banking sector in 2009 and 2011, respectively.³⁰¹ Moreover, foreign banks represent only around 20% of the assets and deposits of the banking system, where the foreign bank share has only marginally increased over the last decade.³⁰² Although in terms of number, local banks comprise merely one-third of the Malaysian banking system, they represent 75% of the banking sector in terms of market share. Therefore, while the data trends do not represent aggregate bank behavior, they do reflect majority of bank behavior and hence, exclusion of foreign banks does not significantly affect the conclusions of this section.

³⁰⁰The local banks include Affin Bank Berhad, Alliance Bank Malaysia Berhad, AmBank Malaysia Berhad, CIMB Bank Berhad, Hong Leong Bank Berhad, Malayan Banking Berhad, Public Bank Berhad and RHB Bank Berhad.

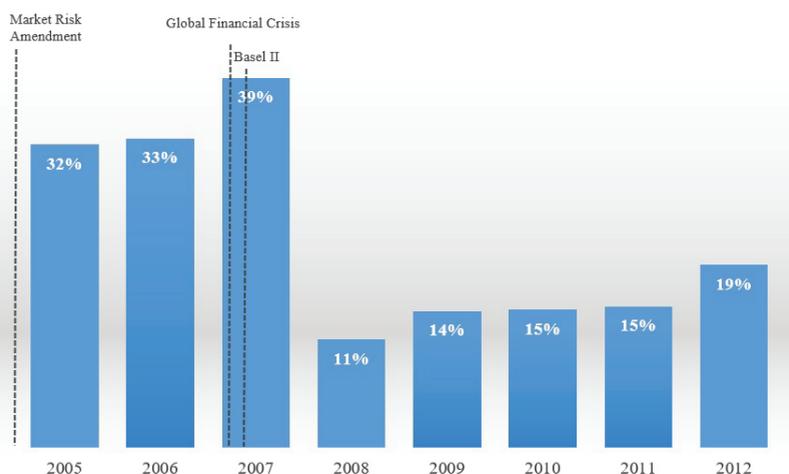
³⁰¹ International Monetary Fund, 'Financial Sector Assessment Program: Malaysia - Financial Sector Performance, Vulnerabilities and Derivatives', vol 14/98 (2014) p. 47. Total commercial banking assets (Ringgit Billion) were 1,139 at year-end 2009 and 1,387 at year-end 2011, with corresponding local bank assets at 866 and 1,034 respectively. This results in local bank market share of 76% in 2009 and 75% in 2011.

³⁰² *ibid.*

Second, data used examines the proportion of private debt securities (excluding government securities) held in the trading book as a percentage of total trading book exposures. These private debt securities include securitized instruments and total trading book consists of all debt and equity securities held for trading purposes (excluding derivative positions). Data has been aggregated from individual banks' annual financial statements. It highlights the *potential* for banks to undertake securitized banking through the trading book i.e. an increase in the proportion of private debt securities in the trading book increases the probability of banks to engage in securitized banking through the same dimension.

Observing the aggregate data for local banks in Malaysia, the trends suggest that the hypotheses above may be correct. Figure 29 shows aggregate private debt securities held in the trading book in the years before and after the crisis.

Figure 29: Private Debt Securities held in the trading book



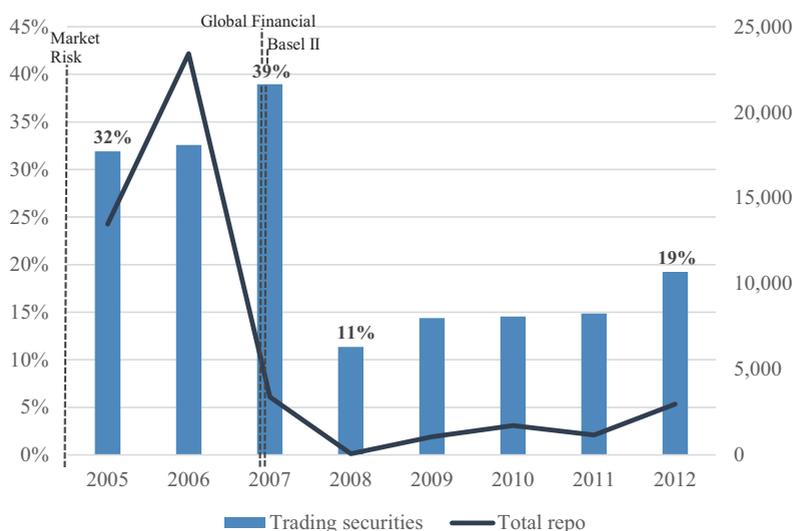
Source: Financial statements of local banks (December month end balance). The graph shows private debt securities (excluding government securities) as a percentage of total trading book securities. Total trading book exposures consist of debt and equity securities held for trading purposes and excludes derivative positions.

Following the implementation of the Market Risk Amendment in 2004, the percentage of private debt securities held in the trading book increased by 7pp, an increase of approximately 22%. Post-crisis, Malaysia continued to operate under the Basel II framework, which was implemented in 2008. Although the crisis seems to have a significant impact on the banks' balance sheet, the

percentage of debt securities in the trading book have increased by 8pp, approximately 73%.

Comparing the proportion of private debt securities held in the trading book and total repo transactions in Figure 30 below also reinforces the hypotheses. Data for total repo transactions is provided by Bank Negara Malaysia and shows total repo transactions undertaken by all commercial banks with other financial institutions.³⁰³ Therefore, the figure below shows majority of bank behavior (through local banks) along with total repo transactions in the market.

Figure 30: Private Debt Securities held in the trading book and Total repo transactions



Source: Bank Negara Malaysia and financial statement of local banks (December month end balance). The graph shows total repo transactions undertaken by commercial banks with other financial institutions (Ringgit Million) and percentage of private debt securities in the trading book.

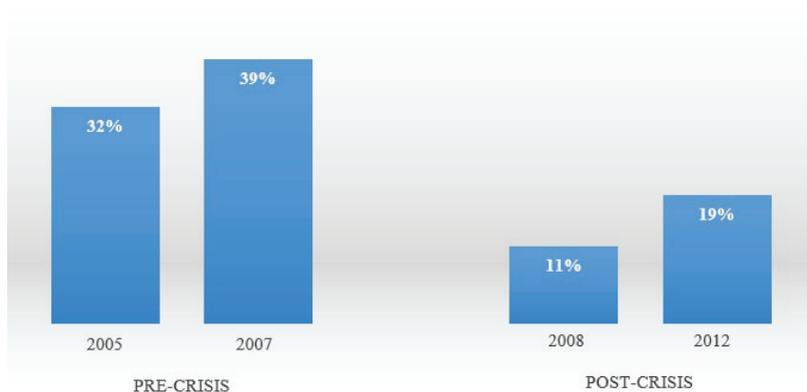
What is most evident is the significant impact of the crisis on both the level of repo transactions and the amount of private debt securities held in the trading book. Before the crisis, the increase in repo transactions corresponded with an

³⁰³ Separating repo transactions between foreign and local banks is not possible since transaction level data is not available and counterparty information is protected under national laws. Repo data is only segregated based on the type of transacting institution i.e. government, business enterprises, individuals or financial institutions.

increase in the proportion of private debt securities. Even after the sharp decline in repo transactions during 2007, the proportion of private debt securities in the trading book started to increase. During the crisis, along with the fall in repo transactions, the percentage of debt securities in the trading book fell by 28pp, a decline of approximately 72%. However, in the aftermath of the crisis, both the amount of repo transactions and trading book debt securities has steadily increased, the latter by approximately 73% since the crisis. This concurs with the incentives inherent in the Basel II Accord, which was concluded to encourage banks to undertake repo transactions through the trading book.

To highlight the trends between the two dimensions of the balance sheet, Figure 31 provides a comparison of the pre-crisis and post-crisis proportion of private debt securities held in the trading book.

Figure 31: Comparison of Pre-crisis and Post-crisis trading book securities



Source: Financial statements of local banks (December month end balance). The graph shows private debt securities in the trading book debt (excluding government securities) as a percentage of total trading book securities.

The figure above suggests that the hypotheses regarding the trend favoring repo transactions through the trading book might be true. Repo transactions preceding the crisis were increasingly undertaken through the trading book (Hypothesis 1) while post-crisis, the trend favoring the trading book continues (Hypothesis 2). While there might be other driving factors for these trends, it is consistent with the preceding analysis.

Although the data trends do not highlight the presence or absence of securitized banking, they do reflect the *potential* for these transactions and illustrate that

banks in Malaysia face similar incentives for securitized banking as those inherent in the Basel Accords.

Conclusion

This chapter focused on the national implementation of the Basel Accords in EMEs to determine whether countries implementing the standards also transpose the incentives inherent in these Accords, thereby encouraging similar bank behavior. The chapter followed the structure and methodology of the previous chapters to identify regulatory arbitrage by comparing the capital requirements for securitized banking under different balance sheet allocations, under both the pre-crisis and post-crisis Basel Accords.

Focusing on EMEs with developed financial markets for securitized banking i.e. South Africa and Malaysia, the chapter finds that Basel implementation in both countries transposed the incentives inherent in these Accords. Pre-crisis regulation in both countries created adverse incentives for asset allocation of securitized instruments and securitized banking, akin to those inherent in the pre-crisis Basel Accords. Similar results are also present for the post-crisis Basel implementation in both countries, with continuing incentives for asset allocation of securitized instruments. While the post-crisis standards in these countries equalized the treatment of repo transactions under both dimensions of the balance sheet, they failed in strengthening the capital requirements for securitized banking, similar to the post-crisis Basel Accords. Owing to these lower capital requirements, securitized banking remained an inexpensive source of funding for banks in both countries. The pre-crisis and post-crisis data trends of the national banking sectors of South Africa and Malaysia also suggest that these hypotheses may be correct. Although the data trends do not highlight the presence (or absence) of securitized banking, they do reflect the potential for these transactions and illustrate that banks in both countries face similar incentives for securitized banking as those inherent in the Basel Accords.

The findings of this chapter illustrate that EMEs, both Basel Committee member and non-member states, were similarly affected by Basel implementation and transposed the adverse incentives inherent in the Basel Accords. Consequently, global implementation of the Basel Accords supported similar bank behavior and hence, similar incentives for securitized banking. While the coordinated implementation of Basel Accords leads to harmonization of global financial standards, it also increases the likelihood of a buildup of common risks and negative spillovers in case of a financial shock. EMEs will continue to remain

an important component of the global economy, thus it is essential for them to have open and liberalized financial markets. However, an appropriate incentive framework supported by prudential regulation is crucial for ensuring systemic stability of EMEs, specifically for large international banks and cross-border financial markets.

Chapter 6

Current Basel Regime and Policy Implications

The dissertation so far focused on the previous Basel Accords, evaluating their role in incentivising banks to undertake securitized banking transactions and has concluded that the previous Basel standards provided banks with significant adverse incentives to engage in securitized banking. The previous chapter went a step further and focused on Basel implementation in Emerging Economies (EMEs) to determine whether national implementation and trends in bank behaviour conform to the theoretical conclusions of the preceding chapters. The chapter illustrated that EMEs, both Basel Committee member and non-member states, were similarly affected by Basel implementation and transposed the adverse incentives inherent in the previous Basel Accords.

This chapter will shed light on the current Basel regime, Basel III, to evaluate its effectiveness in eliminating the previous adverse incentives for bank involvement in securitized banking. Additionally, the chapter will assess whether the current Basel regime continues to incentivise banks to engage in securitized banking and provide policy implications to address whether current policy should be redesigned or reformed more effectively.

This chapter examines the Basel III Accord to answer the final sub-research question: **Has the current regulation resolved the deficiencies inherent in the preceding Basel Accords for securitized banking and does it continue to provide incentives for banks to engage in securitized banking?**

The previous chapter concluded that global implementation of the Basel Accords supported similar bank behaviour and hence, similar incentives for securitized banking. As almost all countries in the world have confirmed to adhere to the Basel III Accord, this chapter contributes to the current policy debate by evaluating the global regulatory regime to examine the incentives for securitized banking that are likely to be transposed in national banking sectors. The conclusions of this chapter will be informative for policy-level decision makers in all countries, even those with underdeveloped securitisation markets,

as it will allow them to weigh the benefits and drawbacks of Basel III implementation for securitized banking and its impact on their banking sectors.

This chapter is broadly divided into two sections. The first section provides an overview of the current Basel Accords, not in their entirety but limited to the key standards relevant for securitized banking. The second section evaluates whether the current Basel regime has resolved the weaknesses of the previous Basel Accords and if the incentives for bank involvement in securitized banking still prevail. This section also provides policy recommendations for the current Basel regime to suggest whether the standards can be reformed to regulate securitized banking transactions more effectively.

6.1. Basel III

The financial crisis of 2007-09 signalled the need for a fundamental reform of the global financial regulatory regime to improve financial market resilience and minimize vulnerability in financial markets. The Basel Committee on Banking Supervision (BCBS) recognized the lack of appropriate incentive structures, poor governance and risk management, which led to the mispricing of credit and liquidity risk and resulted in excessive credit growth.³⁰⁴ In response to the crisis, the Basel Committee and BCBS member states formulated the post-crisis regulatory reform – the Basel III Accord in December 2010, implemented from 2013 following a gradual phase-in approach whereby all parts are expected to be fully implemented by 2019.³⁰⁵

Similar to other Basel Accords, the Basel III standards are minimum requirements applicable to internationally active banks and BCBS member states are committed to implementing these standards within the time frame established by the Basel Committee. For instance, the European Union (EU) adopted a new legislative package to implement Basel III in 2013, which replaced the previous legislations (2006/48 and 2006/49) with a Directive and a Regulation called the CRD IV/CRR package.³⁰⁶ The legislative package was

³⁰⁴ Basel III: Responding to the 2007-09 financial crisis at <https://www.bis.org/bcbs/history.htm>.

³⁰⁵ The Basel Committee on Banking Supervision (BCBS), 'Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems' (2010) Annex 4.

³⁰⁶ European Banking Authority (EBA) at <http://www.eba.europa.eu/regulation-and-policy/implementing-basel-iii-europe>.

implemented from January 2014, with all specific provisions to be phased-in until 2019, in accordance with the BCBS phase-in timeline.³⁰⁷

The BCBS made revisions to the Basel III standards in December 2017, which were endorsed by the Group of Central Bank Governors and Heads of Supervision (GHOS), the Basel Committee's oversight body.³⁰⁸ This finalised Basel III framework is frequently referred to as Basel IV by all market participants, since the standards have undergone extensive revisions to update capital requirement calculations and improve comparability across banks globally. For these final Basel III standards, the BCBS proposes a nine-year implementation timetable, with a five-year phase-in period commencing in January 2022 and full implementation foreseen from January 2027.³⁰⁹ However, since the updated standards have not been officially declared as Basel IV, this dissertation will follow the BCBS and refer to the recent revisions as the finalised Basel III Accord.

The Basel III standards aim to address the shortcomings of the pre-crisis regulatory framework and strengthen the regulation and risk management of banks worldwide to enhance financial stability and develop a resilient banking system that will support the real economy.³¹⁰ The new standards are essentially revisions made to the Basel II Accord, which are intended to strengthen banks by requiring more and better quality of capital, decreasing bank leverage and improving bank liquidity. The Basel III Accord consists of three pillars.³¹¹ Pillar I centres on the quality and quantity of capital and assigns capital requirements for various risks, securitisations, trading book exposures and containing leverage. The new standards also impose additional capital requirements on global systemically important banks (G-SIBs)³¹² as they pose higher risks to the financial system. Pillar II focuses on risk management and supervision whereas

³⁰⁷ *ibid.*

³⁰⁸ The Basel Committee on Banking Supervision (BCBS), 'Basel III: Finalising Post-Crisis Reforms' (2017).

³⁰⁹ *ibid* p. 2 section 9.

³¹⁰ *ibid* p. 1.

³¹¹ The Basel III Accord is a compilation of documents that jointly represent these global standards and can be accessed at <https://www.bis.org/bcbs/basel3.htm?m=3%7C14%7C572>.

³¹² The Basel Committee on Banking Supervision (BCBS), 'Global Systemically Important Banks: Updated Assessment Methodology and the Higher Loss Absorbency Requirement' (2013). Global Systemically Important Banks (G-SIBs) are banks whose business models rely heavily on trading and capital markets-related activities. These institutions pose significant cross-border negative externalities in case of failure, making them systemically important not only locally but also globally. Negative externalities from G-SIBs arise from these institutions being too-big-to-fail, being highly interconnected with other financial institutions, operating with high levels of complexity and functioning on a global scale.

pillar III covers market discipline and outlines standards for disclosure requirements. Moreover, Basel III introduces a liquidity framework which aims to ensure sufficient liquidity in case of severe banking crises and also prescribes measures for sound liquidity risk management and supervision.

The following sections provide an overview of the Basel III Accord, not exhaustive in content but providing a summary of enhanced capital requirements and key components that are relevant for bank involvement in securitized banking. This section focuses firstly on pillar I standards for enhanced capital requirements, risk coverage for securitized instruments and trading book exposures and secondly, on the new liquidity framework. Pillar II and pillar III will be excluded as these standards focus primarily on supervision and disclosure requirements and are hence not crucial for bank involvement in securitized banking. As mentioned, since there is no official recognition of a Basel IV Accord, no distinction will be made between the first Basel III framework and the 2017 revisions. Thus, the upcoming overview will focus on all final revisions and standards under the Basel III Accord to date.

6.1.1. Pillar I

Standards falling under the Pillar I category focus on strengthening capital requirements through higher quality and quantity of capital, leverage ratios and additional requirements for G-SIBs. These standards also outline requirements for enhanced risk coverage of credit risk, market risk, securitisations and asset allocation between the banking and trading book.

6.1.1.1. Capital and Leverage Requirements

The Basel III Accord strengthened capital requirements by improving the quality and quantity of capital held by banks along with several new additions such as the capital conservation buffer and countercyclical capital buffer.³¹³ Additionally, the introduction of a leverage ratio and specific guidelines for G-SIBs are aimed at reducing leverage and improving resilience of the banking sector.³¹⁴ These standards were part of the first round of the Basel III Accord and thus, majority of these have been implemented as of date.

³¹³ The Basel Committee on Banking Supervision (BCBS), 'Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems' A.

³¹⁴ *ibid.*

Total capital requirements determine the amount of capital that should be maintained to guard against unexpected losses. Similar to previous Basel Accords, these capital requirements are based on risk-weighted assets (RWA), which are calculated by multiplying the asset value by the applicable risk weight.

$$\text{Capital requirement} = \frac{\text{Regulatory Capital}}{\text{Risk - weighted assets}}$$

$$\text{Risk - weighted assets (RWA)} = \text{Asset value} \times \text{Risk weight (RW)}$$

The risk weights are dependent on the level of riskiness of the asset, where assets of high risk receive higher risk weights which increases the total amount of RWA and hence, imposes higher capital requirement. Thus, banks need less capital to cover exposures to safer assets and more capital to cover riskier exposures.

To strengthen the quality and quantity of capital, the new standards place a greater focus on banks to hold common equity. The minimum requirement for Common Equity Tier 1 (CET1) increased from 2% to 4.5% of RWA.³¹⁵ Moreover, financial institutions are now required to hold a capital conservation buffer of 2.5% of RWA using only common equity, phased-in from 2016 and effective January 2019.³¹⁶ This buffer is incorporated to absorb losses during periods of financial and economic stress and banks that do not maintain this buffer face restrictions on discretionary distributions such as dividend payouts and bonuses.³¹⁷ Basel III also introduces a countercyclical capital buffer to be implemented within a range of 0% - 2.5% of common equity, dependent on national circumstances and applicable when authorities ascertain an unacceptable build-up of systematic risk from credit growth.³¹⁸

The capital conservation buffer is required in addition to the 4.5% minimum common equity requirement.³¹⁹ Although the overall minimum total capital ratio remains the same as before – the Basel ratio of 8% of RWA, the capital

³¹⁵ *ibid* pt 1, I.A.50 & B.1.52. Common Equity Tier 1 (CET1) refers to equity capital from common shares, retained earnings and other reserves. The remaining equity references in this section pertain to CET1.

³¹⁶ *ibid* pt 1, III.B.129 & C.133.

³¹⁷ *ibid* pt 1, III.B.131-132.

³¹⁸ *ibid* pt 1, IV.B.139.

³¹⁹ *ibid* pt 1, III.B.129.

conservation buffer increases the total capital requirement to 10.5% of RWA, of which 7% must be common equity capital. Thus, the new common equity requirement is increased from 2% to 7% of RWA. These enhanced capital requirements for strengthened definition of capital have been phased-in from 2013 to 2017.³²⁰

Within the Basel III standards, G-SIBs are subject to additional common equity requirements to increase their loss absorbency capacity as they pose higher risks to the financial system.³²¹ These institutions are identified on the basis of both quantitative indicators and qualitative elements. The aim is to dis-incentivize G-SIBs from increasing their global systemic importance in the future and reduce the moral hazard posed by these financial institutions.³²² The new Basel standards prescribe an additional risk-based capital buffer ranging from 1% to 2.5% of common equity tier 1 (CET1) for G-SIBs, depending on a bank's systemic importance.³²³

To restrict individual bank leverage and also contain system wide build-up of leverage, Basel III incorporates a minimum leverage ratio – a non-risk-based measure to supplement the risk-based capital requirements, phased-in over 2013 to 2017.³²⁴ The leverage ratio is calculated by dividing common equity capital (CET1) by the bank's average total assets (including off-balance sheet exposures), with a prescribed leverage ratio in excess of 3%.³²⁵ The 2017 revisions impose an additional leverage surcharge for G-SIBs, effective January 2022, where each such financial institution will incur a surcharge set at 50% of its risk-based capital buffer.³²⁶ For example, a bank with a 2% risk-based capital buffer will have a 1% leverage ratio buffer and thus, will be required to maintain a leverage ratio of at least 4% (minimum leverage ratio of 3% + 1% G-SIBs surcharge).

³²⁰ *ibid* Annex 4.

³²¹ The Basel Committee on Banking Supervision (BCBS), 'Global Systemically Important Banks: Updated Assessment Methodology and the Higher Loss Absorbency Requirement'.

³²² *ibid* 1.3-8.

³²³ *ibid* III.A.46.

³²⁴ The Basel Committee on Banking Supervision (BCBS), 'Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems' pt 1, V.A.151-152 & B.153.

³²⁵ *ibid* pt 1, V.B.153.

³²⁶ The Basel Committee on Banking Supervision (BCBS), 'Basel III: Finalising Post-Crisis Reforms' section leverage ratio, 9. & 13.

6.1.1.2. Risk Coverage

Basel III aims to restore credibility in the calculation of RWA and improve the comparability of banks' capital ratios, specifically targeting the variation in RWA that cannot entirely be explained by differences in the riskiness of banks' portfolios.³²⁷ In accordance with the preceding Basel Accords, capital requirements are dependent on total RWA, which estimate the riskiness of a banks' activities and determine the minimum level of regulatory capital to manage unexpected losses. These RWA incorporate all risk factors impacting banks' activities and include credit risk, market risk and operational risk.

$$\text{Total RWA} = \text{Credit RWA} + \text{Market RWA} + \text{Operational RWA}$$

Following the previous Basel standards, the Basel III Accord also provides banks with two alternatives for calculating RWA across all three risk factors, namely a standardised approach and an internal model approach.³²⁸ While the internal model approach allows for more accurate risk management, the recent financial crisis highlighted the adverse incentives underlying this alternative, which gave banks significant discretion over capital calculations and hence provided an opportunity for regulatory arbitrage to evade capital requirements.³²⁹ The new Basel standards aim to limit the flexibility for banks using the internal model approach by introducing constraints on the estimates for capital calculations and, in some cases, removes the use of internal models entirely.³³⁰ Additionally, an output floor is imposed which limits the regulatory capital benefits that a bank using internal models can derive relative to the standardised approaches when determining minimum capital requirements.³³¹ The output floor requires that banks' calculations of RWA through internal models cannot fall below 72.5% of the RWA computed by the standardised approaches, limiting the capital benefit from using internal models to 27.5%.³³² The revisions and restrictions to the internal model approach is effective Jan

³²⁷ *ibid* 2-4.

³²⁸ *ibid* Standardised approach for credit risk 1-2.

³²⁹ Hellwig (2009). *See also* chapter 2, section 2.1.2 on the information asymmetry inherent in this approach that provided significant incentives for regulatory capital arbitrage.

³³⁰ The Basel Committee on Banking Supervision (BCBS), 'High-Level Summary of Basel III Reforms' (2017) p. 5.

³³¹ *ibid* p. 11.

³³² *ibid*.

2022 whereas the output floor follows a phased-in implementation from Jan 2022 until Jan 2027.³³³

As concluded in the previous chapters, even with the simpler standardised approach banks had significant adverse incentives to engage in regulatory arbitrage of capital requirements when undertaking securitized banking transactions. Therefore, this section focuses primarily on the standardised approach for capital calculations to evaluate the revisions made to improve risk sensitivity and resolve the shortcomings of the preceding Basel Accords. The Basel III framework has made significant amendments to the standardised approaches across the entire risk spectrum for calculating credit risk, market risk and operational risk. However, due to the specific focus of this dissertation on bank involvement in securitized banking, emphasis will remain on revisions made to credit risk and market risk as these are the core risks that impact securitized banking transactions. Additionally, the upcoming description of revisions made to the credit risk and market risk framework do not cover these new standards in their entirety but focus on key components relevant for securitized banking transactions.

6.1.1.2.1. *Credit risk*

Credit risk is the risk of loss due to a borrower's failure to repay a loan or fulfil contractual obligations and usually accounts for majority of banks' risk-taking activities and regulatory capital requirements. Credit risk related capital charges are applicable to exposures and activities undertaken through the banking book. The Basel III Accord makes changes to the standardised approach for credit risk, which requires banks to apply supervisor prescribed risk weights to determine RWA. The main objective is to enhance risk sensitivity by providing a detailed risk-weighting approach instead of a flat risk weight and to reduce reliance on external credit ratings by requiring banks to conduct sufficient due diligence when using external ratings.³³⁴ Furthermore, the new standards require banks to have a detailed non-ratings-based approach for jurisdictions that cannot or do not wish to rely on external credit ratings.³³⁵ Majority of the revisions to the credit risk framework follow a phase-in implementation from

³³³ *ibid* p. 12.

³³⁴ *ibid* p. 2.

³³⁵ *ibid*.

2013 and will be fully implemented until 2019.³³⁶ However, the final revisions pertaining to external credit ratings were introduced in 2017, to be implemented by January 2022.³³⁷

With respect to securitisation exposures, a revised securitisation framework was introduced in December 2014, which was updated in July 2016 and came into effect in January 2018.³³⁸ The new framework focused on the shortcomings of the Basel II securitisation framework and strengthened the capital standards for securitisation exposures held in the banking book. It aimed to address concerns over insufficient capital and risk sensitivity for securitized instruments by increasing the risk weights for highly-rated securitisation exposures and strengthening the capital treatment for complex re-securitisation exposures.³³⁹ While the capital requirements have been significantly increased to reflect the complexity and risk of securitized instruments, senior securitisation exposures backed by high quality assets can still receive risk weights as low as 15%.³⁴⁰ Moreover, the new standards seek to reduce reliance on external ratings by reducing the complexity and hierarchy of permissible calculation methodologies. As opposed to the several approaches and treatments allowed in the Basel II framework, the new standards only allow three approaches while also requiring banks to conduct more rigorous credit analyses of externally rated securitisation exposures.³⁴¹

The revised securitisation framework also introduced an alternative capital treatment for Simple, Transparent and Comparable (STC) securitisations. This criterion is intended to help parties evaluate more thoroughly the risks and returns of securitisation and to enable comparison across securitisation products within an asset class.³⁴² The aim is to help in the risk assessment of securitisation exposures by promoting simplicity in the underlying assets and structures, improving transparency to provide investors with comprehensive

³³⁶ The Basel Committee on Banking Supervision (BCBS), 'Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems' Annex 4.

³³⁷ The Basel Committee on Banking Supervision (BCBS), 'High-Level Summary of Basel III Reforms' p. 12.

³³⁸ The Basel Committee on Banking Supervision (BCBS), 'Revisions to the Securitisation Framework' (2016).

³³⁹ *ibid* p. 6 & The Basel Committee on Banking Supervision (BCBS), 'Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems' A.2.12.

³⁴⁰ The Basel Committee on Banking Supervision (BCBS), 'Revisions to the Securitisation Framework' p. 9.

³⁴¹ *ibid* p. 7 & 9.

³⁴² *ibid* p. 9.

and reliable information and enhancing comparability of securitisation transactions to lower investors' hurdle for assessing securitisation risks.³⁴³

While the Basel III Accord made significant changes to the securitisation framework, capital requirements applicable to securitized banking transactions still follow the Basel II Accord, which treats collateralised repo transactions under the credit risk mitigation framework. In accordance with the Basel II Accord, the new standards also allow banks to take advantage from the risk mitigation potential of eligible collateral, which is reflected as a reduction in the capital charge for credit risk and therefore, lower total capital requirements.

Eligible financial collateral under the credit risk mitigation framework in the Basel III Accord follows the Basel II standards. Privately issued debt securities rated investment grade by a recognised external credit rating agency are still considered eligible financial collateral.³⁴⁴ Unrated securitized instruments and other debt securities are eligible collateral as long as they are issued by a bank, listed on a recognised exchange, fulfil the criteria for issuer credit rating (not below investment grade) and the supervisor is confident about the market liquidity of the security.³⁴⁵ Eligible collateral in jurisdictions that do not allow the use of external ratings also include privately issued debt securities as long as they are issued by high-grade banks and investment grade entities.³⁴⁶ Re-securitisation exposures and non-investment grade securities are not considered eligible financial collateral.³⁴⁷

Similar to the Basel II Accord, the Basel III credit risk mitigation framework gives banks a choice between the simple approach and the comprehensive approach in the banking book, with both approaches remaining fundamentally unchanged.³⁴⁸ The simple approach replaces the risk weight of the counterparty

³⁴³ *ibid.*

³⁴⁴ The Basel Committee on Banking Supervision (BCBS), 'Basel III: Finalising Post-Crisis Reforms' s Standardised approach for credit risk D.3.ii.148 & D.3.iii.b.159. Investment grade securities are those with a credit rating of AAA to BBB- while those rated below BBB- are considered non-investment grade.

³⁴⁵ The Basel Committee on Banking Supervision (BCBS), 'Basel III: Finalising Post-Crisis Reforms' D.3.ii.148.c.ii.

³⁴⁶ *ibid* D.3.ii.148.d.

³⁴⁷ *ibid* D.3.ii.148-149.

³⁴⁸ *ibid* p. 33-42. *See* chapter 4, section 4.1.1 for the credit risk mitigation framework under the Basel II Accord.

with the risk weight of the collateral for the collateralised portion of the exposure, subject to a 20% floor, to calculate RWA as:³⁴⁹

$$RWA_{simple\ approach} = Exposure\ Value \times RW_{issuer\ of\ collateral}$$

Where, RWA = risk-weighted assets and RW = risk weight. These abbreviations will be used henceforth.

Whereas, the comprehensive approach allows for a fuller offset against collateral, applicable to the exposure rather than the risk weight, as below:

$$RWA_{after\ risk\ mitigation} = E^*_{adjusted\ exposure} \times RW_{counterparty}$$

The adjusted exposure (E*) under the comprehensive approach incorporates the risk mitigating effect of collateral by reducing the exposure with a discounted value of collateral using volatility-adjusted haircuts.³⁵⁰ The Basel standards provide banks with applicable supervisory haircuts which are used to adjust both the amount of the exposure and the value of collateral to incorporate possible fluctuations in the value of either.³⁵¹ The amount of haircut is linked to the credit rating of collateral – high credit ratings represent low risk and hence, receive lower haircuts. Standard supervisory haircuts range from zero (cash) to 30% (non-main index equities) and those for debt securities are dependent on issue rating, residual maturity and issuer type (sovereigns, banks or corporates).³⁵² Haircuts are also applicable to unrated exposures where these are considered eligible collateral for risk mitigation.³⁵³

What has essentially changed in the Basel III standards is that the credit risk mitigation framework enhances the risk sensitivity to collateralised transactions where the underlying is a securitized instrument. Supervisory haircuts for comprehensive approach now differentiates between securitisation exposures and other financial instruments.³⁵⁴ The objective is to increase the risk sensitivity to complex financial instruments by increasing the applicable haircuts for securitized instruments to incorporate their higher risk. For the same credit rating, haircuts for securitisation exposures range from 2 to 24% while

³⁴⁹ *ibid* D.3.ii.146-147.

³⁵⁰ *ibid* D.2.i.133.ii.

³⁵¹ *ibid* D.3.iii.a.155.

³⁵² *ibid* D.3.iii.c.163 Table 14.

³⁵³ *ibid*.

³⁵⁴ *ibid*.

those applicable to debt securities from other issuers range from 1 to 20%.³⁵⁵ These higher haircuts and exclusion of non-investment grade securitized instruments from the risk mitigation framework aims to increase the capital requirements for securitized banking.

To determine total RWA, the risk weight applicable to the counterparty falls under the Basel III standard for exposures to banks as repo is an interbank transaction. The current standards aim to reduce the reliance on external credit ratings and differentiate between jurisdictions that allow the use of external credit ratings for regulatory purposes and those that do not.³⁵⁶ Exposure to banks in jurisdictions that allow the use of external credit ratings is risk-weighted according to the External Credit Risk Assessment Approach (ECRA), which similar to the preceding Basel II Accord assigns fixed risk weights dependent on the bank's credit rating. The risk weights range from 20% for highly rated banks (AAA to AA-) to 150% for banks rated below B- while those for short-term exposures range from 20% for investment grade banks (AAA- to BBB-) to 150% for banks rated below B-.³⁵⁷ On the other hand, exposure to banks in jurisdictions that do not allow the use external ratings is risk-weighted according to the Standardised Credit Risk Assessment Approach (SCRA).³⁵⁸ This approach classifies exposures to banks into three buckets – Grades A, B and C and assigns risk weights of 40%, 75% and 150% to all exposures and 20%, 50% and 150% to short-term exposures, respectively.³⁵⁹ Under both approaches, exposures to banks with an original maturity of three months or less are assigned the risk weight for short-term exposures.³⁶⁰

6.1.1.2.2. *Market risk*

Market risk refers to the risk of loss arising from fluctuations in market prices from banks' trading activities and the capital charges for market risk are applicable to exposures held within the trading book. In January 2016, the Basel III framework introduced revisions to the trading book regime (Basel 2.5), which significantly altered the risk calculations for both the standardised

³⁵⁵ *ibid.*

³⁵⁶ *ibid* Standardised approach for credit risk A.4.17.

³⁵⁷ *ibid* A.4.a.18 Table 6.

³⁵⁸ *ibid* A.4.b.21.

³⁵⁹ *ibid* A.4.b.21 Table 7.

³⁶⁰ *ibid* A.4.a.19 & A.4.b.30.

approach and the internal model approach.³⁶¹ These changes to the market risk framework replaced the existing capital requirements for market risk, including all amendments made after Basel II. The revised market risk framework is to be implemented by January 2019 as final rules under national legislation whereas regulatory reporting by banks under the new standards is expected by end 2019.³⁶² The current standards make significant changes to the entire market risk framework including a revised standardised approach, a revised internal model approach and incorporation of illiquidity risk within both approaches to mitigate the risk of a sudden impairment of market liquidity.³⁶³

The revised standardised approach fundamentally overhauls the previous methodology to improve risk-sensitivity for all exposures in the trading book, both non-securitisation and securitisation exposures. The standardised approach capital charge for market risk is now a summation of three key components:

$$\text{Market Risk Charge} = \text{Sensitivities Based Charge} + \text{Default Risk Charge} + \text{Residual Risk Add-on}^{364}$$

The sensitivities based method uses sensitivities in some risk treatments and assigns capital charges for these unique risks (delta, vega and curvature risk) across all asset classes and financial instruments.³⁶⁵ The default risk charge captures the default risk of both non-securitisation and securitisation exposures in the portfolio and is calibrated to the credit risk treatment in the banking book.³⁶⁶ This aims to reduce the discrepancy in capital requirements for similar risk exposures across the two balance sheet dimensions. Lastly, the residual risk add-on accounts for any risks not captured within the other two capital charges to ensure sufficient coverage of market risks for more sophisticated trading book instruments.³⁶⁷

³⁶¹ The Basel Committee on Banking Supervision (BCBS), 'Minimum Capital Requirements for Market Risk' (2016).

³⁶² *ibid* p. 4.

³⁶³ *ibid* p. 1.

³⁶⁴ *ibid* B.2.i.47.

³⁶⁵ *ibid* B.2.i.47.a. *Delta* is a risk measure based on sensitivities of a bank's trading book to regulatory delta risk factors whereas *vega* is a similar risk measure based on sensitivities to regulatory vega risk factors. *Curvature* is a risk measure which captures the incremental risk not captured by delta risk when valuing an option. The entire range of asset classes and risks include General Interest Rate Risk (GIRR), Credit Spread Risk (CSR) for securitisation and non-securitisation exposures, Foreign Exchange (FX) risk, equity risk and commodity risk.

³⁶⁶ *ibid* B.2.i.47.d.

³⁶⁷ *ibid* B.2.i.47.e.

Thus, with respect to holding securitized instruments in the banks' trading book, the new standards completely overhaul the previous risk weight requirements under the Basel II Accord. Market risk requirements for holding securitized instruments in the trading book have significantly strengthened and incorporate risk-sensitivities that were not accounted for in the previous standards. Moreover, securitisation exposures in the trading book are now excluded from the internal model approach and are required to be capitalised under the revised standardised approach.³⁶⁸

However, the focal point of this dissertation is the capital requirements applicable for securitized banking transactions, which uses securitized instruments as collateral in repo transactions. The Basel III standards require that banks calculate a counterparty credit risk charge for repo transactions in the trading book, separate from the capital charge for general market risk.³⁶⁹ Banks are required to calculate this counterparty charge for trading book repo transactions using the comprehensive approach under the Basel II credit risk mitigation framework.³⁷⁰ Thus, the new standards follow the preceding Basel II standards for securitized banking transactions in the trading book, whereby capital charges for these transactions fall under the comprehensive approach of the banking book risk mitigation framework. All instruments held in the trading book may be used as eligible collateral for risk mitigation, thus all instruments that fall under the banking book definition of eligible collateral can also be used for risk mitigation in the trading book.³⁷¹

Therefore, securitized banking transactions under the Basel III Accord follow the same guidelines as those prescribed under the Basel II standards, requiring banks to use the comprehensive approach under the risk mitigation framework (described in the previous section). While the risk mitigation framework in the banking book provides banks with two options for capital charge calculation, banks would likely opt for the comprehensive approach under both dimensions of the balance sheet for securitized banking, as it provides a fuller offset against the collateral and does not require any prior supervisory approval.

³⁶⁸ *ibid* p. 2.

³⁶⁹ *ibid* A.7.40.

³⁷⁰ *ibid* A.7.43.

³⁷¹ *ibid* A.7.41.

6.1.1.3. Asset allocation between the banking book and trading book

The Basel III standards for market risk also aim to strengthen the boundary between the banking and trading book by establishing an objective criterion for asset allocation and reduce arbitrage incentives by placing stricter limits and capital disincentives to the transfer of instruments between the two dimensions of the balance sheet.³⁷² Any deviations from these standards would lead to supervisory review which may initiate reallocation of assets in either regulatory book if an instrument is deemed to be improperly designated.³⁷³ The asset allocation standards were introduced as part of the revised market risk framework in January 2016, expected to be fully implemented by January 2019.

The revised boundary treatment outlines an objective criterion for instruments that must be included in the banking book or trading book. The Basel III framework follows the Basel II Accord to define the components of the trading book. Trading book exposures include all financial instruments, foreign exchange and commodities given that there is no legal impediment against selling or fully hedging the instruments and they are valued daily.³⁷⁴ The revised boundary abandons the arbitrary requirement of ‘trading intent’ that was used under the previous Basel Accords and requires that, *‘Any instrument a bank holds for one or more of the following purposes must be designated as a trading book instrument: (a) short-term resale; (b) profiting from short-term price movements; (c) locking in arbitrage profits; (d) hedging risks that arise from instruments meeting criteria (a), (b) or (c) above.’*³⁷⁵ It specifically requires that *‘...any instrument which is not held for any of the purposes listed above must be assigned to the banking book.’*³⁷⁶

Moreover, the boundary criterion also assigns certain instruments and activities to the trading book which the banks generally hold for trading purposes. Trading-related repo transactions, instruments from market-making and those held as trading assets or liabilities for accounting purposes are required to be held in the trading book, as there is a general presumption that such instruments are being held for at least one of the purposes required for the trading book

³⁷² *ibid* p. 1.

³⁷³ *ibid* p. 3-4.

³⁷⁴ *ibid* A.2.8-11.

³⁷⁵ *ibid* A.2.12.

³⁷⁶ *ibid* A.2.14.

instrument classification above.³⁷⁷ If the bank needs to deviate from this presumptive list, an explicit supervisory approval is required based on evidence that the instrument is held for different purposes and these deviations must be documented on an on-going basis.³⁷⁸

Besides these requirements, the new standards also provide more supervisory tools to help ensure consistent implementation of the boundary across banks. The supervisor may require banks to provide evidence that an instrument held in either regulatory book is in accordance with the Basel criteria and re-assign instruments to the appropriate book in case of insufficient evidence or if the supervisor believes that the instrument customarily would belong to a different balance sheet dimension.³⁷⁹ The Basel III standards also outline documentation requirements that must be subject to periodic internal audit and the results must be available for supervisory review. Banks are required to have clearly defined policies, procedures and documented practices for determining asset allocation to the trading book and conduct on-going evaluation of instruments both in and out of the trading book to assess whether its instruments are being properly designated initially as trading or non-trading instruments.³⁸⁰

The new Basel standards for asset allocation also aim to address weaknesses previously seen in the boundary between the banking and trading book by reducing the possibility of arbitrage between the two balance sheet dimensions. To reduce the opportunities for regulatory arbitrage and eliminate the asset allocation discretion provided by previous Basel regulations, the Basel III Accord specifies restrictions on moving instruments between the two regulatory books, stating that:

“There is a strict limit on the ability of banks to move instruments between the trading book and the banking book by their own choice after initial designation Switching instruments for regulatory arbitrage is strictly prohibited. In practice, switching should be rare and will be allowed by supervisors only in extraordinary circumstances. Possible examples could be a major publicly announced event, such as a bank

³⁷⁷ *ibid* A.2.16.

³⁷⁸ *ibid* A.2.17.

³⁷⁹ *ibid* A.2.18-19.

³⁸⁰ *ibid* A.2.20.

*restructuring that results in permanent closure of trading desks, requiring termination of the business activity applicable to the instrument or portfolio or a change in accounting standards that allows an item to be fair-valued through the P&L. Market events, changes in the liquidity of a financial instrument, or a change of trading intent alone are not valid reasons for re-designating an instrument to a different book.*³⁸¹

Moreover, any re-designation between the two regulatory books requires explicit approval by both the supervisor and senior management, which must be thoroughly documented and publicly disclosed.³⁸² Also, any re-designation between the balance sheet dimensions is irrevocable.³⁸³

With regard to regulatory arbitrage due to discrepancies or switching between the two dimensions of the balance sheet, the standards also provide specific guidelines:

*“Without exception, a capital benefit as a result of switching will not be allowed in any case or circumstance. This means that the bank must determine its total capital charge (across banking book and trading book) before and immediately after the switch. If this capital charge is reduced as a result of this switch, the difference as measured at the time of the switch will be imposed on the bank as a disclosed Pillar 1 capital surcharge, which will be allowed to run off as the positions mature or expire.”*³⁸⁴

Therefore, the Basel III asset allocation standards mitigate regulatory capital arbitrage by imposing strict limits on the movement of instruments between the two dimensions of the balance sheet. In case of a discrepancy arising from the capital charge on an instrument or portfolio, whereby it is reduced as a result of switching (in the rare instances where this is allowed), the difference in charges is imposed on the bank as a fixed, additional Pillar 1 capital charge. This

³⁸¹ *ibid* A.5.27.

³⁸² *ibid* A.5.29.

³⁸³ *ibid*.

³⁸⁴ *ibid* A.5.28.

eliminates all opportunities for regulatory capital arbitrage from asset allocation, as any benefits that would have previously been realised by the bank are now imposed in the form of an additional capital charge within the Pillar I framework.

The revised boundary treatment removes the previous arbitrary ‘trading intent’ criterion and introduces an objective criterion for both initial asset allocation and any re-designation, thus removing all asset allocation discretion earlier provided to banks. More importantly, even in the rare instance that a re-designation or switch is allowed, the standards eliminate any opportunity for regulatory arbitrage or capital benefits.

6.1.2. Introduction of Liquidity Requirements

The global financial crisis illustrated the crucial role of liquidity in the proper functioning of financial markets and the banking sector. Despite being adequately capitalised, many banks experienced difficulties due to improper liquidity management. It also highlighted the likelihood of rapid reversal in market conditions, where liquidity can quickly evaporate and illiquidity can last for an extended period of time.

The Basel Committee has strengthened its liquidity framework by developing two minimum standards for funding liquidity, developed to achieve two separate but complementary objectives. The Liquidity Coverage Ratio (LCR) is developed to achieve the first objective – to promote short-term resilience of a bank’s liquidity risk profile by ensuring that it has sufficient High Quality Liquid Assets (HQLA) to survive a significant stress scenario lasting for one month.³⁸⁵ The Net Stable Funding Ratio (NSFR) aims to meet the second objective – to promote resilience over a longer time horizon (one year) by creating additional incentives for banks to fund their activities with more stable sources of funding on an on-going basis and provide a sustainable maturity structure of assets and liabilities.³⁸⁶

³⁸⁵ The Basel Committee on Banking Supervision (BCBS), ‘Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools’ (2013) 1.

³⁸⁶ The Basel Committee on Banking Supervision (BCBS), ‘Basel III: The Net Stable Funding Ratio’ (2014) I.5.

The new liquidity ratios ensure adequate funding in case of a severe banking crisis and aim to develop a more resilient banking sector. In accordance with the Basel standards, these liquidity ratios establish a *minimum* level of liquidity for internationally active banks and national authorities may impose higher liquidity requirements.³⁸⁷

6.1.2.1. Liquidity Coverage Ratio

The Liquidity Coverage Ratio (LCR) aims to improve the banking sector's ability to absorb shocks arising from financial and economic stress, thus reducing the risk of spill over from the financial sector to the real economy. The objective of the LCR is to promote short-term resilience of the liquidity risk profile of banks by ensuring that sufficient levels of High Quality Liquid Assets (HQLA) are available for one-month survival in a severe stress scenario. The stress scenarios incorporate many of the shocks experienced during the recent financial crisis into one significant stress event for which a bank would need sufficient liquidity to survive for up to 30 calendar days.³⁸⁸ To ensure that banks can implement the liquidity requirement without disruption to their financing activities, the minimum LCR requirement began at 60% in January 2015, rising in equal annual steps of 10 percentage points to reach 100% in January 2019.³⁸⁹

The LCR is represented as:

$$\frac{\text{Stock of HQLA}}{\text{Total net cash outflows over the next 30 calendar days}} \geq 100\%^{390}$$

Under the standard, banks must have an adequate stock of unencumbered HQLA to cover the total net cash outflows (total expected cash outflows minus total expected cash inflows)³⁹¹ over a 30-day period under an acute short-term liquidity stress scenario.³⁹² During periods of stress, banks are allowed to use their stock of HQLA and hence, the ratio can fall below the minimum.³⁹³

³⁸⁷ The Basel Committee on Banking Supervision (BCBS), 'Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools' 6.

³⁸⁸ *ibid* pt 1, II.20.

³⁸⁹ *ibid* 10.

³⁹⁰ *ibid* pt 1, II.22.

³⁹¹ *ibid* pt 1, II.B.69.

³⁹² *ibid* pt 1, II.A.23.

³⁹³ *ibid* 11. Banks are required to notify supervisors immediately if their LCR has fallen, or is expected to fall, below 100% with an assessment of its liquidity position and factors that contributed to the fall in LCR. The supervisor(s) then determine whether the fall in LCR was

The Basel standards specify the characteristics of assets that can fall under the HQLA category. Firstly, these assets should be liquid in markets during a time of stress which requires that they can be easily and immediately converted in private markets into cash at little or no loss of value.³⁹⁴ The test of whether liquid assets are of *high quality* is their liquidity-generating capacity through sale or repo and is presumed to remain unaffected even in periods of severe idiosyncratic and market stress.³⁹⁵ However, certain assets are more likely to generate funds without incurring large discounts in sale or repo markets from fire-sales during stress events.³⁹⁶ The LCR standard requires a bank to hold assets that can be immediately used as a source of contingent funds to fill funding gaps between cash inflows and outflows at any time during a one month stress event, through outright sale or repo and without any restrictions on the use of the liquidity generated.³⁹⁷

Secondly, HQLA should also be eligible at central banks for intraday liquidity needs and overnight liquidity facilities.³⁹⁸ This aims to provide additional confidence that banks are holding assets that could be used in stress events without damaging the broader financial system, thereby raising confidence in the safety and soundness of the banking system.³⁹⁹ The Basel liquidity standards also take account of the ex-ante uncertainty of determining which specific assets might be subject to shocks ex-post and thus, requires that the stock of HQLA be well diversified within asset classes.⁴⁰⁰

HQLA are comprised of Level 1 and Level 2 assets. Level 1 assets include cash, central bank reserves and certain marketable securities backed by sovereigns and central banks.⁴⁰¹ Level 2 assets are comprised of Level 2A and Level 2B assets, where each category of assets is subject to a haircut applicable to the current market value to account for their lower level of liquidity. Level 2A assets are subject to a 15% haircut and include government securities, covered

due to a period of stress, taking into account both current and forward-looking assessments of macroeconomic and financial conditions.

³⁹⁴ *ibid* pt 1, II.A.1.24.

³⁹⁵ *ibid* pt 1, II.A.1.25.

³⁹⁶ *ibid* pt 1, II.A.1.24.

³⁹⁷ *ibid* pt 1, II.A.2.29.

³⁹⁸ *ibid* pt 1, II.A.1.26.

³⁹⁹ *ibid*.

⁴⁰⁰ *ibid* pt 1, II.A.3.44.

⁴⁰¹ *ibid* pt 1, II.A.4.i.49-50.

bonds and corporate debt securities.⁴⁰² Level 2B assets incur varying haircuts and, subject to fulfilment of certain conditions, include residential mortgage-backed securities (25% haircut), lower rated corporate bonds (50% haircut) and equities (50% haircut).⁴⁰³ Level 1 assets are of the highest quality and the most liquid, thus there is no limit on the extent to which a bank can hold these assets to meet the LCR while Level 2 assets may not in aggregate account for more than 40% of HQLA stock and within this, Level 2B assets may not account for more than 15% of the total HQLA stock.⁴⁰⁴

6.1.2.2. The Net Stable Funding Ratio

The Net Stable Funding Ratio (NSFR) promotes long-term resilience by creating incentives for financial institutions to fund their activities with stable sources of funding. The NSFR aims to limit overreliance on short-term wholesale funding, encourages better assessment of funding risk across all on- and off-balance sheet items and promotes funding stability.⁴⁰⁵ This liquidity ratio has been implemented as a minimum standard from January 2018, with banks required to meet these requirements on an on-going basis and report quarterly.⁴⁰⁶

The global financial crisis highlighted that private incentives of banks can diverge from socially desirable levels and result in excessive reliance on unstable sources of funding. The Basel Committee recognises the adverse incentives for banks to expand their balance sheets through cheap and abundant short-term wholesale funding, which can lead to rapid balance sheet growth and weaken the ability of individual banks to respond to liquidity (and solvency) shocks.⁴⁰⁷ The NSFR aims to provide a stable funding structure to promote sustainable liquidity even in case of disruptions to a bank's regular sources of funding, thus reducing the bank's risk of failure and the potential negative spill over to the broader financial system.⁴⁰⁸

⁴⁰² *ibid* pt 1, II.A.4.ii.51-52.

⁴⁰³ *ibid* pt 1, II.A.4.iii.53-54.

⁴⁰⁴ *ibid* pt 1, II.A.4.46-47. The 40% cap on Level 2 assets and the 15% cap on Level 2B assets should be determined after the application of required haircuts.

⁴⁰⁵ The Basel Committee on Banking Supervision (BCBS), 'Basel III: The Net Stable Funding Ratio' I.1.

⁴⁰⁶ *ibid* I.8 & III.A.49.

⁴⁰⁷ *ibid* I.2.

⁴⁰⁸ *ibid* I.1.

The NSFR will require banks to maintain a stable funding profile in accordance with the composition of banks' on-balance sheet assets and off-balance sheet activities.⁴⁰⁹ The NSFR is defined as:

$$\frac{\text{Available amount of stable funding}}{\text{Required amount of stable funding}} \geq 100\%^{410}$$

The standard prescribes that the amount of available stable funding relative to the amount of required stable funding should be equal to at least 100% on an on-going basis. Available stable funding is defined as the portion of capital and liabilities expected to be reliable over the long-term time horizon, defined as one year under the standard.⁴¹¹ The required amount of stable funding will be in accordance with the liquidity characteristics and residual maturities of the various assets held by a bank.⁴¹²

The amount of available and required stable funding are calibrated to incorporate both the degree of stability of liabilities and the liquidity of assets.⁴¹³ The appropriate amount of required stable funding for liabilities is dependent first, on the funding tenor, where long-term liabilities are assumed to be more stable than short-term liabilities.⁴¹⁴ The second determinant is funding type and counterparty, which presumes short-term deposits provided by retail customers and funding provided by small business customers to be more stable than wholesale funding of the same maturity from other counterparties.⁴¹⁵

For determining the required amount of stable funding for assets, the standard incorporates asset tenor which presumes that some short-term assets require a smaller proportion of stable funding because banks would hold some assets to maturity rather than rolling them over.⁴¹⁶ Moreover, asset quality and liquidity value are also incorporated, which presume that unencumbered high-quality assets that can be securitized, traded or used as collateral to secure additional funding or sold in the market, do not need to be wholly financed with stable

⁴⁰⁹ *ibid.*

⁴¹⁰ *ibid* II.9.

⁴¹¹ *ibid.*

⁴¹² *ibid.*

⁴¹³ *ibid* II.12.

⁴¹⁴ *ibid* II.13. The Basel standards refer to short-term funding as those with a short-time horizon i.e. less than one year whereas long-term funding and long-time horizon represent more than one year.

⁴¹⁵ *ibid.*

⁴¹⁶ *ibid* II.14.

funding.⁴¹⁷ The standard also takes into account the importance of resilient credit creation and requires stable funding for a proportion of lending to the real economy for continuity of financial intermediation.⁴¹⁸

The amount of available stable funding (ASF) is dependent on the stability of a bank's funding sources, which includes the residual maturity of its liabilities and the propensity of different types of funding providers to withdraw their funding.⁴¹⁹ The total amount of ASF is calculated as:

$$\text{Total ASF amount} = \text{Carrying value} \times \text{ASF factor}^{420}$$

ASF is determined by allocating the carrying value of a bank's capital and liabilities to one of five categories and the total ASF is calculated as the sum of the weighted amounts within these categories.⁴²¹ Each category is assigned an ASF factor according to assumed funding stability and ranges from 0% to 100%.⁴²² For example, assets with an ASF factor of 100% are the most stable sources and include regulatory capital and long-term liabilities whereas an ASF factor of 90% represents less stable non-maturity deposits and term deposits provided by retail and small business customers.⁴²³ Short-term funding provided by non-financial corporate customers, sovereigns and multilateral development banks along with other short-term funding provided by central banks and financial institutions is considered moderately stable with an ASF factor of 50%.⁴²⁴

To summarise, this first section provided an overview of the current Basel regime and highlighted the key revisions that aim to overcome the weaknesses of the preceding Basel Accords, specifically with regards to securitized banking transactions. The next section discusses the current Basel standards and evaluates their effectiveness in eliminating the previous adverse incentives for bank involvement in securitized banking. Furthermore, it evaluates whether the current Basel regime continues to incentivise banks to engage in securitized

⁴¹⁷ *ibid.*

⁴¹⁸ *ibid.*

⁴¹⁹ *ibid.* II.A.17.

⁴²⁰ *ibid.*

⁴²¹ *ibid.* II.A.26 Table 1.

⁴²² *ibid.*

⁴²³ *ibid.*

⁴²⁴ *ibid.*

banking and provides policy implications to recommend if current policy should be redesigned or reformed more effectively.

6.2. Discussion and Policy Implications

The global financial crisis highlighted significant deficiencies of the preceding Basel framework, following which the current Basel regime has made significant improvements to overcome these weaknesses.

First, the Basel III Accord has improved the loss absorbency capacity and resilience of the banking system through strengthened capital and leverage requirements. The required quality and quantity of capital is strengthened from higher common equity requirements while capital buffers will improve loss absorbency and restrain build-up of systematic risk. The additional capital buffers have increased the *minimum* capital requirement to 10.5% of RWA, of which 7% must be common equity capital. Additionally, the *minimum* leverage ratio will restrict individual and aggregate build-up of leverage within the banking sector. Specific guidelines for G-SIBs impose additional common equity requirements and a leverage surcharge to constrain the size of these financial institutions and restrict their global systemic importance.

Second, the new standards significantly improve the risk management of securitized instruments, now including more complex re-securitisation instruments as well. The revised standards focus on the shortcomings of the Basel II securitisation framework and strengthen the capital requirements for securitisation exposures held in both the banking book and the trading book. Capital requirements and risk sensitivity for securitized instruments have improved through increased risk weights applicable to highly-rated securitisation exposures and strengthening the capital treatment for re-securitisation exposures. Trading book securitisation requirements are completely overhauled, now incorporating risk-sensitivities that were previously not accounted for and increasing capital requirements for holding securitized instruments in portfolios. Moreover, the new standards seek to reduce reliance on external credit ratings and constrain the options for calculation methodologies in both regulatory books, allowing only one capital calculation approach for securitisation exposures in the trading book.

Third, the current Basel regime successfully eliminates the adverse incentives for asset allocation and regulatory arbitrage between the banking and trading book present in the previous Basel Accords. The boundary between the two dimensions of the balance sheet is strengthened by establishing an objective criterion for asset allocation, for both initial asset allocation and any re-designation. This removes the arbitrary ‘trading intent’ criterion and all asset allocation discretion previously provided to banks. To reduce the opportunities for regulatory arbitrage, the Basel III Accord places stricter limits and capital disincentives to the transfer of instruments between the two regulatory books. Even in the rare instance that a re-designation or switch is allowed, the standards eliminate any opportunity for regulatory arbitrage by imposing an additional capital charge equivalent to the capital reduction from any asset switching.

Lastly, the LCR and NSFR under the new liquidity framework are appropriate for managing short-term liquidity and promoting long-term stability, respectively. The LCR recognizes the varying liquidity of financial instruments by incorporating asset liquidity and asset quality. HQLA are categorized according to their characteristics, those with high liquidity and quality fall under Level 1 while others are assigned to Level 2 and subject to haircuts to account for their lower level of liquidity. However, the LCR continues to recognise securitized instruments (specifically mortgage-backed securities) as liquid assets, assigned under Level 2 and subject to a haircut. This is contrary to the developments in the crisis, where even highly rated and liquid securitized instruments were deemed illiquid due to the uncertainty of their valuation.⁴²⁵ Moreover, although the NSFR provides appropriate incentives for banks to hold a sufficient amount of stable funding for the long-term, it falls short on repo financing requirements, stating that “... *unencumbered, high-quality assets that can be securitized or traded can be readily used as collateral to secure additional funding or sold in the market and therefore, do not need to be wholly financed with stable funding.*”⁴²⁶ This is also at odds with the experience of financial markets during the crisis, as assets perceived to be high-quality for securitisation or trade suffered the most from liquidity constraints and funding withdrawals.⁴²⁷

⁴²⁵ See chapter 2, section 2.2.1 on the underlying risks and resulting financial fragility from securitized instruments.

⁴²⁶ *ibid* II.14.d.

⁴²⁷ See chapter 2, section 2.2.2 on the vulnerabilities of short-term repo funding.

However, it is pertinent to assess whether the current Basel regime continues to incentivise bank involvement in securitized banking. The Basel III Accord has shown little improvement in this regard. The new Basel standards treat securitized banking transactions similar to those under the Basel II Accord. Securitized banking under both the banking book and the trading book remain under the comprehensive approach of the credit risk mitigation framework. Banks can continue to take advantage from lower capital charges for securitized banking as privately issued investment grade debt securities are still considered eligible financial collateral for risk mitigation. Although the Basel III risk mitigation framework aims to increase the capital requirements for securitized banking by imposing higher haircuts to these transactions, securitized banking still remains a cheap source of funding as compared to other sources for banks who want to gain exposure to securitized instruments. Therefore, while the capital requirements for securitized instruments are higher than before, the current Basel regime still provides incentives for banks to engage in securitized banking due to the significantly lower capital charges as compared to deposit funding.

Nevertheless, the principal focus should be on the financial instruments considered as eligible collateral for risk mitigation. Not only investment grade securitized instruments, but also all other privately issued investment grade debt securities continue to be recognised as eligible collateral. While securitized instruments have become infamous in the aftermath of the crisis, prior to that, these instruments evolved as innovative private securities developed for efficient risk management, fulfil demand for private collateral by market participants and provide a new source of liquidity for financial institutions.⁴²⁸ Repo transactions were, and will continue, to remain a vital source of short-term funding for banks. While private liquidity creation is desirable, such private money can result in socially excessive leverage, imposing negative externalities on other banks and the society.⁴²⁹ The crisis highlighted the fact that while financial innovation can be beneficial to increase the liquidity in financial markets, such liquidity might not be socially desirable. More specifically, private security issuance might suffer from neglected risks, both by the issuers and investors, creating false substitutes for traditional securities, which can lead

⁴²⁸ See chapter 1, section 1.2 on securitisation.

⁴²⁹ Gennaioli, Shleifer and Vishny, 'Neglected Risks, Financial Innovation, and Financial Fragility'; Gorton and Metrick, 'Securitized Banking and the Run on Repo'; Stein (2012).

to financial instability.⁴³⁰ Therefore, not all innovative collateral in repo transactions can be considered ‘safe’ and a source of ‘good liquidity’ for financial institutions.

While proclaiming any financial instrument as ‘safe’ is idealistic, as zero risk is an unachievable target, the focus should be on securities that carry the least risk.⁴³¹ The definition of HQLA in the LCR of the Basel III liquidity framework provides a realistic description of ‘safe’ instruments that can provide ‘good liquidity’. Firstly, these assets should be liquid in markets during stress events and thus, can be easily and immediately converted in to cash at little or no loss of value through sale or repo in private markets. Secondly, HQLA should also be eligible at central banks for intraday and overnight liquidity needs to provide additional confidence that these assets can be used in a crisis without harming the broader financial system. Most government securities fall under this criterion but the LCR specifies ‘safe’ assets as cash, central bank reserves and marketable securities backed by sovereigns and central banks. However, the LCR aims to promote short-term resilience over a one-month stress event and the NSFR requires banks to hold a stable source of funding for a one-year period. While both these liquidity instruments positively contribute to the provision of ‘good liquidity’ provided by ‘safe’ collateral, the crucial aspect is to examine the use of assets as collateral in *on-going* bank operations and activities. Although regulating assets, such as securitized instruments, found to be high-risk *after* a crisis will constrain related financial activities, such as production of securitized instruments and their use in securitized banking, this asset-specific regulation will also support the development of new and innovative financial instruments that will continue to provide banks with similar benefits but are not currently regulated.

Financial innovation will continue to evolve and financial institutions and markets will continue to find creative ways to expand their balance sheet. In reforming financial regulation, scholars have stressed the importance of not only controlling leverage but also restricting the scale of financial innovation while preserving the creation of liquidity by the banking system.⁴³² Regulation should be more attuned to the risks inherent in innovative or complex financial

⁴³⁰ Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’.

⁴³¹ Acharya and others, ‘Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises’.

⁴³² Blinder (2010); Gennaioli, Shleifer and Vishny, ‘Neglected Risks, Financial Innovation, and Financial Fragility’.

instruments and stipulate higher capital requirements to account for their higher risks. With regard to bank involvement in repo transactions, both the risks pertaining to the underlying collateral and counterparty are equally relevant. The following sections provide recommendations to constrain bank involvement in securitized banking, and repo transactions with new forms of collateral, while promoting the beneficial role of these transactions in providing ‘good liquidity’ with ‘safe’ collateral, such as government securities.

6.2.1. Collateral – Risk mitigation from complex financial collateral

As a first step in this direction, securitized instruments and innovative financial securities, especially those with complex risks, should not be considered eligible for risk mitigation.

The current regulatory regime, Basel III, does little in this regard. Securitized instruments are still considered eligible collateral for risk mitigation under both the banking book and trading book. Moreover, the standards applicable to securitized banking transactions under the new Basel Accord are similar to those under the Basel II Accord. Securitized banking transactions under both dimensions of the balance sheet fall under the comprehensive approach of the risk mitigation framework which allows a significant portion of the exposure to be offset against eligible collateral, as below:

$$RWA_{after\ risk\ mitigation} = E^*_{adjusted\ exposure} \times RW_{counterparty}$$

Similar to the Basel II Accord, this approach calculates the adjusted exposure as:

$$E^*_{adjusted\ exposure} = \max\{0, [E(1 + H_e) - C(1 - H_c - H_{fx})]\}^{433}$$

Where, E = exposure value, H_e = exposure haircut, C = collateral value, H_c = collateral haircut, H_{fx} = currency mismatch haircut

⁴³³ The Basel Committee on Banking Supervision (BCBS), ‘Basel III: Finalising Post-Crisis Reforms’ Standardised approach for credit risk D.3.iii.b.160; The Basel Committee on Banking Supervision (BCBS), ‘International Convergence of Capital Measurement and Capital Standards (Basel II)’ pt 2, section II, D.3.ii.147-148.

The exposure is adjusted for specific collateral characteristics, which are incorporated in the applicable haircut. For example, supervisory haircut assigned to a high-grade (AAA rated) private debt security with a residual maturity greater than 10 years issued by a bank is 12%.⁴³⁴ Thus, the collateral value is discounted by 12% and the exposure can be offset against 88% of the collateral value. This reduction in original exposure reduces the corresponding RWA and hence, lowers capital requirements. However, now the risk mitigation framework differentiates the haircuts applicable to securitized collateral from all other financial instruments. It aims to increase the risk sensitivity to complex financial instruments by increasing the applicable haircuts for securitized exposures to incorporate their higher risk. So, supervisory haircut assigned to a securitized instrument with similar characteristics (high-grade, residual maturity greater than 10 years) is 16%.⁴³⁵ The collateral value is discounted by 16% and the exposure can now be offset against only 84% of the collateral value.

The differences in the capital requirements for a securitized banking transaction under the new Basel standards can be assessed by examining the total RWA calculation of a hypothetical transaction under both the previous Basel II Accord and the Basel III Accord. The hypothetical transaction will assume an exposure of 9.8 million and collateral of 10 million, without any currency mismatch. The collateral is assumed to be a high-grade (AAA rated) asset-backed security with a residual maturity greater than 10 years.

Basel II

Under the Basel II Accord, haircut applicable to the exposure and collateral was 2% (H_e) and 8% (H_c), respectively.⁴³⁶ Thus, the original exposure was allowed to be offset against 92% of the collateral value, as below:

$$E^*_{adjusted\ exposure} = \{9.8(1 + 0.02) - 10(1 - 0.08)\}$$

However, to determine the total RWA for the securitized banking transaction, this adjusted exposure needs to be multiplied by the counterparty risk weight. The counterparty to an interbank repo transaction is primarily other banks or

⁴³⁴ The Basel Committee on Banking Supervision (BCBS), 'Basel III: Finalising Post-Crisis Reforms' Standardised approach for credit risk D.3.iii.c.163 Table 14.

⁴³⁵ *ibid.*

⁴³⁶ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel II)' section II.D.3.ii.151.

securities firms. Thus, the applicable counterparty risk weight was 20%, corresponding to claims on banks and securities firms with highest credit rating.⁴³⁷

The RWA for a securitized banking transaction with risk mitigation are determined as:

$$\begin{aligned}
 RWA_{risk\ mitigation} &= E^*_{adjusted\ exposure} * RW_{counterparty} \\
 &= \{9.8(1 + 0.02) - 10(1 - 0.08)\} * 20\% \approx \\
 &0.16\text{million (mn)}
 \end{aligned}$$

The total counterparty credit risk charge applicable to a securitized banking transaction under the Basel II Accord was approximately 1.6% (RWA ÷ original exposure).

Basel III

Under the Basel III Accord, haircut applicable to the exposure remains 2% (H_c) but the haircut applicable to the collateral is increased to 16% (H_c).⁴³⁸ Thus, the original exposure can now be offset against only 84% of the collateral value, as below:

$$E^*_{adjusted\ exposure} = \{9.8(1 + 0.02) - 10(1 - 0.16)\}$$

The total RWA for the securitized banking transaction are determined by multiplying this adjusted exposure with the counterparty risk weight. The applicable counterparty risk weight remains 20%, corresponding to short-term claims on banks with investment grade rating.⁴³⁹ The RWA for a securitized banking transaction under the new risk mitigation framework are:

$$\begin{aligned}
 RWA_{risk\ mitigation} &= E^*_{adjusted\ exposure} * RW_{counterparty} \\
 &= \{9.8(1 + 0.02) - 10(1 - 0.16)\} * 20\% \approx 0.32\text{mn}
 \end{aligned}$$

⁴³⁷ *ibid* section II.A.4 & 5.

⁴³⁸ The Basel Committee on Banking Supervision (BCBS), 'Basel III: Finalising Post-Crisis Reforms' Standardised approach for credit risk D.3.iii.c.163 Table 14.

⁴³⁹ *ibid* A.4.a.18 Table 6.

The total counterparty credit risk charge applicable to a securitized banking transaction under the current Basel III Accord is approximately 3.3% (RWA ÷ original exposure).

Therefore, the Basel III Accord imposes higher capital requirements for similar securitized banking transactions, essentially doubling the total counterparty risk charge compared to that under the Basel II Accord. Thus, in first instance, the new Basel regime does strengthen the capital requirements and hence, makes securitized banking more expensive for banks. This is a positive development in the Basel standards as it is now more risk-sensitive to the complexities of securitized instruments and hence, requires banks to hold higher amounts of capital to take into account the higher risks associated with securitized banking.

Looking beyond the strengthened capital requirements, the new Basel regime continues to provide significant incentives for bank involvement in securitized banking. First, the exclusion of non-investment grade securitisation exposures from eligible collateral encourages banks to use investment grade securitized instruments, the quality of which might not be as stable as that perceived by market participants. Secondly, unrated securitized instruments and other debt securities are eligible collateral as long as they fulfil certain criteria, allowing banks to undertake repo transactions with unrated exposures, which might have similar or even higher risks than non-investment grade exposures. Thirdly, new financial instruments will fall under the non-securitisation category, subject to lower haircuts and hence, lower capital requirements. This further incentivises banks to develop innovative and complex financial instruments to use as collateral in repo markets, providing benefits similar to that from securitized banking but subject to lower capital requirements as these new instruments will be considered less risky than securitized exposures.

Therefore, the new Basel regime does not only continue to provide incentives for on-going bank involvement in securitized banking but also provides banks with new incentives, whereby using new financial instruments as collateral for repo transactions would provide an even cheaper source of short-term funding than securitized banking. Thus, regulation should not only eliminate the risk mitigation potential for securitized instruments but also new financial securities, especially those with complex risk profiles, should not be considered eligible for risk mitigation. In this instance, securitized banking or a repo transaction with any new financial instrument will be eliminated from the risk mitigation

framework. Without any risk mitigation benefits, the total RWA applicable to these transactions would be:

$$\begin{aligned} RWA_{no\ risk\ mitigation} &= Exposure * RW_{counterparty} = 9.8\ mn * 20\% \\ &= 1.96\ mn \end{aligned}$$

Hence, the total counterparty credit risk charge for a securitized banking transaction, or a repo transaction with a new financial instrument, will be 20% (RWA ÷ original exposure). This is significantly higher than the 1.6% and 3.3% charges under the Basel II and Basel III Accord, respectively.

The proposal for excluding securitized exposures, and other innovative financial instruments, from the risk mitigation framework should not be seen as a prohibition. The goal is to merely restrict securitized banking and repo transactions with new forms of collateral for necessary liquidity needs. This can be achieved by imposing higher capital requirements for such transactions and giving preferential treatment to those with ‘safe’ forms of collateral, such as high-grade government securities. This will promote on-going ‘good liquidity’ and restrict the growth of financial instruments with complex risks, which can lead to instability in financial markets. The recommendation does not suggest an ‘all-or-nothing’ approach to repo transactions but maintains that the increased risk inherent in the underlying collateral, securitized or other complex instruments, must be segregated from ‘safe’ collateral. However, this should not be at the expense of ‘good liquidity’ provided by repo transactions since it remains an effective and secure source of funding for financial institutions.

6.2.2. Counterparty – Capital for exposures between financial institutions

A second step should be to minimise the negative externalities due to increased linkages from bank involvement in repo transactions by strengthening the capital treatment for exposures between financial institutions. A suggestion is to increase risk weights for transactions between banks, specifically for securitized banking and repo transactions with innovative collateral.

The current regulatory regime, Basel III, lacks in this respect. The applicable risk weight for exposures to banks keeps the counterparty risk weight for repo transactions unchanged, with a floor of 20% for highly-rated and high-grade

banks.⁴⁴⁰ While the Basel II Accord assigned risk weights based only on the credit rating of banks, the Basel III Accord takes a step forward to reduce the reliance on external credit ratings by differentiating between jurisdictions that allow the use of external ratings for regulatory purposes and those that do not. However, under both approaches, counterparty risk weight for repo transactions will correspond to those applicable to short-term exposures since repo is an exposure to banks with a maturity of three months or less. Thus, in any jurisdiction, repo transactions with high-credit rating or a high-grade bank will receive a counterparty risk weight of 20%.⁴⁴¹

Thus, while the new Basel regime differentiates between a jurisdiction's use of credit ratings, it does little to improve the capital requirements for exposures between financial institutions as the applicable risk weight for counterparty remains unchanged from the preceding Basel II Accord. Moreover, while the current standards are risk-sensitive to the varying credit ratings of banks, prescribing higher risk weights to low-credit rating and low-grade banks, there is little differentiation in the risk weights for short-term exposures, which are significantly lower than those applicable to exposures longer than three months. Additionally, the risk-sensitivity to varying credit rating has little impact for repo transactions since post-financial crisis, interbank transactions are likely to be primarily undertaken between high-credit rating and high-grade banks to minimise default risk.

The recommendation for promoting *on-going* 'good liquidity' from 'safe' collateral through higher capital requirements for securitized banking and repo transactions with innovative financial collateral is also supported by increasing the counterparty risk weight and hence, capital requirements for such transactions. Thus, preferential treatment will be given to repo transactions with 'safe' forms of collateral, such as high-grade government securities. This will address the increased risks from interconnectedness between financial institutions, specifically with existing and new forms of complex financial instruments while encouraging 'good liquidity' in the banking sector.

In this instance, other regulatory tools, most prominently the EU Financial Transactions Tax is a step forward. It imposes a harmonized tax (0.1% of the market price) on all securities trading transactions to be paid by all involved

⁴⁴⁰ *ibid* A.4.a.18 & A.4.b.21.

⁴⁴¹ *ibid*.

financial institutions.⁴⁴² The goal is to increase the disincentives for certain transactions and reduce the size of the securities trading market. However, it is important to stress that imposing a tax on all inter-financial transactions can constrain the ‘good liquidity’ provided by repo collateralized with ‘safe’ securities. This observation has been made by the European Repo Council, claiming that the tax would cause the short-term repo market in Europe to contract by approximately 66%.⁴⁴³ The study argues for secured financing transactions, such as repo and securities lending, to be exempted from the tax, to maintain an efficient debt capital market and continued collateralisation in the financial markets.

While imposing a tax on all transactions between financial institutions is one extreme that will restrict all liquidity provided through repo markets, not accounting for the higher risk inherent in securitized or other complex instruments is another extreme that can lead to excessive liquidity in financial markets. Therefore, liquidity provided through securitized banking and repo with innovative financial collateral must be segregated from the ‘good liquidity’ provided from repo using ‘safe’ collateral.

Conclusion

This chapter focused on the current Basel regime, Basel III, to evaluate whether the current regulation has resolved the weaknesses of the preceding Basel Accords and if the incentives for bank involvement in securitized banking still prevail. The chapter also provided policy implications to address whether current policy should be reformed to regulate securitized banking transactions more effectively.

The chapter finds that the current Basel regime has made significant improvements to overcome the weaknesses of the previous Basel Accords by strengthening capital and leverage requirements, enhancing the risk management of securitized instruments, implementing a strict and objective boundary between the banking book and trading book and introducing a new liquidity framework which appropriately manages short-term liquidity and

⁴⁴² European Commission, ‘Proposal for a Council Directive Implementing Enhanced Cooperation in the Area of Financial Transaction Tax’, vol 45 (2013).

⁴⁴³ European Repo Council and Richard Comotto, ‘Collateral Damage: The Impact of the Financial Transaction Tax on the European Repo Market and Its Consequences for the Financial Markets and the Real Economy’ [2013] International Capital Market Association (ICMA) p. 3.

promotes long-term stability. However, with regard to on-going bank activities, the current Basel regime continues to incentivise bank involvement in securitized banking. The new Basel standards treat securitized banking transactions similar to those under the Basel II Accord, allowing banks to continue to take advantage from lower capital charges for securitized banking through risk mitigation. Although the capital requirements for securitized instruments are higher than before, the continuing opportunity of risk mitigation incentivizes banks to engage in securitized banking as it still remains a cheap source of funding as compared to other sources.

In this regard, proposed policy recommendations focus on the fact that while financial innovation can be beneficial to increase the liquidity in financial markets, such liquidity might not be socially desirable. Therefore, not all innovative collateral in repo transactions can be considered 'safe' and a source of 'good liquidity' for financial institutions. Thus, regulation should be more attuned to the risks inherent in innovative or complex financial instruments and stipulate higher capital requirements to account for their higher risks.

The chapter recommends that higher capital requirements should be imposed for securitized banking and repo transactions with innovative collateral by giving preferential treatment to repo with 'safe' forms of collateral, such as high-grade government securities. The proposal requires that firstly, securitized instruments and other innovative financial securities should not be considered eligible for risk mitigation and secondly, higher counterparty risk weights should be applicable to such transactions between financial institutions. This will constrain bank involvement in securitized banking and repo transactions with new forms of collateral while promoting the beneficial role of repo in providing 'good liquidity' with 'safe' collateral, thereby restricting the growth of instruments with complex risks which can lead to instability in financial markets.

Conclusion

Securitized banking – the use of securitized instruments as collateral in repo markets, became a new avenue for banks' private liquidity creation and has grabbed considerable attention for its contribution in the global financial crisis of 2007-09. The dissertation started by providing a theoretical overview of bank involvement in securitized banking and summarized the current literature in this regard.

Chapter 1 illustrated the mechanism of repo transactions and how they developed into a new kind of money-like instrument through securitized banking. Repo transactions are an important instrument for short-term financing, allowing financial institutions to borrow from each other for very short periods of time. Central to repo borrowing is the underlying collateral, reliability of which is crucial for the functioning of repo markets. In the years before the crisis, securitisation supported the development of high-grade securitized instruments which were perceived to carry the lowest risk and were considered as safe as government securities. This was the critical step in the innovation of securitized banking, as all market participants considered these high-grade securities reliable and safe to be used as collateral in repo transactions. While commercial banks were traditionally involved in repo transactions as lenders, securitized banking allowed them to expand their roles as borrowers and provided them with a new source of short-term borrowing. Consequently, securitized banking became an additional source of short-term funding (besides deposits) for banks using privately issued securities which created a private liquidity cycle for banks and therefore, increased liquidity in financial markets.

Chapter 2 highlighted the key literature regarding securitized banking and its role in the crisis. Securitized banking became a new source of banks' short-term funding, but the underlying vulnerabilities were similar to other forms of short-term debt. Literature has recognized the harmful social welfare effects from private liquidity creation and there is agreement on the instability caused by private security issuance which increases private liquidity but exposes the financial system to the risks of financial meltdown due to socially excessive leverage and liquidity. The key source of instability arises from the significant negative externalities from private liquidity creation through securitized banking, whereby the failure of individual banks can spread to other financial institutions and financial markets. As financial institutions had relied heavily on

short-term repo funding from each other using similar collateral, a shock in collateral value affected all market participants alike, transmitting weakness in one bank to other financial institutions. In the presence of such negative externalities, regulation plays an important role to make firms internalize the harmful social effects from their activities. However, in the aftermath of the crisis, bank regulation was found to be inadequate in fully incorporating the true risk of banks' activities and overlooked regulatory capital arbitrage, thereby imposing negative externalities on other financial institutions, and on society.

The dissertation focused on these shortcomings of the global financial regulatory framework and analysed the role of international capital regulation – the Basel Accords, to answer the overarching question of the role of capital regulation in encouraging bank involvement in securitized banking.

Incentives for Bank Involvement in Securitized Banking

In order to answer this central question, the dissertation started by examining the incentives inherent in the preceding Basel Accords to identify the presence of regulatory capital arbitrage for securitized banking. It evaluated the presence of regulatory arbitrage in the pre-crisis Basel Accords (Chapter 3) and the effectiveness of the immediate post-crisis regulatory response (Chapter 4) in eliminating these arbitrage opportunities. The objective was to examine differences between the capital charges for securitized banking through both dimensions of the balance sheet – the banking book and trading book, to identify the presence (or absence) of any capital arbitrage. The analysis focused on banks' rationale for minimising their capital requirements, thus asset allocation of securitized instruments would favour the balance sheet dimension with lower capital requirements and hence, securitized banking would primarily occur through the same dimension.

The dissertation finds that preceding the crisis, the presence of significant adverse incentives under both dimensions of the balance sheet encouraged bank involvement in securitized banking. Similar incentives existed for asset allocation of securitized instruments and securitized banking, both favouring the trading book. The pre-crisis Basel Accords allowed similar assets and transactions in the trading book to receive lower capital requirements than in the banking book. This created an arbitrage opportunity to reduce capital requirements and created significant adverse incentives for banks to allocate

securitized instruments and engage in securitized banking primarily through the trading book. This regulatory capital arbitrage opportunity provided banks with significant capital savings for securitized banking, making it cheaper in the trading book and hence, an inexpensive source of funding for banks.

With regards to the post-crisis regulatory response, the previous adverse incentives for asset allocation of securitized instruments persisted but favoured the banking book. While the post-crisis standards equalized capital requirements for securitized banking under both dimensions of the balance sheet, eliminating the previous opportunity for regulatory arbitrage, securitized instruments in the trading book were now subject to higher capital requirements. This created an arbitrage opportunity to reduce capital requirements and created significant adverse incentives for banks to allocate securitized instruments to the banking book. Thus, the adverse incentives for asset allocation prevailed and encouraged securitized banking to be undertaken primarily through the banking book. Moreover, the post-crisis Basel standards failed to strengthen the capital requirement for securitized banking, which remained subject to significantly low capital requirements as compared to deposit funding, creating incentives for banks to engage in repo funding and reduce their overall capital requirements. While the post-crisis regulatory response met its objective of strengthening the trading book capital requirements, the revisions did not eliminate the adverse incentives for asset allocation and securitized banking remained an inexpensive avenue for banks' short-term funding.

To support these theoretical findings, the dissertation relied on descriptive empirics to illustrate data trends for bank involvement in securitized banking in some of the largest European banks before and after the crisis. Both pre-crisis and post-crisis data trends support the theoretical findings of the analysis of the preceding Basel Accords. Pre-crisis data trends highlight the increased asset allocation towards the trading book and an increase in bank reliance on repo transactions in the years before the crisis. Post-crisis data trends show increased asset allocation towards the banking book and the continued bank reliance on repo funding in the years after the crisis in majority of the banks.

To summarize, the dissertation finds that the preceding Basel Accords, both pre-crisis and post-crisis, provided banks with significant adverse incentives to engage in securitized banking. The incentives were primarily borne out of opportunities for regulatory capital arbitrage, which allowed banks to lower their capital requirements through preferential balance sheet allocation and capital treatment of securitized banking transactions. These lower capital

requirements made securitized banking an inexpensive source of short-term funding and encouraged bank involvement in securitized banking.

Basel Implementation in Emerging Economies

As the Basel Accords are the global benchmark for bank capital regulation, in Chapter 5 the dissertation evaluated the impact of Basel implementation and investigated the international dimension of securitized banking and bank behaviour. The aim was to examine whether national implementation of the Basel Accords also transpose the underlying incentives for securitized banking, thereby encouraging similar bank behaviour.

The focus was limited to Emerging Economies (EMEs) as they play an important role in the global economy and are major drivers for global growth. The inability of EMEs to shield themselves from shocks in advanced economies was evident in the global financial crisis as the adverse impacts were transmitted to countries worldwide. The Basel Accords were not intended for the financial systems of EMEs but these standards became the benchmark for regulatory strength and financial stability, implemented by countries worldwide. Therefore, global implementation of the Basel Accords would also transpose the incentives inherent in these Accords and thus, banks in EMEs would face similar incentives for securitized banking as those in advanced economies under the preceding Basel Accords.

EMEs were chosen based on the presence of the fundamental components of securitized banking, namely the availability of securitized collateral in the national banking system and the eligibility of securitized instruments to be used as collateral in repo markets. Following these criteria and due to certain data limitations, two EMEs with developed financial markets for securitized banking were chosen, namely South Africa and Malaysia. To examine the incentives transposed with Basel implementation, under both pre-crisis and post-crisis Basel Accords, the structure and methodology of the previous chapters were followed to identify the presence of regulatory capital arbitrage by comparing the capital requirements for securitized banking under different balance sheet dimensions.

The dissertation finds that Basel implementation in both South Africa and Malaysia transposed the incentives inherent in these Accords. Pre-crisis regulation in both countries created adverse incentives for asset allocation of

securitized instruments and securitized banking, akin to those inherent in the pre-crisis Basel Accords. Similar results are also present for the post-crisis Basel implementation in both countries, with continuing incentives for asset allocation of securitized instruments and hence, securitized banking. Following the preceding Basel Accords, opportunities for regulatory capital arbitrage incentivised banks to lower their capital requirements and hence, securitized banking became an inexpensive source of funding for banks within these countries. To support these theoretical findings, the dissertation used descriptive statistics to illustrate data trends within the national banking sectors of both South Africa and Malaysia, revealing bank involvement in securitized banking before and after the crisis. Both pre-crisis and post-crisis data trends of these countries' banking sectors support the theoretical findings and illustrate that banks in both countries face incentives for securitized banking similar to those inherent in the Basel Accords.

The dissertation illustrates that EMEs, both Basel Committee member and non-member states, were similarly affected by Basel implementation and transposed the adverse incentives inherent in the Basel Accords. Consequently, global implementation of the Basel Accords supports similar bank behaviour and hence, similar incentives for securitized banking.

Current Regulatory Regime

To examine the current Basel regime – Basel III, chapter 6 evaluates whether the current regulation has resolved the weaknesses of the preceding Basel Accords for securitized banking and if the incentives for bank involvement in securitized banking still prevail.

The dissertation finds that the current Basel regime has made several improvements to the global regulatory framework. Capital and leverage requirements have been strengthened by imposing higher common equity requirements to improve the loss absorbency capacity and restrain build-up of systematic risk and leverage within the banking sector. The standards also recognise the significance of global systemically important banks (G-SIBs), which are now subject to additional equity and leverage requirements to restrict their global systemic importance. The crucial role of liquidity within the financial system is also incorporated in the new liquidity framework, which appropriately manages short-term liquidity and promotes long-term stability.

The Basel III Accord has also made significant changes to overcome the weaknesses of the previous Basel Accords. The current Basel regime successfully eliminates the adverse incentives present in the preceding Basel Accords for asset allocation and regulatory arbitrage between the two dimensions of the balance sheet. The boundary between the banking book and trading book is strengthened by establishing an objective criterion for asset allocation while stricter limits and capital disincentives are imposed to the transfer of instruments between the two regulatory books to eliminate opportunities for regulatory arbitrage. The revised standards have notably improved the risk management of securitized instruments by strengthening the capital requirements for securitized exposures in both the banking and trading book. Moreover, the current Basel standards now incorporate the risks from more complex re-securitisation instruments and other risk-sensitivities that were previously not accounted for.

To assess whether the current Basel regime continues to incentivise bank involvement in securitized banking, the dissertation focuses on on-going bank activities and finds that the Basel III Accord has shown little improvement in this regard. The new Basel standards treat securitized banking transactions similar to those under the post-crisis Basel Accord, allowing banks to continue to take advantage from lower capital charges for securitized banking transactions. Although the capital requirements for securitized instruments are higher than before, using these assets as collateral in a repo transaction – a securitized banking transaction, is subject to lower capital requirements, akin to those under the post-crisis Basel Accords. These lower capital requirements make securitized banking a cheaper source of funding than others and incentivise banks to engage in securitized banking as an inexpensive source of short-term funding. Therefore, the current Basel regime – Basel III, continues to incentivise bank involvement in securitized banking.

Assessment of the incentives inherent in the current Basel regime was the last element to consider in order to answer the central question of the dissertation i.e. “What is the role of the Basel Accords in encouraging bank involvement in securitized banking?”. The dissertation provides significant evidence that the preceding Basel Accords played a vital role in encouraging bank involvement in securitized banking. While regulation should provide banks with appropriate incentives to internalize the social costs from their activities and behaviour, the regulatory arbitrage opportunities present in the preceding Basel Accords provided banks with significant adverse incentives to engage in securitized banking. Moreover, the lax capital requirements for securitized banking

transactions under the current Basel regime continues to incentivise bank involvement in securitized banking, irrespective of the risks underlying these transactions. Consequently, securitized banking continues to remain an inexpensive source of short-term funding for banks.

Policy Implications

After answering the overarching research question, the dissertation takes a step further to address whether and how the current regulation should be reformed to regulate securitized banking transactions more effectively.

The focus was on the failure of the current Basel regime to incorporate the risks from securitized banking by examining the use of assets as collateral in ongoing repo transactions. The main aspect of the Basel III Accord that continues to incentivise bank involvement in securitized banking is the risk mitigation standard, which allows transactions secured by eligible collateral to be subject to lower capital requirements than unsecured transactions. Assets eligible for this reduction in capital continue to include securitized instruments, allowing banks to lower capital requirements for securitized banking than if they were to be treated as unsecured funding. Moreover, assets considered eligible for risk mitigation also include all other privately issued debt securities. Since the current Basel regime strengthens the capital requirements for securitized instruments, other debt securities are now subject to lower capital requirements. Hence, the current standards are stricter for repo transactions with securitized collateral than with other debt securities. Therefore, the new Basel regime does not only continue to provide incentives for securitized banking but also provides banks with incentives to use new financial instruments as collateral for repo transactions, which would provide them with an even cheaper source of short-term funding than securitized banking.

While strengthening oversight of securitized instruments will constrain their production and use in securitized banking, this asset-specific regulation will also support the development of new and innovative financial instruments that can be used as collateral in repo transactions. The global financial crisis was evidence that although financial innovation can be beneficial to increase the liquidity in financial markets, such liquidity might not be socially desirable and hence, not all innovative collateral used in repo transactions should be considered 'safe' and a source of 'good liquidity'. Thus, regulation should be

more attuned to the risks inherent in innovative or complex financial instruments and stipulate higher capital requirements to account for their higher risks while preserving the creation of liquidity by the banking system.

In this regard, the dissertation provides policy implications for better regulation to incorporate the risks of not only securitized banking but also repo transactions with new innovative collateral in the future, which might have risks similar to securitized banking but will not be regulated in the same way. The dissertation recommends that higher capital requirements should be imposed for securitized banking and repo transactions with innovative collateral by giving preferential treatment to repo with 'safe' forms of collateral, such as government securities. This can be achieved firstly, by making securitized instruments and other innovative financial securities ineligible for risk mitigation, excluding them from receiving lower capital charges when used as collateral in repo transactions. Secondly, higher capital requirements should be applicable to securitized banking and repo with innovative collateral between financial institutions, to minimise the negative externalities due to increased financial linkages from such transactions.

These recommendations will constrain bank involvement in securitized banking and repo transactions with new forms of collateral while promoting the beneficial role of repo in providing 'good liquidity' with 'safe' collateral. The dissertation does not recommend an 'all-or-nothing' approach to repo transactions but maintains that the increased risk inherent in the underlying collateral, securitized or other complex instruments, must be segregated from traditional 'safe' collateral. Repo transactions were, and will continue, to remain a vital source of short-term funding for banks and the 'good liquidity' provided by repo transactions with 'safe' collateral should be preserved as the key source of liquidity for financial institutions.

Limitations and Recommendations for Future Research

The primary limitation of this dissertation pertains to the empirical strategy. An extensive empirical analysis could not be undertaken to assess the causal impact of Basel Accords on bank involvement in securitized banking due to the unavailability of transaction level repo data. Historical data on repos was either not collected or the information required could not be accessed under information protection laws. Therefore, a descriptive empirical strategy was

chosen, which used proxy data variables to reflect the potential for these transactions and demonstrate bank involvement in securitized banking. Thus, the data trends do not show genuine presence (or absence) of securitized banking and there might be other driving factors influencing the trends. Similar limitations were also present in the analysis of Basel implementation in EMEs. Due to informational limitations (unavailability of historical data and regulations) and language barriers (inability to access required data), some countries could not be examined and hence, a complete overview of the impact of Basel implementation in EMEs could not be provided.

There are also several aspects of Basel Accords and securitized banking that could not be incorporated in this dissertation and can form the basis for future research. Some recommendations are below:

- i. Differentiating between different types of securitized instruments for use as collateral in repo. This will shed light on whether only certain types of securitized instruments were considered safe by market participants.
- ii. Extent of securitized banking within the shadow banking system. This will highlight the use of securitized banking by other financial institutions besides banks as repo transactions are the main source of short-term funding for shadow banks. Moreover, it will illustrate the complex financial linkages created between different financial institutions in different financial markets.
- iii. Securitized banking within the universal banking model. Evaluating whether segregation of securitized banking between commercial banking and investment banking is economically efficient. For instance, segregation can restrict the commercial banking arm to use only safe collateral while the investment banking arm can undertake the risky transactions with securitized and innovative instruments.
- iv. Inclusion of EMEs as Basel Committee member states. EMEs are now actively involved in the standard setting process and future research can illustrate whether the Basel standards now accommodate and incorporate the different financial systems of EMEs.
- v. Basel implementation and enforcement. This can shed light on the differences in bank behaviour when agreement is reached on the timeline of Basel implementation and after they are enforced within national laws.

Appendices

Appendix I: The Basel Accords

Appendix II: Applicable risk weights under the Basel Accords

Appendix III: SOUTH AFRICA – Basel Timeline

Appendix IV: MALAYSIA – Basel Timeline

Appendix V: SOUTH AFRICA – Applicable risk weights

Appendix VI: MALAYSIA – Applicable risk weights

Appendix II: Applicable risk weights under the Basel Accords

I. Pre-Crisis Basel Accords

(a) *Banking Book (Basel I)*

1. **Asset-backed Security: Risk weight 20%**¹

- 1.1. Claims on banks incorporated in the OECD and claims guaranteed by OECD incorporated banks.
- 1.2. Claims on securities firms incorporated in the OECD subject to comparable supervisory and regulatory arrangements, including in particular risk-based capital requirements, and claims guaranteed by these securities firms.

2. **Repo: Risk weight 20%**²

- 2.1. Sale and repurchase agreements and asset sales with recourse, where the credit risk remains with the bank are assigned a credit conversion factor (CCF) of 100%.
- 2.2. These items are to be weighted according to the type of asset and not according to the type of counterparty with whom the transaction has been entered into. *The applicable risk weight corresponds to that for an asset-backed security.*

(b) *Trading Book (Market Risk Amendment)*

1. **Asset-backed Security: Risk weight 0.25 - 14.10%**

- 1.1. Specific Risk (0.25 – 1.60%)³: Qualifying category including securities that are rated investment grade by authorized credit rating agencies. Risk weights vary according to residual term to maturity.
- 1.2. General Risk (0 – 12.50%)⁴: This calculation applies to the securities positions in the entire trading book. Under the maturity method, risk weights for debt securities correspond to their coupon payments and residual term to maturity.
- 1.3. Specific risk capital charges for an investment grade and a non-investment grade securitization exposure under the standardised approach:

¹ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel I)' (1998) annex 2.

² *ibid* annex 3, 4. ft 1.

³ The Basel Committee on Banking Supervision (BCBS), 'Amendment to the Capital Accord to Incorporate Market Risks' (1996) pt A, sec A.1.I, 4-6.

⁴ *ibid* pt A, sec A.1.II, 8-12.

Qualifying Category: Investment Grade (AAA to BBB)			
	less than 6 months	between 6 and 24 months	greater than 24 months
Residual term to maturity			
Specific Risk weight	0.25%	1.00%	1.60%
General Risk weight	0% - 0.4%	0.70 – 1.25%	1.25-12.50%
Minimum Total Market Risk	0.25%	1.70%	2.85%
Maximum Total Market Risk	0.65%	2.25%	14.10%

Other Category: Non-Investment Grade (BB and below)			
	less than 6 months	between 6 and 24 months	greater than 24 months
Residual term to maturity			
Specific Risk weight	8.00%	8.00%	8.00%
General Risk weight	0% - 0.4%	0.70 – 1.25%	1.25-12.50%
Minimum Total Market Risk	8.00%	8.70%	9.25%
Maximum Total Market Risk	8.40%	9.25%	20.25%

2. Repo: Risk weight 0.25 - 14.10%

- 2.1. A security which is the subject of a repurchase or securities lending agreement will be treated as if it were still owned by the lender of the security, i.e., it will be treated in the same manner as other securities positions.⁵ *(The applicable risk weight corresponds to that for an asset-backed security)*

II. Post-Crisis Basel Accords

(a) Banking Book (Basel II)

1. Asset-backed Security (AAA to AA-/A-1/P-1): Risk weight 20% under the Securitization Framework

- 1.1. Retained or repurchased securitization exposures needed to be accounted for in regulatory capital.⁶
- 1.2. Risk weights are determined dependent on the credit ratings of the securitized tranches. Long-term ratings range from AAA – BB+ with risk weights of 20 - 350% and short-term ratings range from A-1/P-1 – A-3/P-3 with risk weights of 20 - 100% respectively.⁷

⁵ ibid pt A, sec A.1.1, ft 9.

⁶ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel II)' (2006) pt 2, sec IV.D.1.560.

⁷ ibid pt 2, sec IV.D.3.(ii).567.

2. Repo: Risk weight < 20% under the Credit Risk Mitigation Framework

- 2.1. Where banks take eligible financial collateral, they are allowed to reduce their credit exposure to a counterparty when calculating their capital requirements to take account of the risk mitigating effect of the collateral.⁸
- 2.2. Banks may opt for either the simple approach (subject to a 20% floor) or for the comprehensive approach, which allows fuller offset of collateral against exposures, by effectively reducing the exposure amount by the value ascribed to the collateral.⁹
- 2.3. The comprehensive approach recognised the risk mitigating effect of collateral by calculating the adjusted credit exposure, which was then assigned a corresponding counterparty risk weight, as below:¹⁰

$$RWA_{after\ risk\ mitigation} = E^*_{adjusted\ exposure} * RW_{counterparty}$$

$$E^*_{adjusted\ exposure} = \max\{0, [E(1 + H_e) - C(1 - H_c - H_{fx})]\}$$

Where: E = current value of the exposure, H_e = haircut appropriate to exposure, C = the value of the collateral received, H_c = haircut appropriate to collateral, H_{fx} = haircut appropriate for currency mismatch between collateral and exposure

- 2.4. Standard supervisory haircuts range from zero (cash) to 25% (non-main index equities) where those for debt securities depend on their issue rating, residual maturity and type of issuer (sovereigns, banks or corporates).¹¹
- 2.5. Example of the calculation of risk-weighted assets for a repo transaction under different collateral scenarios, with an exposure and collateral amount of 9.8 million and 10 million respectively, without any currency mismatch, are as follows:

Where: E = 9.8 million, C = 10 million, H_e = 2%, H_{fx} = 0%, RW_{counterparty} = 20% (banks and securities firms with highest credit rating)¹²

- (i) Collateral: AAA asset-backed security, residual maturity less than 1 year (H_c=1%)

$$RWA_{risk\ mitigation} = \{9.8(1 + 0.02) - 10(1 - 0.01)\} * 20\% \approx 0.02mn$$

⁸ ibid pt 2, sec II, D.2.(i).120 & D.3.(i).

⁹ ibid pt 2, sec II.D.2.(i).121.

¹⁰ ibid, pt 2, sec II, D.3.(ii).147-8.

¹¹ ibid pt 2, sec II.D.3.(ii).151.

¹² ibid pt 2, sec II.A.4 & 5.

(ii) Collateral: AAA rated asset-backed security, residual maturity greater than 5 years ($H_c=8\%$)

$$RWA_{risk\ mitigation} = \{9.8(1 + 0.02) - 10(1 - 0.08)\} * 20\% \approx 0.16mn$$

(iii) Collateral: Non-investment grade (BB) rated junk bond issued by sovereigns ($H_c=15\%$)

$$RWA_{risk\ mitigation} = \{9.8(1 + 0.02) - 10(1 - 0.15)\} * 20\% \approx 0.3mn$$

(iv) Collateral: Non-investment grade (BB) rated junk bond issued by non-sovereign entities (*not eligible collateral*)

$$RWA = Exposure * RW_{counterparty} = 9.8\ mn * 20\% = 1.96\ mn$$

Therefore, the *total* counterparty credit risk charge (RWA/original exposure) in all the scenarios with eligible financial collateral is much lower than the 20% charge without risk mitigation. Due to the range of possible scenarios, it suffices to say that under the risk mitigation framework, the adjusted exposure will be lower than the original, implying that the total credit risk charge must be lower than 20%.

(b) Trading Book (Basel 2.5)

1. Asset-backed Security (AAA to AA-/A-1/P-1): Risk weight > 20% under the Securitization Framework

- 1.1. For securitised products, the capital charges of the banking book will apply and the standardised measurement method will in general be applied to these products.¹³
- 1.2. The specific risk of securitisation positions which are held in the trading book is to be calculated according to the method used for such positions in the banking book unless specified otherwise. To that effect, the risk weight has to be calculated and applied to the net positions in securitisation instruments in the trading book.¹⁴

The applicable risk weights are similar to those under the securitization framework in the banking book i.e. 20% for a high credit rating securitization exposure. However, the new trading book regime applies an additional specific risk charge to the *net positions* in the security. Therefore, the overall risk weight is likely to be greater than 20% for the *securitisation portfolio* but the precise calculation is beyond the scope of this thesis.

¹³ The Basel Committee on Banking Supervision (BCBS), 'Revisions to the Basel II Market Risk Framework' (2009) 1. & I.9.

¹⁴ *ibid* IV.18.712(iii).

2. Repo: Risk weight < 20% under the Credit Risk Mitigation Framework

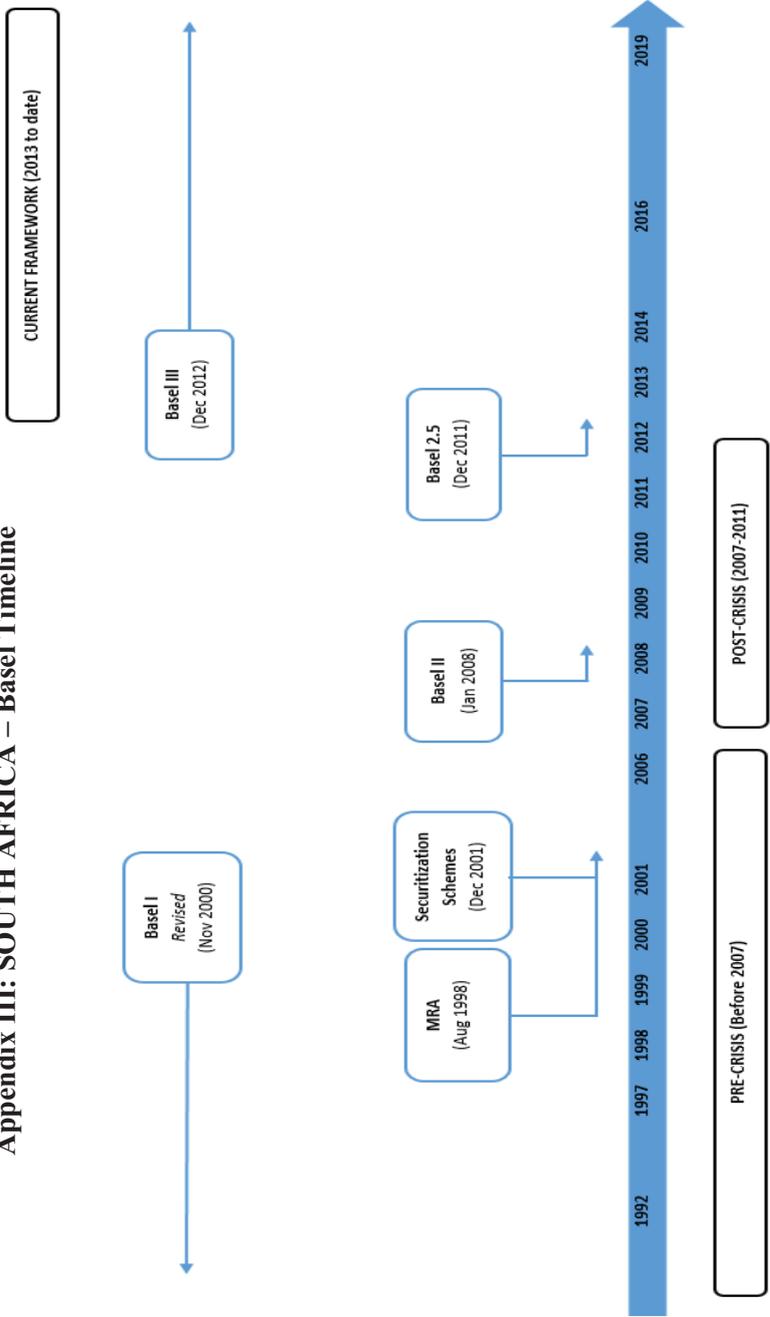
- 2.1. Banks may operate only under the comprehensive approach in the trading book which will be applied to OTC derivatives and repo transactions.¹⁵
- 2.2. Regardless of where they are booked, all repo-style transactions are subject to a banking book counterparty credit risk charge.¹⁶
- 2.3. Banks will be required to calculate the counterparty credit risk charge for OTC derivatives, repo-style and other transactions booked in the trading book, separate from the capital charge for general market risk and specific risk. The risk weights to be used in this calculation must be consistent with those used for calculating the capital requirements in the banking book.¹⁷ (*The applicable risk weight calculation is similar to that for a banking book repo transaction using the comprehensive approach*)

¹⁵ The Basel Committee on Banking Supervision (BCBS), 'International Convergence of Capital Measurement and Capital Standards (Basel II)' pt 2, sec II, D.1.(ii).112 & D.2.(i).121.

¹⁶ *ibid* pt 2, sec VI.A.1.689.(iii).

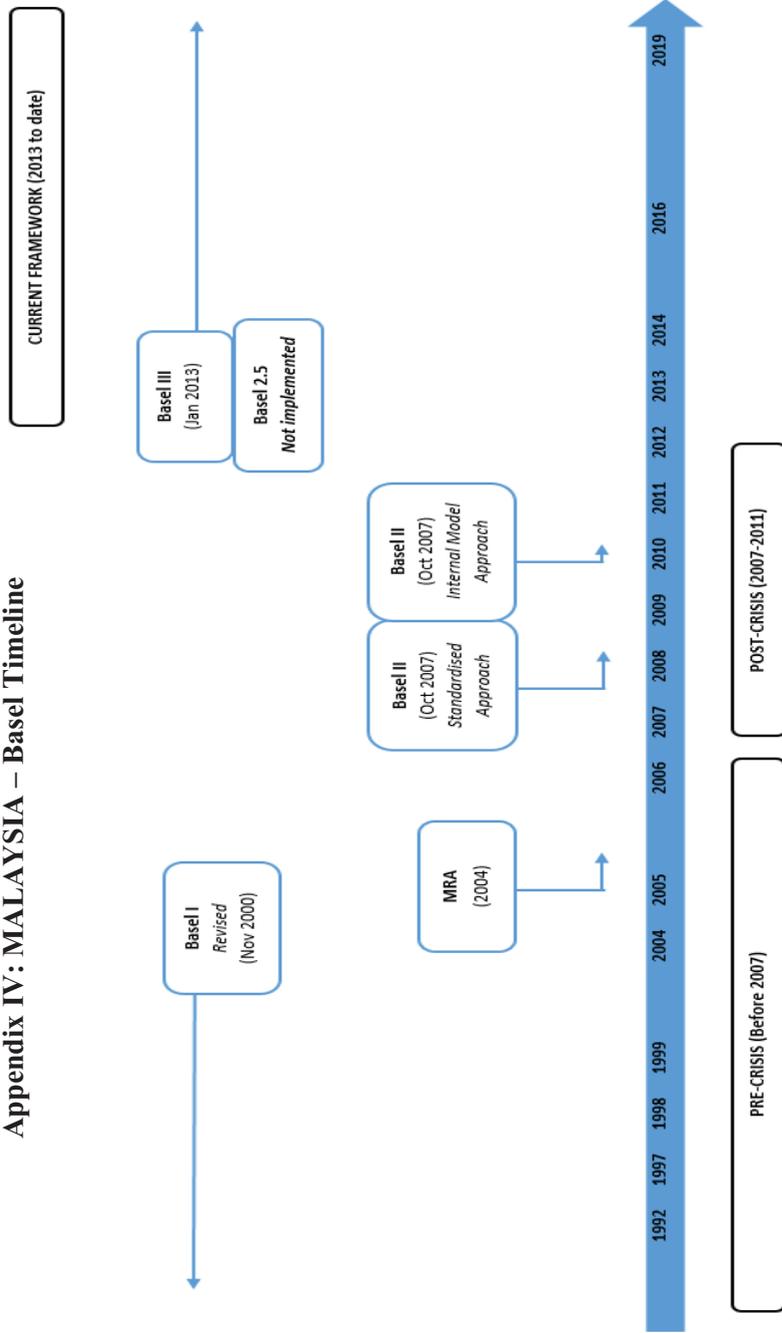
¹⁷ *ibid* pt 2, sec VI.A.4.702.

Appendix III: SOUTH AFRICA – Basel Timeline



Note: The arrows correspond to the intended date of implementation.

Appendix IV: MALAYSIA – Basel Timeline



Note: The arrows correspond to the intended date of implementation.

Appendix V: SOUTH AFRICA – Applicable risk weights

I. Pre-Crisis Basel Accords

(a) Banking Book (Regulations Relating to Banks - Basel I)

1. Asset-backed Security: Risk weight 20%¹

1.1. Transactions with and assets issued by banks and securities firms incorporated in the Republic of South Africa and OECD countries.

2. Repo: Risk weight 20%

2.1. Investments in securities issued by a special purpose vehicle in terms of a securitisation scheme shall attract the risk weighting applicable to the underlying asset securitised.²

2.2. When loans, advances, leasing transactions, suspensive sale transactions, off balance sheet lending transactions, counterparty risk exposures and large exposures are – (b) secured by the pledge of assets that attract a lower risk weighting than the transactions or exposures themselves, the risk weightings applicable to the assets pledged shall apply.³ *(The applicable risk weight corresponds to that for an asset-backed security)*

(b) Trading Book (CAR for banks trading activities - Market Risk Amendment)

1. Asset-backed Security:

1.1. A bank may enter into transactions included in the trading book of a bank with a special purpose institution under certain conditions. If the conditions are met, the provisions of CAR for banks trading activities shall apply to such transactions.⁴

¹ Regulations Relating to Banks (8 November 2000), ch II, Regulation 21, (9).

² *ibid* ch II, Regulation 16, (6).

³ *ibid* ch II, Regulation 21, (14), 6-9 (b).

⁴ Securitisation Schemes (13 December 2001), 9 (a)-(b).

Simplified Approach (Basel I): Capital Requirement 10.00 - 30.00%⁵

LOAN STOCK⁶			
	Marketable securities issued by other parties		
Residual term to maturity	Less than 1 year	Less than 3 years	More than 3 years
Required Capital	10% of MV	20% of MV	30% of MV

Building - Block Approach (Standardised Approach): Risk weight 0.25 - 14.10%

- 1.2. Specific Risk (0.25 – 1.60%)⁷: Qualifying category includes all loan stock listed on the Bond Market Exchange, or any other financial exchange listed loan stock approved by the Financial Services Board. Risk weights vary according to residual term to maturity.
- 1.3. General Risk (0-12.50%)⁸: This calculation applies to the securities positions in the entire trading book. Under the maturity method, risk weights for debt securities correspond to their coupon payments and residual term to maturity.
- 1.4. Capital charges for a listed asset-backed security under the building-block approach:

Qualifying Category (LISTED on Bond Market Exchange)			
Residual term to maturity	less than 6 months	between 6 and 24 months	greater than 24 months
Specific Risk weight	0.25%	1.00%	1.60%
General Risk weight	0% - 0.40%	0.70-1.25%	1.25-12.50%
Minimum Total Market Risk	0.25%	1.70%	2.85%
Maximum Total Market Risk	0.65%	2.25%	14.10%

2. Repo: Risk weight < 20%⁹

- 2.1. The counterparty-risk requirement shall be calculated by multiplying the counterparty exposure by the counterparty risk weight i.e. Risk-weighted Assets (RWA) = Exposure x Counterparty risk weight.

⁵ CAR for banks trading activities in financial instruments (21 August 1998) & as amended (5 October 2001), ch 4, Regulation 14 (Method 1) Table 3.

⁶ Loan stock refers to financial instruments (including debt securities) which evidence the existence of a debt between a borrower (issuer) and one or more lenders.

⁷ CAR for banks trading activities in financial instruments (21 August 1998) & as amended (5 October 2001) ch 4, Regulation 15 (Method 2) Table 4.

⁸ ibid ch 4, Regulation 15 (Method 2) Table 5.

⁹ ibid ch 5, Regulation 21 Table 11.

Exposure	
Qualifying debt instruments	Market Value less 105% of related funds or collateral
Other securities notional value	Notional Value less 110% of related funds or collateral

Counterparty Risk Weight	
Transactions settled through exchange	10%
Banks in RSA and OECD countries	20%
Other counterparty	100%

Since exposure takes into account the risk mitigating effect of collateral, only the uncollateralized portion of the repo transaction will be subject to risk weight calculation. The counterparty risk weight applicable for repo transactions between banks is 20%. Due to the range of possible scenarios, it suffices to say that the *total* credit risk charge (RWA/original exposure) will be lower than 20%.

II. Post-Crisis Basel Accords

(a) Banking Book (Regulations Relating to Banks - Basel II)

1. Asset-backed Security (AAA to AA-/A-1/P-1): Risk weight 20%

- 1.1. Risk weights are dependent on the credit ratings of the securitized tranches. Long-term ratings range from AAA – BB+ with risk weights of 20 - 350% and short-term ratings range from A-1/P-1 – A-3/P-3 with risk weights of 20 - 100% respectively.¹⁰

2. Repo: Risk weight < 20% - Credit Risk Mitigation

- 2.1. Banks may opt for either the simple approach (subject to a 20% floor) or for the comprehensive approach, which allows fuller offset of collateral against exposures, by effectively reducing the exposure amount by the value ascribed to the collateral.¹¹
- 2.2. The comprehensive approach recognised the risk mitigating effect of collateral by calculating the adjusted credit exposure, which was then assigned a corresponding counterparty risk weight, as below:¹²

$$RWA_{after\ risk\ mitigation} = E^*_{adjusted\ exposure} * RW_{counterparty}$$

¹⁰ Regulations Relating to banks (15 December 2011), ch II, Regulation 23, (h)(i) Table 3.

¹¹ *ibid* ch II, Regulation 23, 7(b)(v) and 9(b)(i).

¹² *ibid* ch II, Regulation 23, 9(b)(viii)(A).

$$E^* \text{ adjusted exposure} = \max\{0, [E(1 + H_e) - C(1 - H_c - H_{fx})]\}$$

Where: E = current value of the exposure, H_e = haircut appropriate to exposure, C = the value of the collateral received, H_c = haircut appropriate to collateral, H_{fx} = haircut appropriate for currency mismatch between collateral and exposure

2.3. Standard supervisory haircuts range from zero (cash) to 25% (non-main index equities) where those for debt securities depend on their issue rating, residual maturity and type of issuer (sovereigns, banks or corporates).¹³

2.4. Example of the calculation of risk-weighted assets for a repo transaction under different collateral scenarios, with an exposure and collateral amount of 9.8 million and 10 million respectively, without any currency mismatch, are as follows:

Where: E = 9.8 million, C = 10 million, H_e = 2%, H_{fx} = 0%, $RW_{counterparty} = 20\%$ (banks and securities firms with highest credit rating)¹⁴

(i) Collateral: AAA rated asset-backed security, residual maturity less than 1 year (H_c=1%)

$$RWA_{risk\ mitigation} = \{9.8(1 + 0.02) - 10(1 - 0.01)\} * 20\% \approx 0.02mn$$

(ii) Collateral: AAA rated asset-backed security, residual maturity greater than 5 years (H_c=8%)

$$RWA_{risk\ mitigation} = \{9.8(1 + 0.02) - 10(1 - 0.08)\} * 20\% \approx 0.16mn$$

Therefore, the *total* counterparty credit risk charge (RWA/original exposure) in all the scenarios with eligible financial collateral is much lower than the 20% charge without risk mitigation. Due to the range of possible scenarios, it suffices to say that under the risk mitigation framework, the adjusted exposure will be lower than the original, implying that the total credit risk charge must be lower than 20%.

(b) Trading Book (Regulations Relating to Banks - Basel 2.5)

1. Asset-backed Security (AAA to AA-/A-1/P-1): Risk weight > 20%

1.1. A bank that adopted the standardised approach for the measurement of the bank's exposure to market risk shall in the case of a securitisation exposure calculate the bank's specific risk capital requirement in accordance with those applied in the banking book. Moreover, an additional specific risk weight is applicable to externally rated net securitization positions.¹⁵

¹³ *ibid* ch II, Regulation 23, 9(b)(xi) Table 11.

¹⁴ *ibid* ch II, Regulation 23, 8(a) Table 9.

¹⁵ *ibid* ch II, Regulation 28, 7(b)(ii)(C).

The applicable risk weights are similar to those in the banking book i.e. 20% for a high credit rating securitization exposure. However, the new trading book regime applies an additional specific risk charge to the *net positions* in the security. Therefore, the overall risk weight is likely to be greater than 20% for the *securitisation portfolio* but the precise calculation is beyond the scope of this thesis.

2. Repo: Risk weight < 20% - Credit Risk Mitigation

- 2.1. For bank exposures to credit risk secured by the pledge of eligible financial collateral, banks may operate only under the comprehensive approach in the trading book.¹⁶
- 2.2. Banks will be required to calculate the counterparty credit risk charge for repo transactions booked in the trading book by using the comprehensive approach to credit risk mitigation, consistent with those under the same approach in the banking book.¹⁷ *(The applicable risk weight calculation is similar to that for a banking book repo transaction using the comprehensive approach)*

¹⁶ *ibid* ch II, Regulation 23, 9(b)(i).

¹⁷ *ibid* ch II, Regulation 28, 6(i).

Appendix VI: MALAYSIA – Applicable risk weights

I. Pre-Crisis Basel Accords

(a) Banking Book (Capital Adequacy Framework - Basel I)

1. Asset-backed Security: Risk weight 20%

1.1. Claims (all maturities) on, securities issued by licensed banking institutions in Malaysia (including branches of foreign banking institutions operating in Malaysia).¹

2. Repo: Risk weight 20%

2.1. Claims (all maturities) collateralised by securities issued by licensed banking institutions in Malaysia (including branches of foreign banking institutions operating in Malaysia). This includes repo transactions with instruments with licensed banking institutions, which are treated as collateralised loans.² *(The applicable risk weight corresponds to that for an asset-backed security)*

(b) Trading Book (Capital Adequacy Framework - Market Risk Amendment)

1. Asset-backed Security: Risk weight 0.25 – 9.60%

1.1. Specific Risk (0.25 – 1.60%)³: Financial institutions category includes interest rate related financial instruments issued and guaranteed by licensed banking institutions.

1.2. General Risk (0-8.00%)⁴: This calculation applies to the securities positions in the entire trading book. Under the maturity method, risk weights for debt securities correspond to their coupon payments and residual term to maturity.

1.3. Capital charges for a highly rated asset-backed security issued by a licensed banking institution:

Financial Institutions Category			
Residual term to maturity	less than 6 months	between 6 and 24 months	greater than 24 months
Specific Risk weight	0.25%	1.00%	1.60%
General Risk weight	0% - 0.50%	0.80-1.30%	1.90-8.00%
Minimum Total Market Risk	0.25%	1.80%	3.50%
Maximum Total Market Risk	0.75%	2.30%	9.60%

¹ Capital adequacy framework (Basel I – Risk-weighted Assets Computation), Part B, 4.3.

² *ibid* pt B, 4.3.

³ *ibid* pt C, 11.2, Table 4.

⁴ *ibid* pt C, 11.3, Table 5.

2. Repo: Risk weight 0.25 – 9.60%

- 2.1. Repo transactions are treated in the same manner as other securities positions i.e. they are subject to a specific and general market risk requirement. *(The applicable risk weight corresponds to that for an asset-backed security)*⁵

II. Post-Crisis Basel Accords

(a) Banking Book (Capital Adequacy Framework - Basel II)

1. Asset-backed Security (AAA to AA-/A-1/P-1): Risk weight 20%

- 1.1. Risk weights are dependent on the credit ratings of the securitized tranches. Long-term ratings range from AAA – BB+ with risk weights of 20 - 350% and short-term ratings range from A-1/P-1 – A-3/P-3 with risk weights of 20 - 100% respectively.⁶

2. Repo: Risk weight < 20% - Credit Risk Mitigation

- 2.1. Banks may opt for either the simple approach (subject to a 20% floor) or for the comprehensive approach, which allows fuller offset of collateral against exposures, by effectively reducing the exposure amount by the value ascribed to the collateral.⁷
- 2.2. The comprehensive approach recognised the risk mitigating effect of collateral by calculating the adjusted credit exposure, which was then assigned a corresponding counterparty risk weight, as below:⁸

$$RWA_{after\ risk\ mitigation} = E^*_{adjusted\ exposure} * RW_{counterparty}$$

$$E^*_{adjusted\ exposure} = \max\{0, [E(1 + H_e) - C(1 - H_c - H_{fx})]\}$$

Where: E = current value of the exposure, H_e = haircut appropriate to exposure, C = the value of the collateral received, H_c = haircut appropriate to collateral, H_{fx} = haircut appropriate for currency mismatch between collateral and exposure

- 2.3. Standard supervisory haircuts range from zero (cash) to 25% (non-main index equities) where those for debt securities depend on their issue rating, residual maturity and type of issuer (sovereigns, banks or corporates).⁹
- 2.4. Example of the calculation of risk-weighted assets for a repo transaction under different collateral scenarios, with an exposure and collateral amount of 9.8

⁵ ibid pt C, 11.4, Table 8.

⁶ Capital adequacy framework (Basel II – Risk-weighted Assets), Part F, F.3.1, Appendix III.

⁷ ibid pt B, B.2.5, 2.95 & 2.108.

⁸ ibid pt B, B.2.5, 2.118.

⁹ ibid pt B, B.2.5, 2.119.

million and 10 million respectively, without any currency mismatch, are as follows:

Where: E = 9.8 million, C = 10 million, $H_c = 2\%$, $H_{fx} = 0\%$, $RW_{counterparty} = 20\%$ (banks and securities firms with highest credit rating)¹⁰

(i) Collateral: AAA rated asset-backed security, residual maturity less than 1 year ($H_c=1\%$)

$$RWA_{risk\ mitigation} = \{9.8(1 + 0.02) - 10(1 - 0.01)\} * 20\% \approx 0.02mn$$

(ii) Collateral: AAA rated asset-backed security, residual maturity greater than 5 years ($H_c=8\%$)

$$RWA_{risk\ mitigation} = \{9.8(1 + 0.02) - 10(1 - 0.08)\} * 20\% \approx 0.16mn$$

Therefore, the *total* counterparty credit risk charge (RWA/original exposure) in all the scenarios with eligible financial collateral is much lower than the 20% charge without risk mitigation. Due to the range of possible scenarios, it suffices to say that under the risk mitigation framework, the adjusted exposure will be lower than the original, implying that the total credit risk charge must be lower than 20%.

(b) Trading Book (Capital Adequacy Framework - Basel II)

1. Asset-backed Security: Risk weight 0.25 – 19.40%

- 1.1. Specific Risk (0.25 – 3.00%)¹¹: Securitization exposures are subject to a specific risk capital charge, dependant on credit ratings.
- 1.2. General Risk (0-16.40%)¹²: This calculation applies to the securities positions in the entire trading book. Under the maturity method, risk weights for debt securities correspond to their coupon payments and residual term to maturity.
- 1.3. Capital charges for a highly rated asset-backed security (Non-G10 issuers):

Corporates & Securitizations Category			
Residual term to maturity	less than 6 months	between 6 and 24 months	greater than 24 months
Specific Risk weight	0.25%	1.00 - 2.00%	1.60 – 3.00%
General Risk weight	0% - 0.50%	0.80-1.30%	1.90-16.40%
Minimum Total Market Risk	0.25%	1.80%	3.50%
Maximum Total Market Risk	0.75%	3.30%	19.40%

¹⁰ ibid pt B, B.2.2, Appendix III.

¹¹ ibid pt D, D.2.1, 5.51, Table 2.

¹² ibid pt D, D.2.1, 5.65, Table 3.

2. Repo: Risk weight < 20% - Credit Risk Mitigation

- 2.1. For bank exposures to credit risk secured by the pledge of eligible financial collateral, banks may operate only under the comprehensive approach in the trading book.¹³ Banks will be required to calculate the counterparty credit risk charge for repo transactions booked in the trading book by using the comprehensive approach to credit risk mitigation, consistent with those under the same approach in the banking book.¹⁴ *(The applicable risk weight calculation is similar to that for a banking book repo transaction using the comprehensive approach)*

¹³ *ibid* pt B, B.2.5, 2.97.

¹⁴ *ibid* pt B, B.2.5, 2.96-2.97.

Bibliography

- Acharya V, Gale D and Yorulmazer T, 'Rollover Risk and Market Freezes' (2011) 66 *The Journal of Finance* 1177
- Acharya VV and others, 'Manufacturing Tail Risk: A Perspective on the Financial Crisis of 2007–2009' (2010) 4 *Foundations and Trends® in Finance* 247
- , 'Market Failures and Regulatory Failures: Lessons from Past and Present Financial Crises' [2011] ADBI Working Paper Series no. 264 41
- Acharya V V. and Richardson M, 'Causes of the Financial Crisis' (2009) 21 *Critical Review: Journal of Politics and Society* 195
- Admati; AR and others, 'Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity Is Not Socially Expensive' [2013] Max Planck Institute for Research on Collective Goods 2013/23; Rock Center for Corporate Governance at Stanford University Working Paper No. 161; Stanford University Graduate School of Business Research Paper No. 13-7
- Admati A and Hellwig M, *The Bankers' New Clothes: What's Wrong with Banking and What to Do about It* (Princeton University Press 2014)
- Akerlof GA, 'The Market for "Lemons": Quality Uncertainty and the Market Mechanism' (1970) 84 *The Quarterly Journal of Economics* 488
- Anginer D and Demirguc-Kunt A, 'Has the Global Banking System Become More Fragile over Time?' (2014) 13 *Journal of Financial Stability* 202
- Avgouleas E, 'The Reform of "Too-Big-To-Fail" Bank: A New Regulatory Model for the Institutional Separation of "Casino" from "Utility" Banking' [2010] SSRN Electronic Journal
- Balin BJ, 'Basel I, Basel II, and Emerging Markets : A Nontechnical Analysis' [2008] SSRN Electronic Journal
- Bank for International Settlements, 'Implications of Repo Markets for Central Banks' (1999)
- , 'EME Banking Systems and Regional Financial Integration' (2014)

- Barth JR, Caprio G and Levine R, *Rethinking Bank Regulation: Till Angels Govern* (Cambridge University Press 2008)
- Blinder AS, 'The Squam Lake Report: Fifteen Economists in Search of Financial Reform' (2010) 57 *Journal of Monetary Economics* 892
- Blundell-wignall A, 'Restoring Confidence in Financial Systems' [2009] *OECD Forum: The crisis and beyond*
- Brunnermeier M, 'Deciphering the Liquidity and Credit Crunch 2007-08' (2009) 23 *Journal of Economic Perspectives* 77
- Brunnermeier M and others, 'The Fundamental Principles of Financial Regulation' [2009] Geneva London: International Center for Monetary and Banking Studies Centre for Economic Policy Research
- Caprio G, Demirgü-Kunt A and Kane EJ, 'The 2007 Meltdown in Structured Securitization: Searching for Lessons, Not Scapegoats' (2010) 25 *The World Bank Research Observer* 125
- Coase RH, 'The Problem of Social Cost' (1960) 3 *The Journal of Law and Economics* 1
- Coval J, Jurek J and Stafford E, 'The Economics of Structured Finance' (2009) 23 *Journal of Economic Perspectives* 3
- Dahlman CJ, 'The Problem of Externality' (1979) 22 *The Journal of Law and Economics* 141
- Dang T, Gorton G and Holmström B, 'Haircuts and Repo Chains' [2013] Columbia University
- Demirguc-Kunt A and Detragiache E, 'Cross-Country Empirical Studies of Systemic Bank Distress: A Survey' [2005] IMF Working Papers 05/96, International Monetary Fund
- Dewatripont M, Rochet J and Tirole J, *Balancing the Banks: Global Lessons from the Financial Crisis* (Princeton University Press 2010)
- Dooley M and Hutchison M, 'Transmission of the U.S. Subprime Crisis to Emerging Markets: Evidence on the Decoupling-Recoupling Hypothesis' (2009) 28 *Journal of International Money and Finance* 1331
- Eichengreen B, 'Lessons of the Crisis for Emerging Markets' (2010) 7 *International Economics and Economic Policy* 49
- Emerging Markets Committee of the IOSCO, 'Securitization and Securitized Debt Instruments in Emerging Markets' (2010)

- Euroclear and Comotto R, *Understanding Repos and the Repo Markets* (2009)
- European Central Bank, 'Enhancing the Monitoring of Shadow Banking' (2013)
- , 'The Slowdown in Emerging Market Economies and Its Implications for the Global Economy' [2016] ECB Economic Bulletin
- European Commission, 'Proposal for a Council Directive Implementing Enhanced Cooperation in the Area of Financial Transaction Tax', vol 45 (2013)
- European Repo Council, 'A White Paper on the Operation of the European Repo Market, the Role of Short-Selling, the Problem of Settlement Failures and the Need for Reform of the Market Infrastructure' (2010)
- European Repo Council and Comotto R, 'Collateral Damage : The Impact of the Financial Transaction Tax on the European Repo Market and Its Consequences for the Financial Markets and the Real Economy' [2013] International Capital Market Association (ICMA)
- Fecht F, Hackethal A and Karabulut Y, 'Is Proprietary Trading Detrimental to Retail Investors?' [2013] Bundesbank Discussion Paper No. 42/2013
- Financial Stability Board, 'Securities Lending and Repos : Market Overview and Financial Stability Issues' (2012)
- , 'Strengthening Oversight and Regulation of Shadow Banking: An Integrated Overview of Policy Recommendations' (2012)
- Financial Stability Institute, 'FSI Survey: Basel II, 2.5 and III Implementation' (2012)
- Frame WS and White LJ, 'Empirical Studies of Financial Innovation : Lots of Talk , Little Action ?' (2004) 42 *Journal of Economic Literature* 116
- Franklin A and Gale D, *Financial Innovation and Risk Sharing* (The MIT Press 1994)
- Gennaioli N, Shleifer A and Vishny R, 'Neglected Risks, Financial Innovation, and Financial Fragility' (2012) 104 *Journal of Financial Economics* 452
- Gennaioli N, Shleifer A and Vishny RW, 'A Model of Shadow Banking' (2013) 68 *The Journal of Finance* 1331
- Gorton G, 'Bank Regulation When "Banks" and "Banking" Are Not the Same' (1994) 10 *Oxford Review of Economic Policy* 106
- Gorton G and Metrick A, 'Haircuts' [2009] NBER Working Paper No. 15273

Gorton G and Metrick A, 'Regulating the Shadow Banking System' (2010) 2010 Brookings Papers on Economic Activity 261

——, 'Securitization' [2012] NBER Working Paper No. 18611

——, 'Securitized Banking and the Run on Repo' (2012) 104 Journal of Financial Economics 425

——, 'Who Ran on Repo?' [2012] NBER working paper no. 18455

Gorton G and Pennacchi G, 'Financial Intermediaries and Liquidity Creation' (1990) 45 The Journal of Finance 49

Gorton G and Souleles N, 'Special Purpose Vehicles and Securitization', *The Risks of Financial Institutions* (University of Chicago Press 2007)

Gorton GB, *Misunderstanding Financial Crises: Why We Don't See Them Coming* (Oxford University Press 2012)

Greenbaum SI and Thakor A V., 'Bank Funding Modes: Securitization versus Deposits' (1987) 11 Journal of Banking and Finance 379

Hellmann TF, Murdock KC and Stiglitz JE, 'Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?' (2000) 90 American Economic Review 147

Hellwig MF, 'Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage Financial Crisis' (2009) 157 De Economist 129

Hördahl P and King MR, 'Developments in Repo Markets during the Financial Turmoil' [2008] BIS Quarterly

International Monetary Fund, 'Financial Sector Assessment Program: Malaysia - Financial Sector Performance, Vulnerabilities and Derivatives', vol 14/98 (2014)

Jingu T, 'Significance of Restart of Asset Securitization in China' (2013) 176 Nomura Research Institute Ltd.

Kose MA and Prasad ES, *Emerging Markets: Resilience and Growth amid Global Turmoil* (Brookings Institution Press 2010)

Krishnamurthy A, Nagel S and Orlov D, 'Sizing Up Repo' (2014) 69 The Journal of Finance 2381

Liu HCK, 'The Global Economy in Transition', *Invited lecture at the ERC/METU International Conference on Economics, Ankara, Turkey, September 6.* (2003)

- Merton RC, 'Financial Innovation and the Management and Regulation of Financial Institutions' (1995) 19 *Journal of Banking and Finance* 461
- Minsky HP, 'The Financial Instability Hypothesis' [1999] The Jerome Levy Economics Institute Working Paper No. 74
- Morgan DP and Stiroh KJ, 'Too Big to Fail after All These Years' [2005] FRB NY Staff Report No. 220
- Myers SC, 'Determinants of Corporate Borrowing' (1977) 5 *Journal of Financial Economics* 147
- Myers SC and Majluf NS, 'Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have' (1984) 13 *Journal of Financial Economics* 187
- Nachane DM and others, 'Capital Requirements and Bank Behaviour: An Empirical Analysis of Indian Public Sector Banks' (2003) 15 *Journal of International Development* 145
- O'Hara M and Shaw W, 'Deposit Insurance and Wealth Effects: The Value of Banking "Too Big to Fail"' (1990) 45 *The Journal of Finance* 1587
- Odenbach M, 'Mortgage Securitization: What Are the Drivers and Constraints from an Originator's Perspective (Basel I/Basel II)?' (2002) 17 *Housing Finance International* 52
- OECD Publishing, *OECD Economic Surveys - Poland* (Organisation for Economic Co-operation and Development 2008)
- Ong KTW and Yeung EYC, 'Repos & Securities Lending: The Accounting Arbitrage and Their Role in the Global Financial Crisis' (2011) 6 *Capital Markets Law Journal* 92
- Pepe G, 'Basel 2.5: Potential Benefits and Unintended Consequences' [2013] Bank of Italy Occasional Paper No. 159
- Plosser MC and Santos JAC, 'Banks' Incentives and the Quality of Internal Risk Models' [2014] FRB of New York Staff Report No. 704
- Pozsar Z and others, 'Shadow Banking' [2010] Federal Reserve Bank of New York Staff Reports, no. 458
- Prasad ES, 'Financial Sector Regulation and Reforms in Emerging Markets: An Overview' [2010] NBER Working Paper No. 16428
- Rajan R, 'Bankers' Pay Is Deeply Flawed' [2008] *Financial Times*

Rajan RG, 'Has Finance Made the World Riskier?' (2006) 12 *European Financial Management* 499

Reserve Bank of India, *Guidelines for Uniform Accounting for Repo/Reverse Repo Transactions* (IDMC3810/110810/2002-03 2003)

Roubini N and Mihm S, *Crisis Economics: A Crash Course in the Future of Finance* (Penguin Books 2011)

Saadaoui Z, 'Risk-Based Capital Standards and Bank Behaviour in Emerging and Developed Countries' (2011) 12 *Journal of Banking Regulation* 180

Schwarz SL, 'Regulating Complexity in Financial Markets' (2009) 87 *Washington University Law Review* 211

Shavell S, 'Liability for Harm Versus Regulation of Safety' (1984) 13 *The Journal of Legal Studies* 357

Shleifer A and Vishny R, 'Fire Sales in Finance and Macroeconomics' (2011) 25 *Journal of Economic Perspectives* 29

Shleifer A and Vishny RW, 'Unstable Banking' (2010) 97 *Journal of Financial Economics* 306

Singh M, 'Velocity of Pledged Collateral: Analysis and Implications' [2011] *IMF Working Papers* 11/256

South African Reserve Bank, 'Annual Report' [2006] *Bank Supervision Department*

Stein JC, 'Monetary Policy as Financial Stability Regulation' (2012) 127 *The Quarterly Journal of Economics* 57

Stigum M, *Stigum's Money Market* (McGraw-Hill Education 2007)

The Basel Committee on Banking Supervision (BCBS), 'Amendment to the Capital Accord to Incorporate Market Risks' (1996)

——, 'International Convergence of Capital Measurement and Capital Standards (Basel I)' (1998)

——, 'International Convergence of Capital Measurement and Capital Standards (Basel II)' (2006)

——, 'Revisions to the Basel II Market Risk Framework' (2009)

——, 'Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems' (2010)

——, 'Basel III: The Liquidity Coverage Ratio and Liquidity Risk

Monitoring Tools' (2013)

——, 'Global Systemically Important Banks: Updated Assessment Methodology and the Higher Loss Absorbency Requirement' (2013)

——, 'Basel III: The Net Stable Funding Ratio' (2014)

——, 'Minimum Capital Requirements for Market Risk' (2016)

——, 'Revisions to the Securitisation Framework' (2016)

——, 'Basel III: Finalising Post-Crisis Reforms' (2017)

——, 'High-Level Summary of Basel III Reforms' (2017)

Theissen R, *EU Banking Supervision* (Eleven International Publishing 2013)

Turner A, 'The Turner Review: A Regulatory Response to the Global Banking Crisis' [2009] Financial Services Authority Report

Vallascas F and Hagendorff J, 'The Risk Sensitivity of Capital Requirements: Evidence from an International Sample of Large Banks' (2013) 17 *Review of Finance* 1947

White LJ, 'The Credit-Rating Agencies and the Subprime Debacle' (2009) 21 *Critical Review: A Journal of Politics and Society* 389

Wilmarth A, 'The Dark Side of Universal Banking: Financial Conglomerates and the Origins of the Subprime Financial Crisis' (2009) 41 *Connecticut Law Review*

Wilmarth AEJ, 'Reforming Financial Regulation to Address the Too-Big-to-Fail Problem' (2010) 35 *Brook. J. Int'l L.* 707

Executive Summary

In the aftermath of the global financial crisis of 2007-09, bank involvement in securitized banking gained considerable attention and is claimed to be one of the main sources of the crisis. Securitized banking is the use of securitized instruments as collateral in repo transactions, which allowed financial institutions to borrow money from each other for very short periods of time. The crisis highlighted the shortcomings of global financial regulation and the failure of banks and regulators to incorporate the risks from securitized banking in capital regulation.

The dissertation assesses the role of international capital regulation – the Basel Accords, in encouraging bank involvement in securitized banking. Emphasis is on the presence of regulatory capital arbitrage, which refers to strategies by which regulated financial institutions evade capital requirements. The dissertation conducts a legal analysis of the Basel Accords to evaluate the underlying incentives and their impact on bank involvement in securitized banking.

The introduction sets the stage for the dissertation and is followed by the first two chapters, which provide a theoretical overview of securitized banking and summarize the current literature in this regard. Chapter 1 focuses on the functioning and motivation behind bank involvement in securitized banking. Chapter 2 highlights the key literature, focusing on the negative externalities from private liquidity creation through securitized banking and elaborates on the shortcomings of the financial regulatory framework visible after the crisis.

These chapters are followed by an analysis of the preceding Basel Accords to evaluate the role of regulation in incentivising bank involvement in securitized banking. Chapter 3 is an analysis of the pre-crisis Basel Accords to identify the presence of regulatory arbitrage and Chapter 4 assesses the effectiveness of the post-crisis Basel Accords in eliminating any arbitrage opportunities. Both chapters find the presence of significant adverse incentives that encouraged banks to engage in securitized banking. The finding regarding capital arbitrage is vital, as this made securitized banking an inexpensive source of funding for banks.

Chapter 5 focuses on the implementation of the Basel Accords in Emerging Economies (EMEs) to determine whether global implementation also transposed the incentives inherent in these Accords, thereby encouraging similar bank behavior. The findings of this chapter illustrate that EMEs, both

Basel Committee member and non-member states, were similarly affected by Basel implementation and transposed the adverse incentives inherent in the Basel Accords.

Chapter 6 evaluates the effectiveness of the current Basel regime in eliminating the previous adverse incentives and also assesses whether it continues to incentivise banks to engage in securitized banking. The chapter finds that although the current Basel regime has made significant improvements to overcome the previous weaknesses, the adverse incentives for bank involvement in securitized banking still persist. This chapter also provides policy implications and recommends higher capital requirements for securitized banking and repo transactions with other innovative collateral to restrict the growth of instruments with complex risks which can lead to instability in financial markets. The dissertation concludes with a summary of the research findings and suggestions for future research.

Samenvatting

In de nasleep van de wereldwijde financiële crisis van 2007-2009 kreeg de betrokkenheid van banken in securitisatiemarkten uitgebreide aandacht. In securitisatietransacties worden gesecuritiseerde vorderingen gebruikt als onderpand in repo-transacties, wat het voor financiële instellingen mogelijk maakte om voor korte periodes geld van elkaar te lenen. De crisis vestigde de aandacht op de tekortkomingen van financiële regulering wereldwijd en de nalatigheid van banken en toezichhouders om de risico's van securitisatie te integreren in de kapitaalregulering.

In deze dissertatie wordt onderzocht wat de rol is van internationale kapitaalregulering – meer specifiek de de Bazel-akkoorden – in het bevorderen van de deelname van banken aan securitisatietransacties. Het accent ligt daarbij op de aanwezigheid van financiële reguleringsarbitrage, wat verwijst naar strategieën waarmee gereguleerde financiële instellingen kapitaalvereisten omzeilen. De Bazel-akkoorden worden vanuit een juridisch perspectief geanalyseerd teneinde de onderliggende prikkels en de invloed daarvan op de betrokkenheid van banken bij securitisatie te evalueren.

Na een inleiding waarin de toon wordt gezet voor de dissertatie, volgen de eerste twee hoofdstukken die een theoretisch overzicht geven van gesecuritiseerd bankieren en een samenvatting van de actuele literatuur over dit onderwerp. Hoofdstuk 1 richt zich op de wijze waarop banken betrokken zijn in securitisatietransacties en wat hun motivatie is. Hoofdstuk 2 belicht relevante literatuur, waarbij de nadruk ligt op de negatieve externe effecten van het creëren van liquiditeit door securitisatietransacties in de private sector. Ook wordt een uitwerking gegeven van de tekortkomingen van het financiële reguleringskader, die zichtbaar werden na de crisis.

Deze hoofdstukken worden gevolgd door een analyse van de genoemde Bazel-akkoorden, om de rol van regulering in het bevorderen van betrokkenheid van banken in securitisatie te evalueren. In hoofdstuk 3 worden de Bazel-akkoorden van voor de crisis geanalyseerd om de aanwezigheid van mogelijkheden tot toezichtarbitrage op te sporen, en in hoofdstuk 4 wordt de effectiviteit van de Bazel-akkoorden van na de crisis in het elimineren van mogelijkheden tot arbitrage beoordeeld. Beide hoofdstukken signaleren de aanwezigheid van negatieve prikkels die banken hebben aangemoedigd om zich bezig te houden met securitisatie. De uitkomst met betrekking tot financiële arbitrage is cruciaal,

omdat deze gesecuritiseerd bankieren maakt tot een goedkope manier om kapitaal te verwerven.

Hoofdstuk 5 richt zich op de implementatie van de Bazel-akkoorden in opkomende economieën (Emerging Economies, EMEs), om vast te stellen in hoeverre wereldwijd dezelfde prikkels zijn overgebracht en soortgelijk gedrag van banken is aangemoedigd. De uitkomsten in dit hoofdstuk laten zien dat EMEs, leden en niet-leden van het Bazelse Comité, op dezelfde manier zijn beïnvloed door de implementatie van de Bazel-akkoorden en de daaraan inherente negatieve prikkels.

Hoofdstuk 6 evalueert de effectiviteit van het huidige Bazel-regime in het elimineren van de eerder aanwezige negatieve prikkels en onderzoekt of het banken nog steeds aanmoedigt om zich bezig te houden met securitisatietransacties. De bevinding in dit hoofdstuk is dat, hoewel het huidige Bazel-regime aanzienlijke verbeteringen laat zien met betrekking tot het elimineren van de eerdere zwakheden, er nog steeds negatieve prikkels aanwezig zijn voor banken met betrekking tot gesecuritiseerde transacties. Daarnaast benoemt dit hoofdstuk beleidsimplicaties, en wordt de aanbeveling gedaan om te komen tot hogere kapitaalvereisten voor securitisatie en repo-transacties met andere innovatieve onderpanden, om de groei te beperken van instrumenten met complexe risico's die kunnen leiden tot instabiliteit op de financiële markten. De dissertatie wordt afgesloten met een samenvatting van de onderzoeksresultaten en aanbevelingen voor toekomstig onderzoek.

Curriculum Vitae

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Short bio	
<p>I was born in Lahore, Pakistan where I did my early education and then went to London, UK for my secondary school education. Following this, I returned to Pakistan for my bachelor study in Economics and Finance after which I joined a commercial bank and gained banking experience in various positions. I joined the EMLE program to explore the interdisciplinary subject of law and economics and then decided to pursue the PhD in Law and Economics. During my PhD, I have also engaged in teaching activities and my primary research areas focus on economics of regulation, comparative law and economics, banking and financial markets.</p>	
Education	
European Doctorate (PhD) in Law and Economics – Erasmus University Rotterdam (the Netherlands), University of Hamburg (Germany) and University of Bologna (Italy)	2013-2018
Passed Level III exam for Chartered Financial Analyst – CFA Institute	2015-2017
European Master (LLM) in Law and Economics – Erasmus University Rotterdam (the Netherlands) and University of Hamburg (Germany)	2011-2012
Bachelor (BSc Honours) in Economics and Finance – Lahore School of Economics (Pakistan)	2005-2008
Work experience	
Advisor Regulations & Policies – ABN AMRO Bank (Amsterdam, the Netherlands)	2018 - Date
Teaching Assistant for Maths and Microeconomics - European Master in Law and Economics (Erasmus University Rotterdam)	2014/2015
Student Tutor – International Bachelors Program (CapitaSelecta, Erasmus University Rotterdam)	2012-2013
Operations Officer – Foreign Exchange (Bank Alfalah Limited, Lahore, Pakistan)	2010-2011
Credit Analyst – SME Banking (Bank Alfalah Limited, Lahore, Pakistan)	2008-2010
Prizes and awards	
Full scholarship holder (Bachelor Program) – Lahore School of Economics (Pakistan)	2005-2008

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PhD training

Compulsory courses		year
Introduction to the Italian Legal System		2013
Elementary Statistics		2013
Game Theory and the Law		2013
Economic Analysis of Law		2013
Behavioral L&E I - Game Theory		2013
Behavioral L&E II – Enforcement Mechanism		2014
Experimental L&E		2014
European Securities and Company Law		2014
Specific courses		year
Seminar ‘How to write a PhD’		2013
Academic Writing Skills for PhD Students (Rotterdam)		2014
Introduction into German Law		2014
Econometrics - Introduction and Applications		2014
Topics in International Law and International Relations		2014
Subsidies, Regulation Procurement and Consumer Protection in WTO Law: Economic and Legal Concepts		2014
Seminar Series ‘Empirical Legal Studies’		2015

Seminars and workshops	year
University of Bologna (Italy) – November Seminar (attendance)	2013
Erasmus University Rotterdam (the Netherlands) – Fall Seminar Series (peer feedback)	2014
Erasmus University Rotterdam (the Netherlands) – Winter Seminar Series (peer feedback)	2015
GSE Barcelona (Spain) – Summer School (attendance)	2015
Paris Nanterre University (France) – Joint Seminar ‘The Future of Law and Economics’(attendance)	2015

Presentations	year
University of Bologna (Italy) – March PhD Seminar Series	2014
University of Hamburg (Germany) – June PhD Seminar Series	2014
Erasmus University Rotterdam (the Netherlands) – Fall PhD Seminar Series	2014
Erasmus University Rotterdam (the Netherlands) – Winter PhD Seminar Series	2015
Bad Homburg (Germany) – EURO-CEFG International PhD workshop	2015
University of Bologna (Italy) – November PhD Seminar Series	2015
Erasmus University Rotterdam (the Netherlands), Joint Seminar ‘The Future of Law and Economics’	2016
Teaching	year
Teaching assistant - European Master in Law and Economics (EMLE) – Mathematics	2014/2015
Teaching assistant - European Master in Law and Economics (EMLE) – Microeconomics	2014/2015