# *BANK FUNDING LIQUDITY, ADJUSTMENT SPEEDS OF NET STABLE FUNDING REQUIREMENT AND RISK-TAKING IN BRICS*

AHMED MOHAMED DAHIR

FEP 2019 19

BANK FUNDING LIQUDITY, ADJUSTMENT SPEEDS OF NET STABLE FUNDING REQUIREMENT AND RISK-TAKING IN BRICS

By

AHMED MOHAMED DAHIR

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

March 2019

BANK FUNDING LIQUDITY, ADJUSTMENT SPEEDS OF NET STABLE FUNDING REQUIREMENT AND RISK-TAKING IN BRICS

By

AHMED MOHAMED DAHIR

March 2019

Chairman : **Associate Professor Fauziah Mahat, PhD**
Faculty : **Economics and Management**

The conjecture that Basel III Net Stable Funding Ratio (NSFR) limits maturity mismatch problem and improves financial stability has strong intuitive appeal; however, the researcher's knowledge with regards to the empirical support corroborating multi-faceted potential adjustment dimensions to assess banks' response to tougher liquidity requirements and the link between NSFR and bank risk-taking has been tenuous at best. In this light, the study develops a comprehensive theoretical framework which posits that a better understanding of the relationship between NSFR and bank risk-taking is necessary, in order for the emerging economies to develop strategies that maintain sufficient liquidity holdings reducing the impacts of risk-taking incentives and ensuring the credit supply. Guided by this framework, the study also investigates the adjustment speeds of banks in Brazil, Russia, India, China and South Africa (BRICS) toward target NSFR, the joint impact of NSFR and capital on bank risk-taking, the impact of funding liquidity on bank risk-taking and the interrelationship between NSFR and capital using a sample of 269 banks and unbalanced panel data for period 2006-2015. A set of econometric estimations, such as LSDVC, GMM and panel VAR is employed in order to perform the analysis.

The results reveal that banks adjust quickly their target NSFR, but concordance is strongest for large banks suggesting that large banks actively manage their liquidity during the sample period. The bank risk-taking is inversely associated with NSFR and capital, indicating that NSFR and capital jointly reduce bank risk-taking incentives and, in turn, improve the financial stability of banking system; nevertheless, this is true only in case of large banks. Further, the bank risk-taking is positively related to funding liquidity. The findings appear to be conditional on bank regulation and supervision. Interestingly, strengthening of bank regulation and supervision mitigate the adverse effects of funding liquidity and weaken the linkage between NSFR and bank risk-taking behavior, showing that the NSFR and bank regulation and

supervision appear to be substitutes rather than complements. Finally, Granger causality is found to exist between NSFR and regulatory capital; specifically, a unidirectional causality that runs from NSFR to capital. Unsurprisingly, banks have taken less risks during the recent financial crisis. Notably, the findings are robust to alternative estimations and different measures as well. The findings of the study have significant implications for bank regulators, policy makers and academics, emphasizing the importance of higher liquidity holdings and supporting the need to develop and implement long-term liquidity policies in order to effectively address the effects of potential financial turbulences in emerging economies, thereby setting bank safety and soundness. The results also justify the exemption of small banks from implementing Basel III new liquidity. The study is limited to BRICS economies, further work is needed to explore the effects of NSFR adjustment on bank outcome in BRICS and other developing and developed economies.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KECAIRAN PEMBIAYAAN BANK, PELARASAN KEPERLUAN PENDANAAN STABIL BERSIH DAN PENGAMBILAN RISIKO DALAM BRICS

Oleh

AHMED MOHAMED DAHIR

Mac 2019

Pengerusi : **Profesor Madya Fauziah Mahat, PhD**
Fakulti : **Ekonomi dan Pengurusan**

Ramalan bahawa Nisbah Pembiayaan Stabil Bersih (NSFR) Basel III mengehadkan masalah ketidaksesuaian matang dan meningkatkan kestabilan kewangan mempunyai daya tarikan intuitif yang kuat; Walau bagaimanapun, pengetahuan penyelidik berkenaan dengan sokongan empiris yang memperkuat dimensi pelarasan berpotensi pelbagai aspek untuk menilai tindak balas bank terhadap keperluan kecairan yang lebih ketat dan hubungan antara NSFR dan pengambilan risiko bank telah menjadi lemah. Kajian ini membina rangka kerja teoretikal yang komprehensif yang menunjukkan bahawa pemahaman yang lebih baik mengenai hubungan antara NSFR dan pengambilan risiko bank adalah perlu, agar ekonomi baru muncul untuk membangunkan strategi yang mengekalkan pegangan mudah tunai yang mencukupi mengurangkan kesan risiko- mengambil insentif dan memastikan bekalan kredit. Dipandu oleh rangka kerja ini, kajian ini juga menyiasat kelajuan pelarasan bank-bank di Brazil, Rusia, India, China dan Afrika Selatan (BRICS) ke arah NSFR sasaran, kesan bersama NSFR dan modal pada pengambilan risiko bank, impak pendanaan kecairan mengenai pengambilan risiko bank dan hubungan antara NSFR dan modal menggunakan sampel 269 bank dan data panel tidak seimbang untuk tempoh 2006-2015. Satu set anggaran ekonometrik, seperti LSDVC, GMM dan panel VAR digunakan untuk melaksanakan analisis berkenaan.

Hasilnya menunjukkan bahawa bank-bank menyesuaikan dengan pantas sasaran NSFR mereka, tetapi kesesuaian adalah paling kuat bagi bank besar yang mencadangkan bahawa bank-bank besar secara aktif menguruskan kecairan mereka semasa tempoh sampel dijalankan. Pengambilan risiko bank secara bertentangan dengan NSFR dan modal, menunjukkan bahawa NSFR dan modal bersama-sama mengurangkan insentif pengambilan risiko bank dan, seterusnya, memperbaiki kestabilan kewangan sistem perbankan; sebenrnya, ini hanya berlaku terdapat dalam

bank besar. Selanjutnya, pengambilan risiko bank positif berkaitan dengan pendanaan kecairan. Penemuan ini bersyarat atas pengawalseliaan dan penyeliaan bank. Menariknya pengawalseliaan bank dan penyeliaan mengurangkan kesan buruk pendanaan kecairan dan melemahkan hubungan antara NSFR dan risiko pengambilan risiko bank, menunjukkan bahawa pengawalseliaan NSFR dan bank dan pengawasan nampaknya pengganti dan bukan pelengkap. Akhirnya, kausaliti Granger didapati wujud antara NSFR dan modal pengawalseliaan; khususnya, kaitan yang tidak langsung yang berjalan dari NSFR kepada modal. Tidak mengejutkan, bank-bank telah mengambil sedikit risiko semasa krisis kewangan baru-baru ini. Terutama, penemuan ini kukuh dengan anggaran alternatif dan langkah-langkah yang berbeza juga. Penemuan kajian ini mempunyai implikasi penting untuk pengawal selia bank, pembuat dasar dan ahli akademik, menekankan kepentingan pemegangan kecairan yang lebih tinggi dan menyokong keperluan untuk membangun dan melaksanakan dasar mudah tunai jangka panjang untuk menangani secara berkesan kesan potensi pergolakan kewangan dalam muncul ekonomi, dengan itu menetapkan keselamatan dan kekukuhan bank. Hasilnya juga membenarkan pengecualian bank kecil daripada melaksanakan Basel III kecairan yang baru. Kajian ini terhad kepada ekonomi BRICS, kajian yang lebih lanjut diperlukan untuk meneroka kesan penyesuaian NSFR terhadap hasil bank di BRICS dan negara-negara membangun dan maju yang lain.

ACKNOWLEDGEMENTS

All praise to ALLAH (S.W.T) the LORD of the Wolds. The most Beneficent and the most Merciful. Peace be upon His noblest Prophet Muhammad (SAW). I thank ALLAH (S.W.T) for granting me this opportunity, strength and patience to successfully complete this PhD programme. I would like to express my sincere appreciation and pay a tribute to my supervisor, Associate Professor Dr. Fauziah Mahat who has been professionally and tirelessly guiding me throughout the period of study. I would like to extend my profound gratitude to members of my supervisor committee. Special thanks to Associate Professor Dr. Bany Ariffin Amin Noordin and Dr. Nazrul Hisyam Ab Razak for their tireless support and contributions.

I would like to extent my heartfelt appreciation my father and entire family for their continued moral support, encouragement, love and endless prayers. I would also like express my friends in Ma'mur Foundation for their moral and financial support and understanding and prayers.

My appreciation also goes to my friends who were offering me moral support. Finally I would like to extend my gratitude and heartfelt thanks to those who have contributed to my study and those I have gained knowledge that enabled me to easily work with my thesis. These include Ahmad Karage, Aminah Shari, Abdulla Hamdad, Associate Professor Dr. Law Siong Hook, Professor Dr. Mansor Ibrahim and many that I did not mension their names here.

Declaration by graduate student

I hereby confirm that:
- this thesis is my original work;
- quotations, illustrations and citations have been duly referenced;
- this thesis has not been submitted previously or concurrently for any other degree at any institutions;
- intellectual property from the thesis and copyright of thesis are fully-owned by Universiti Putra Malaysia, as according to the Universiti Putra Malaysia (Research) Rules 2012;
- written permission must be obtained from supervisor and the office of Deputy Vice-Chancellor (Research and innovation) before thesis is published (in the form of written, printed or in electronic form) including books, journals, modules, proceedings, popular writings, seminar papers, manuscripts, posters, reports, lecture notes, learning modules or any other materials as stated in the Universiti Putra Malaysia (Research) Rules 2012;
- there is no plagiarism or data falsification/fabrication in the thesis, and scholarly integrity is upheld as according to the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) and the Universiti Putra Malaysia (Research) Rules 2012. The thesis has undergone plagiarism detection software

Signature: _____   Date: _____

Name and Matric No: <u>Ahmed Mohamed Dahir, GS46687</u>

Declaration by Members of Supervisory Committee

This is to confirm that:
- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) were adhered to.

Signature:
Name of Chairman
of Supervisory
Committee: Associate Professor Dr. Fauziah Mahat

Signature:
Name of Member
of Supervisory
Committee: Associate Professor Dr. Bany Ariffin Bin Amin Noordin

Signature:
Name of Member
of Supervisory
Committee: Dr. Nazrul Hisyam Bin Ab Razak

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AR	Serial Correlation
ASF	Available Stable Funding
BCBS	Basel Committee on Banking Supervision
BRICS	Brazil, Russia, India, China and South Africa
BRS	Bank Regulation and Supervision
FDI	Foreign Direct investment
FE	Fixed Effects
GAP	Funding Gap
GFC	Global financial crisis
GMM	Generalized Method of Moments
IV	Instrumental Variables
LCR	Liquidity Coverage Ratio
LSDVC	Least Square Dummy Variables- Bias-corrected
LSDVC (AB)	Arellano and Bond Least Square Dummy Variables- Bias-corrected
LSDVC (AH)	Anderson and Hsio Least Square Dummy Variables- Bias-corrected
LSDVC (BB)	Blundell and Bond Least Square Dummy Variables- Bias-corrected
LTCD	Loan to Core Deposit
NSFR	Net Stable Funding Ratio
OLS	Ordinary Least Square
PVAR	Panel Autoregressive
RCR	Regulatory Capital Requirement
RE	Random Effect
ROE	Return on Equity

RSF	Required Stable Funding
SOA	Speed of Adjustment
TBTF	Too-Big-to Fail
VIF	Variance Inflation Factor
WDI	World Development Indicators

CHAPTER 1

INTRODUCTION

1.1   Introduction

In the wake of 2008 financial turmoil, deficiencies in financial regulations were highlighted. The crisis contributed to disruptions in bank activities which generally play an important role in economic development of a country. It resulted in an economic recession and a higher record of unemployment. Further, its severity was felt more in developing countries than developed economies. These nations are mainly dependent on the banking system because their financial markets are less developed. In response, extensive financial reforms have been introduced in December 2010 by global regulators (i.e., the Basel committee on Banking Supervision (BCBS). In this situation, a very important reform is known as Basel III that contains a set of reforms in regulation, supervision and risk management of banking system. The discussion of this study departs from Net Stable Funding Ratio (NSFR) which is a major part of the liquidity regulations in Basel III framework. It deals with maturity mismatch problem. It is aimed at reducing banks' use of short-term funds (debts), preventing future crises and strengthening stability of banking sector (Hasman & Samartín, 2017). Moreover, higher capital requirement is strongly believed to increase capabilities of the banks, allowing them to absorb unexpected losses and making them better and more resilient.

BRICS countries (i.e., Brazil, Russia, India, China and South Africa) have the economic importance as their economic growth is estimated at 8.1% annually, whereas the annual growth rates of emerging and advanced economies are estimated at 6.6 % and 2.5 %, respectively. Despite the economic development, banks in BRICS have mainly witnessed higher nonperforming loans which are the overt signs of banks' excessive risk-taking. Thus, higher bank risk-taking behavior will have negative impacts on bank stability and the economic activities. They also had low capitals followed by remarkable declines in their profits (IMF Report, 2017). Moreover, they relied on the short-term financing. The reliance on short-term funds by banks was recognized as the major cause of the recent crisis (Wei, Gong, & Wu, 2017). In this light, banks in BRICS have to implement Basel III to attain harmonization with international standards of banking regulations. Basel III Net Stable Funding Ratio (NSFR) limits maturity mismatch problem and improves liquidity management and financial stability.

The goal of this study to investigate adjustment speeds of banks in response to tougher liquidity requirements and the effects of Basel III NSFR and capital on bank risk-taking. Moreover, the study develops a comprehensive theoretical framework which posits that a better understanding of the linkage between NSFR and bank risk-taking is necessary, in order for the emerging economies to develop strategies that maintain sufficient liquidity holdings reducing the impacts of risk-taking incentives and ensuring the credit supply. In this chapter, background of the study, problem

statement, research questions, research objectives, scope of the study, significance of research, and organization of the study are presented.

1.2   Background of the study

Commercial banks are a subset of banking system collecting deposits and providing borrowers liquidity. They finance relatively loans (i.e., illiquid assets) with relatively liquid liabilities (Diamond & Dybvig, 1983). They also give borrowers liquid funds off-balance sheet through commitments of loans and analogous claims to liquidity (Hou, Li, Li, & Wang, 2018). In particular, banks do broad arrays of functions: (i) pooling and mobilizing deposits, (ii) reducing asymmetric information about investment and allocating capital, (iii) enabling trade, diversification and risk management and (iv) monitoring investments in general and after credit provision in particular (Aluko & Ajayi, 2018). These bank activities have significant effects on the real economy and financial system and in particular become a clear sign during financial crises(Bryant, 1980). In this study, it is focused on bank liquidity. More specially, the study sheds light on banks in emerging countries, which play a significant role in steering and fostering economy than developed countries as their financial markets are not well advanced while developed nations have well developed financial markets that contribute to economy substantially along with the vital role of banking system (Zhang, Jiang, Qu, & Wang, 2013).

The search for underlying causes of the 2007-2009 global financial crisis which led to losses of US$2.7 trillion in the U.S alone and US$1.4 trillion in the rest of world has consequently re-ignited a heated discussion among academic researchers, bank regulators, and policymakers (Grosse, 2017). The financial turmoil has strongly shaken long existing finance and banking theories, and its impact on a banking industry across countries demonstrated heterogeneous (Nadeem, 2017). Thus, it was demanded to understand the causes of the recent financial crisis before seeking solutions. The extant literature attempted to find what went wrong with existing regulations. The evidence showed that the causes of the global financial crisis were linked to multiples of interconnected factors rather than of a sole determinant involving in excessive risk-taking behavior, liquidity risk, greater use of asset-backed securitization, default risk in counterparty, credit rating agencies which overstated risky assets consistently, lack of consideration in capital requirements for pro-cyclicality and weaknesses in financial regulations (Dermine, 2015; Hlatshwayo, Petersen, Mukuddem-Petersen, & Meniago, 2013; Hong, Huang, & Wu, 2014).

In particular, the excessive risk-taking of banks is believed to be the primary cause of the financial crisis which led to the collapses of the many banks across the world (Laeven, Ratnovski, & Tong, 2016). Indeed, the excessive risk-taking behavior generally arises from several channels and then pose challenges to the current risk management practices of banking industry (Hong et al., 2014). The deregulation, financial innovation and the bank managers' compensation packages were documented as the risk-taking channels (Laeven et al., 2016; Uhde, 2016). In addition, the risk-taking is driven by bank competition which generally intensifies with the

deregulations. Whenever, the competition deepens, it increases the banks' risk-taking as the market power is lowered and banks are to be forced to invest risky projects because of likely squeezed opportunities. Subsequently, taking more risks can reduce by banks' profits and increase their insolvency risks leading to financial losses and instability.

Moreover, when banks are awash with funding liquidity which is defined as banks' abilities to meet depositors' claims with immediacy, they tend to take more risks so that the funding liquidity is recognized as a significant risk determinant which has a negative impact on the stability of banking system (Acharya & H. Naqvi, 2012). The extant empirical literature has established a positive linkage between funding liquidity and bank risk-taking in the banking industry (Khan, Scheule, & Wu, 2017).

Moreover, Banks usually strive to manage liquidity risk in every possible way as the evidence showed that the liquidity risk was the most important cause of the 2007-2008 turmoil (DeYoung & Jang, 2016; Laeven et al., 2016). when banks are awash with funding liquidity which is defined as banks' abilities to meet depositors' claims with immediacy, they tend to take more risks so that the funding liquidity is recognized as a significant risk determinant which has a negative impact on the stability of banking system (Acharya & H. Naqvi, 2012). The extant empirical literature has established a positive linkage between funding liquidity and bank risk-taking in the banking industry (Khan et al., 2017). Enhancing liquidity risk management, banks usually increase their liquidity through diversification of revenues and controlling risks, namely market risk, credit risk, capital risk, and overall risk so that risks are they mitigated and banking stability is improved.

Credit rating is another risk factor is that credit rating agencies overstated risky investments which banks invested and that consequently resulted in the inability of banks to recover their loans because of counterparty default risks. A deficiency of reliable prudential frameworks that can prevent the bank risk-taking behavior was another cause for the crisis (Kahou & Lehar, 2017). It is because the regulations did not account for liquidity and capital buffers for the pro-cyclicality in case of economic stress and focused on the risk-taking of individual banks using the on-balance sheet data to estimate the potential risks rather than considering off-balance sheet items. Thus, emphasis on individual banks suffers a substantial drawback in which the banks may likely appear healthy, but they may have still adverse impacts on the stability of banking system. In sum, taking more risks can result in liquidity crunches which will be harmful to bank stability which will have negative impact on real economy and a burden to social welfare.

In response to the above issues, changes to existing prudential regulations have been recommended. Notably, the regulations prompted profound revisions to the present risk management practices of banks to mitigate the effects of negative effects of bank risk-taking (Vazquez & Federico, 2015). Basel Committee on Banking Supervision

(BCBS) at the Bank for International Settlements (BIS) established new liquidity and capital requirements to reduce excessive risk-taking by banks and to prevent potential reoccurrence of the financial crisis (Kashyap, Stein, & Hanson, 2010).

1.2.1 Basel III liquidity measures

The new liquidity measures under Basel III were established by Basel committee on banking supervision (BCBS) in 2010 to address the potential financial crises. They consist of Net Stable Funding Ratio (henceforth NSFR) and Liquidity Coverage Ratio (LCR). The LCR deals with short-term funding and requires banks to maintain a sufficient level of unencumbered high-quality liquid assets that can be changed into cash to cover the liquidity needs for 30 days under liquidity stress situations. The unencumbered high-quality liquid assets consist of cash, marketable securities or other assets that can be easily converted to cash in case of need and without loss of value. The value of LCR must be equal or greater than 100%, implying that the stock of high-quality liquid assets should equal at least total projected net cash outflows. However, the analysis of LCR appears unfeasible as its data requires detail information on duration and composition of both 30-day liability and liquidity assets and cannot be generally sourced from banks' financial statements (Dietrich, Hess, & Wanzenried, 2014). It is worth note that LCR is not considered in this study as the banks' financial statements do not normally provide liquid assets and 30-day liabilities in detail, posing challenges on applying LCR (Dietrich et al., 2014).

On the other hand, NSFR deals with medium and long-term stable funds that are unlikely to run during crisis (Wei et al., 2017). It is defined as the ratio of banks' available amount of stable funding to the required amount of stable funding. NSFR should be larger than 100 %. The NSFR requirement requires banks to increase the level of stable funding from more stable retail deposits and long-term wholesale funding and, at the same time, it reduces the banks' reliance on short-term financing. It requires banks to (1) hold cash and liquid securities in order to service short-term funding runs; (2) issue stable funding which is not probable to run during the financial crisis, and (3) maintain better levels of funding to signal a long-term solvency and thus reducing the possible bank runs (DeYoung & Jang, 2016; Farhi & Tirole, 2012) In doing so, it mandates banks to finance their medium and long-term loans with stable funds that are unlikely to run during the economic stress and at the same time it prevents banks from being exposed to possible excessive liquidity risk ; in addition, it limits maturity mismatch problems from banks' assets and liabilities (Wei et al., 2017). To that effect, NSFR is a quantitative approach designed to strengthen liquidity risk management, and its effectiveness is merely recognized until a crisis is imminent (N. Chen, Huang, & Lin, 2017). Additionally, it is a good indicator that differentiates banks that have sufficient stable liquidity from those that have less liquidity structure rather than stress testing and it accounts for the imbalances of both sides of banks' balance sheets that enable regulators to evaluate the ability of banks to meet unexpected deposit withdrawals and to reduce any possible funding liquidity problems. Moreover, it measures banks' vulnerability to system-wide funding risk controlling for the likelihood of liquidity shocks as well as excessive risk-taking behavior (Tran, Lin, & Nguyen, 2016).

For safety and soundness of the banking system, bank regulators give capital requirement a top priority after monetary and fiscal policies after the crisis, imposing banks an additional capital to improve their capacity to absorb unexpected potential financial losses and prevent happening turmoil again (Allahrakha, Cetina, & Munyan, 2018). Given the increase in the size of banks' equity, they also improve the quality of capital considering the banks' on-and off-balance sheets (Allahrakha et al., 2018; Jayadev, 2013). Banks with adequate capital perform better in their intermediations during the economic downturns(Kim & Sohn, 2017). Thus, capital ratio is used as a mechanism for the security to absorb potential contagion effects and as a tool to avoid the future financial crisis and potential future exposures.

1.2.2   An overview of NSFR

There are a number of studies examined whether banks complied with NSFR requirement before the financial crisis and its impacts on banking stability and performance (Dietrich et al., 2014; King, 2013; Wei et al., 2017). The results revealed that most of the banks did not fulfill the NSFR requirement. Further, the findings showed a negative relationship between NSFR and bank performance. On the other hand , the link between NSFR and banking stability is positive (Ashraf, Rizwan, & L'Huillier, 2016). The evidence shows that implementation of NSFR puts pressure bank lending (Dietrich et al., 2014). However, the research on the relationship between NSFR and bank risk-taking in BRICS remains scarce. Understanding the association between NSFR and bank risk-taking is very important because NSFR is the cornerstone of the ongoing debate on liquidity regulation that aims to address maturity mismatch problems and excessive risk-taking to ensure banks' resilience.

Moreover, others investigated the impact of regulations like capital requirements, restrictions on activities, deposit insurance and private monitoring on bank risk-taking and soundness (Agoraki, Delis, & Pasiouras, 2011). While other studies also document that banking regulation and supervision are considered as critical determinants of bank risk-taking behavior (Nadeem, 2017). However, the relationship between the joint effect of NSFR and capital ratio and bank risk-taking in BRICS is not yet completely understood. The reason for focusing on the joint impact of NSFR and capital ratio is that the recent crisis demonstrated that the capital requirement alone is inadequate to prevent banks from taking more risks (Allahrakha et al., 2018; Bitar, Pukthuanthong, & Walker, 2018). NSFR requirement advances the Basel II that has already focused on equity requirements (DeYoung & Jang, 2016). Notably, there is a concern about whether and how joint NSFR and capital ratios reduce risk-taking without jeopardizing the banks' intermediations that are crucial for economic activity. To this end, the systematic understanding of the relationships between the joint effect of NSFR and capital ratio and bank risk-taking in BRICS economies is of paramount significant for the study. To sum up, the study develops a theoretical framework to evaluate how joint effect of NSFR and capital ratio influences bank risk-taking behavior. To the best of the researcher's knowledge, there is no research on the association between NSFR, capital ratio and bank risk-taking.

Such empirical research is not only timely but also essential for various reasons. Firstly, some scholars support the NSFR as it decreases banks' dependence on short-term funding (funding liquidity) and liquidity provision by central banks because the involvement of central banks as liquidity providers have a drawback like the problem of moral hazard. For example, when banks have access to public liquidity, they may not insure against refinancing risk. As a result, excessive liquidity causes banks to decrease their levels of long-term bonds and retail deposits which are considered as the most expensive stable funding (Jacob & Munro, 2018). During credit growth, banks apt to have less stable funding using short-term wholesale markets and the retail deposits gradually raise. When banks face liquidity pressures, they shift toward short-term funding wholesale funding. This process creates a chain of intermediation and rollover requirement, while the NSFR services as self-insurer against maturity mismatch problem. In contrast, other scholars argue that there is no evidence on whether the implementation of NSFR reduces excessive risk-taking and improves banking stability.

There is the theory of financial intermediation supporting the view that higher long-term stable funding reduces risk-taking of banks. In contrast, the theoretical model of Brunnermeier and Oehmke (2013) conflicts with this view suggesting that banks work with excessive maturity mismatches. Despite the discussions about banks are better than financial markets as they offer liquidity insurance. The theory underlines several banks' activities, commonly known as qualitative asset transformation. These activities include credit risk, maturity and liquidity transformation (Bhattacharya & Thakor, 1993). Banks create liquidity through their on-balance sheets and then provide liquidity to real economic activities by holding illiquid assets (loans) with short-term financing funding with deposits as a proxy (Diamond & Dybvig, 1983).

On the other hand, they improve their liquidity provision through off-balance sheet activities, such as loan commitments and claims to liquid funds which are analogous to demand deposits from perspective of customers. However, liquidity risk evolves in most cases when banks use deposits (illiquid liability) or equity to finance liquid assets like securities. As a result, they are exposed to the risk which depositors may likely withdraw their deposits and therefore to risk of bank runs (Baltas, Kapetanios, Tsionas, & Izzeldin, 2017).

The study also investigates banks' responses to the new liquidity measure (NSFR). The real banks' responses to the implementation of NSFR have become a focal point of interest for policymakers, bank practitioners, and academics (Ly, Chen, Wang, & Jiang, 2017). The existing literature mainly focused on capital structure for non-financial firms and generally highlights corporate leverage displays mean reversion due to firms' adjustment toward target leverage and this view is consistent with the dynamic trade-off theory (Dang, Kim, & Shin, 2012). Significant studies have examined whether and how fast firms adjust their target leverage; however, testing dynamic trade-off theory in banking literature is in its infancy and the empirical evidence on the banks' adjustment towards the Basel III NSFR is still scarce.

Notably, the new liquidity measure is based on assumptions which have not yet been tested both empirically (Hong et al., 2014). More importantly, the missing gap from both empirics and theory is whether and how banks adjust their target NSFR which is ambiguous. In the theoretical perspective, the study applies the dynamic trade-off theory which generally covers contracting and regulation issues. The motivation of this theory is that, firstly, banks' regulatory environment influences their target NSFR requirement. Secondly, bank-specific factors can all affect the speeds with which banks converge to their desired levels of liquidity. Apart from the theory as mentioned earlier, there are other theories, such as pecking order and market timing have been advanced in the corporate finance literature.

The pecking order theory posits that the firm's observed mix of capital structure (i.e., equity and debt) basically reflects its overall financing decisions over time. With the regard of asymmetric information, firms prefer internal finance such as retained earnings over costly external sources such as debt and new equity issuance. Thus, this shows that the firms' borrowing and their retained earnings are negatively associated. While the theory of market timing postulates that financing decisions regarding capital structure are strongly driven by market conditions with which firms issue shares when market situation is favorable and repurchase them when the share prices fall (Zavertiaeva & Nechaeva, 2017). According to recent work that applied market timing theory in NSFR adjustment has found that banks adjust their liquidity quickly in response to Basel III liquidity requirement (Ly et al., 2017).

Mainly, these findings are consistent with the view of immediate trading, implying that rational banks could implement the NSFR requirement immediately by maintaining sufficient liquidity. When higher adverse selection problem is expected in the future and this view refers to the immediate trading equilibrium, while delayed trading equilibrium posits banks postpone complying with NSFR requirement when they expect favorable market conditions in the future (Bolton, Santos, & Scheinkman, 2011).

Though there has been growing empirical literature on the effectiveness of NSFR, more specifically, yet very little theoretical and empirical research studies attempt to answer the following questions. Do banks in BRICS economies change their investment, financing, and risk management policies in order to meet NSFR requirement? If so, do they maintain separate targets for NSFR across bank size? How quickly do banks in BRICS adjust their desired levels of NSFR when they face shocks that may likely compel them to deviate from their targets? Do banks' adjustment speeds and target NSFR change with bank characteristics?

Moreover, the study employs a dynamic partial adjustment model which is widely popular in capital structure literature (Flannery & Rangan, 2006). In the context of bank-specific variables, the advantage of examining adjustment speed of NSFR requirement is related to costs and benefits with which banks incur to make an adjustment towards their target liquidity which depends on deposits, wholesale funding and capital. For instance, better levels of deposits make banks easier to issue

loans and settle claims from depositors with immediacy. Well-capitalized banks provide stable funding and promote the stability of banking system (Garel & Petit-Romec, 2017). A further point to be taken into account is the extension of wholesale funding which refers to an easy conversion of short-term liabilities to long-term stable funds which is believed to contribute to the higher speed of adjustment.

The study applies a dynamic bias-corrected least square dummy variable (LSDVC) model to examine the speed of adjustment (SOA) in banking research as the dynamic panel estimation techniques play an increasingly crucial role in the finance literature. With regard of its importance, there are several dynamic panel models and each of these estimators has been suggested to provide novel insights about the dynamic behavior of financial policy; however, inescapably all models suffer some form of shortcomings (Flannery & Hankins, 2013). The dynamic panel requires an inclusion of lagged dependent variable in the baseline regression which does result in severe econometric issues, namely dynamic panel bias, endogeneity, misspecification of empirical estimation, and other issues emerging out from possible corporate finance data (Flannery & Hankins, 2013; Wintoki, Linck, & Netter, 2012; Zhou, Faff, & Alpert, 2014). Consequently, estimated inferences pose serious doubt over the credibility of decisions drawn.

Searching solution for above issues, the econometric literature has introduced several dynamic approaches, namely the just-identified instrumental variable estimator (AH)developed by Anderson and Hsiao (1982), the first-difference generalized method of moments (DIF-GMM) estimator by Arellano and Bond (1991), the system generalized method of moments (SYS-GMM) estimator by Blundell and Bond (1998) , and the dynamic bias-corrected least square dummy variable (LSDVC) model by Kiviet (1995) and Bruno (2005). Theoretically, although all these advanced methods have been shown to reduce possible bias, the dynamic bias-corrected least square dummy variable (LSDVC) model is found to be most suitable and robust estimation technique (Dang, Kim, & Shin, 2015). More specifically, it is argued that the lagged coefficient is often bias and more likely renders the other estimated coefficients doubtful and unreliable. In this case, lagged estimate captures the speed of adjustment (SOA) which is the interest of this study and since then the speed of adjustment (SOA) in corporate finance has been the long-standing challenge.

To address the issue, the dynamic partial adjustment approach can be applied to estimate the speed of adjustment (SOA). However, the model suffers misspecification that can spuriously favor the adjustment hypothesis as well as raises several questions requiring dynamic adjustment approaches constitutes some of the most contentious and unresolved areas of both banking and finance literature (Zhou et al., 2014). This also implies that the dynamic panel model produces inconclusive results about the significance of adjustment behavior (Flannery & Hankins, 2013). In this regard, there is limited understanding about whether and to what extent the banks in BRICS actually adjust desired NSFR as well as the determinants that influence the desired liquidity. Empirically, the study thus controls for effects of certain bank-specific variables on target NSFR and investigates how these variables affect the speed with which banks

8

converge on their target NSFR. To sum up, the goal of this study is to examine how banks respond to their target liquidity using the dynamic LSDVC approach to fill this significant research gap. Because most of the studies focused on corporate finance rather than banking using the dynamic model to examine the firms' adjustment towards their long-term target leverage.

1.2.3 Profiling banking sector in BRICS countries

More specifically, banks in BRICS countries are focused on this study. Given market capitalization, 4 of ten of world's largest banks belonged to BRICS whereas 44 of the top banks in the worlds were from developing countries in 2007 (Zhu & Yang, 2016). In the meantime, 2007-2009 financial crisis has triggered the active debate on the issues such as bank risk-taking, financial stability, liquidity and capital requirements, competition and so forth. It should be of particular heightened interest to bank regulators, academic researchers and policymakers in BRICS countries. A research on banks in BRICS is of paramount importance as these economies increasingly play important role in trade, economic growth, and population and are considered as key players in the world economy (Demir & Ersan, 2017; Mensi, Hammoudeh, Reboredo, & Nguyen, 2014).

Regarding share of global output, the region's economic growth has increased from approximately 7% to almost 22% in the last two decades, implying that the BRICS hold the second largest GDP of the global economic output after U.S (Demir & Ersan, 2017). Regarding population, BRICS account for 41 % of world population and enjoy more than 1 billion working people (Demir & Ersan, 2017). In world trade, their exports and imports are estimated to increase nearly in triple and double respectively. Also, they have more than US$ 4 trillion of foreign exchange reserves, with FDI which peaked at $US294 billion in 2013as well as capitalization which is expected to be more than 40% of world stock in 2030. Notably, the BRICS economies have made financial reforms as well as adopted the swift economic transformation. Unsurprisingly, their economic growth dramatically surpassed other developing countries and is also expected to exceed the U.S after 2020 (Demir & Ersan, 2017). Thus, these countries appear as the role model for the other developing countries since their influence on the global economy is on the rise (Rodrik, 2014).

The below figures (1.1–1.6) demonstrate that risk-taking and funding liquidity have increased substantially over the last decade, specifically banks in BRICS. Bank size was growing at a remarkable pace, while banks tend to have a lower capital ratio and less NSFR. In BRICS countries, the levels of risk-taking of banks were heterogeneous. The banks in the region experienced the highest levels of risk-taking at the year 2008. That was the evidence of the global financial crisis which affected the banking industry. Surprisingly, the risk-taking of banks in the BRICS economies has increased dramatically at the beginning of 2014. There are number of reasons why banks take more risks. Firstly, banks with the abundant liquidity induce excessive risks due to bank managers' compensation (Acharya & H. Naqvi, 2012). There are two views, the compensation of managers depends on the volume of loans implying higher loans lead

9

to higher payoffs. When macroeconomic risk exists, it forces the investors to lower the direct investment and leaves banks awash with abundant liquidity which induces higher risk taking behavior. Secondly, the ownership structure is often viewed as the main determinant of bank risk-taking. In developing countries, the two-tier of banks are owned by state and private (Zhu & Yang, 2016). The state-ownership is correlated with higher risk-taking of banks because state-owned banks often benefit their political connections to obtain finance and resolution of nonperforming loans from the government as support that may decrease default risks. Secondly, the bank risk-taking increases due to foreign bank entry, privatization of government-owned banks, bank branch expansion and so forth. For instance, bank competition may lead to deterioration of bank capital and liquidity. However, the impact becomes minimal if effective policies about bank restructuring and mergers are implemented as policy makers are aware of the adverse effects of these regulations on banking system, especially liquidity and capital. The policies would be crucial in nations where entities such as bank regulators and competition authorities are separate. Notably, for example, India is a country where functions of both bank regulators and competition authorities are under the supervision of central bank of India whereas the countries that coordinate functions of both bank regulators and competition authorities include Russia, United Kingdom, Mexico, European Union, et and they bring together competition policy and macro-prudential regulation in order to obtain gains from bigger competition in the banking system (Sarkar, Sarkar, Sensarma, & Sensarma, 2016).
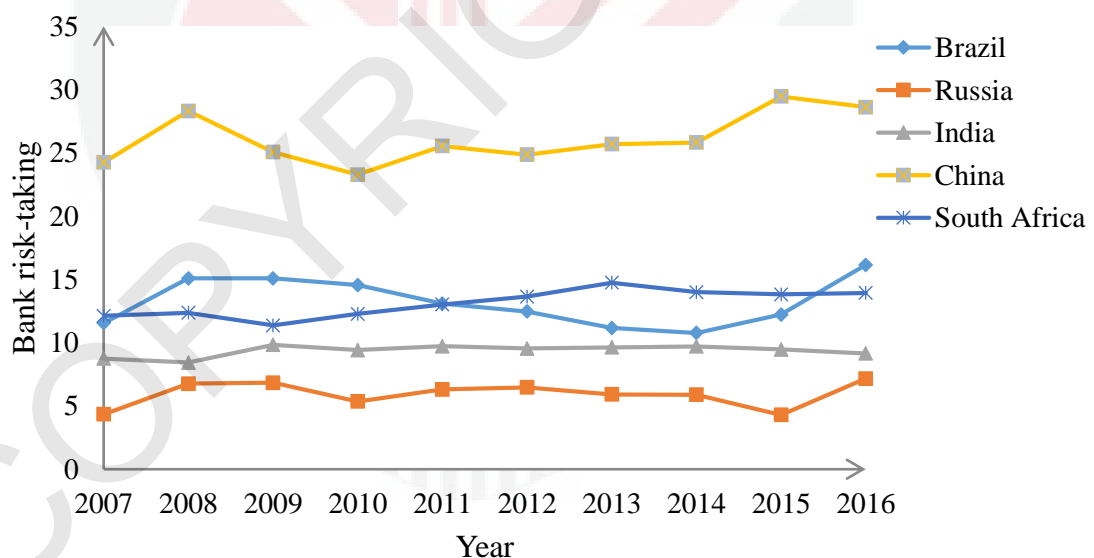
Figure 1.1 : Risk-taking of individual banks of each country in BRICS
(Source : Bureau van Dijk Bankscope and author's calculation)

Figure 1.1 shows that the risk-taking of Chinese banks has the highest value among banks over the period 2007-2016. Their amount of risk-taking is 28.62 standard deviation which is higher than the twice of risk-taking of Brazil banks that have the value of 16.14 standard deviation. On the hand, Russian banks documented the lowest risk-taking practices among banks. Their lower risk-taking behavior may be attributed

to the fact that the government owns the significant number of banks whereas foreign ownership is insignificant. The banking industry is concentrated on five banks holding more than half of the assets of the banking sector in Russia. In Brazil, bank risk-taking grew from approximately 12 to 16 standard deviations at 2016. The risk-taking of Brazilian banks is increasing at an alarming rate. The in South African banks show that they are in the second position in terms of risk-taking which went up from 12.46 to13.96 standard deviation in the ten-year period from 2007 to 2016. Indian banks' risk-taking showed slight changes between the periods from 2007 to 2016, ranging from the lowest 8.4 standard deviations to highest 9.46 standard deviations.

Figure 1.2 presents the bank risk-taking showing a sharp elevation in BRICS. The risk-taking grew at a rate of nearly eight standard deviations with evidence of excessive risk-taking led to the financial crisis from 2007 to 2009. The bank risk-taking witnessed with precipitous fall from 2010 to 2012. The decline in bank risk-taking can be explained by regulatory efforts to tighten the banks' risk-taking behavior. The efforts entailed reforms in the global banking regulations, which imposed banks to increase their cash and liquidity securities in an attempt to prevent any issues regarding liquidity crunches; in contrast, make banks less risky as well as an entire financial system more secure moving forward. Despite regulatory reforms, bank risk-taking has abruptly increased at the beginning of 2013. Moreover, increased levels of liquidity and capital that were intended to prevent banks from taking more risks do not seem to have changed banks' risk-taking behavior substantially, especially in BRICS.
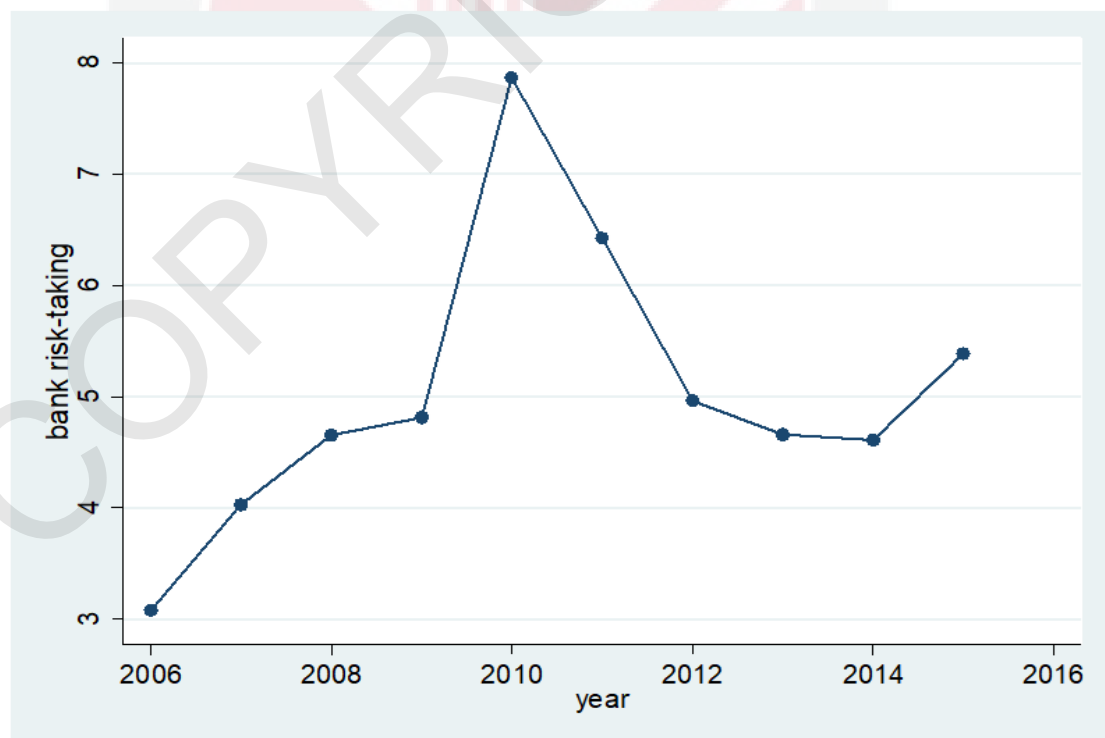
Figure 1.2 : Bank risk-taking in BRICS countries
(Source : Bureau van Dijk Bankscope and author's calculation)

11

What caused the tremendous increase in risk-taking by banks in BRICS has triggered the attention of regulators, policymakers, and academic researchers. The rich literature provides numerous market-, firm- and regulation- specific determinants of bank risk (B. N. Ashraf, Zheng, & Arshad, 2016; Battaglia & Gallo, 2017). For example, it highlights significantly unexplained factors that may lead banks to take more risks that, as a result, make them vulnerable to the financial crisis (Haritchabalet, Lepetit, Spinassou, & Strobel, 2017). However, it still appears ambiguity why some banks take more risks than others.

Figure1.3 presents the capital ratio of banks in BRICS countries over the period between 2006 and 2015. The ratio of capital consistently declined over 2006–2007 implying that banks in this region experienced lower capital during the crisis. This ratio increased in 2008. From late 2009 to 2012, the ratio declined sharply. This decline in capital reflects that banks increased their activities, strengthened economic growth, and increased risk-taking. From late 2012 to 2014, the capital ratio grew sharply. From late of 2014 to 2015, the ratio of capital was decreasing at alarming rate. To this end, this contradicts to a regulatory initiative to increase capital ratio.
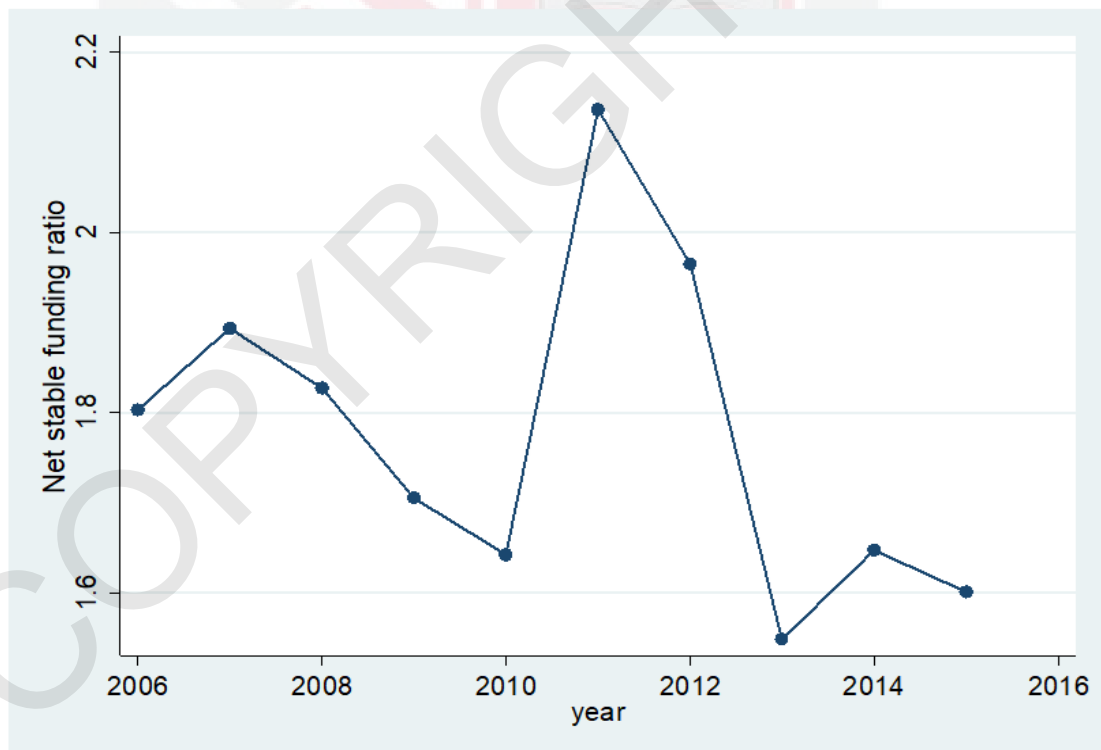
Figure 1.3 : Capital ratio of banks in BRICS
(Source : Bureau van Dijk Bankscope and author's calculation)

Figure 1.4. shows NSFR of banks in BRICS countries. It decreased sharply from 2007 to 2010. Over the period between 2010 and 2011, the ratio abruptly went to peak with the evidence of tightening high levels of liquidity. It kept falling persistently from late

2011 to 2013. In 2014, the ratio slightly increased, which it decreased relatively at 2015
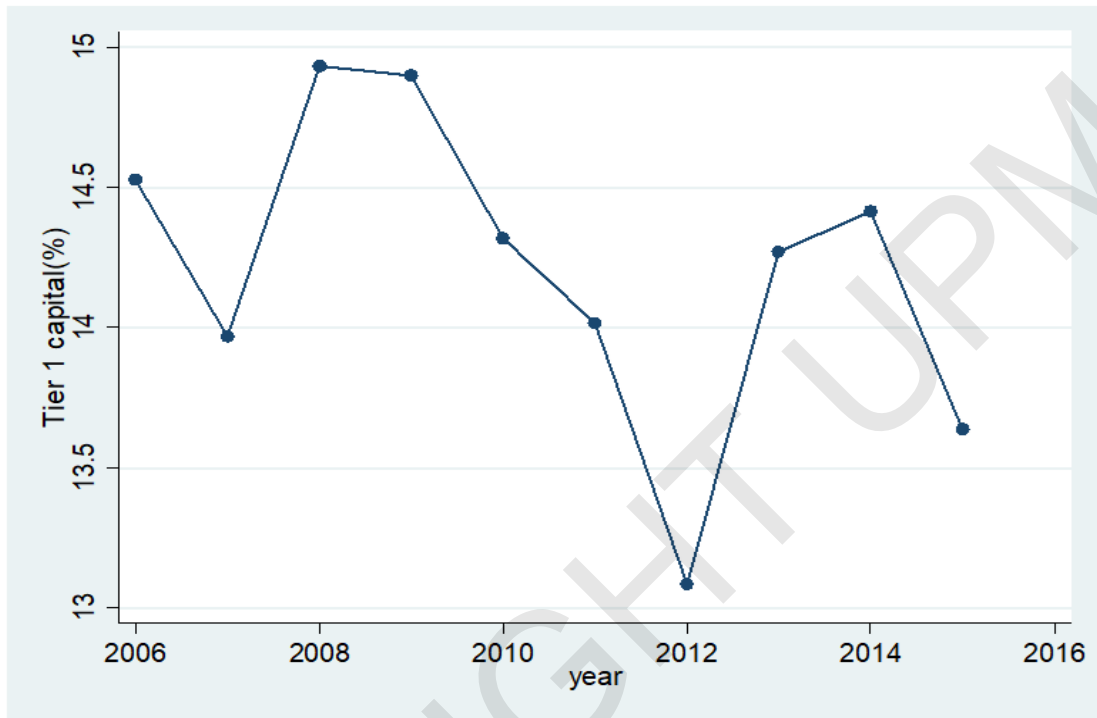
Figure 1.4 : Net stable funding ratio in BRICS
(Source : Bureau van Dijk Bankscope and author's calculation)

Figure 1.5 indicates funding liquidity measured by deposits to total assets of the period between 2006 and 2015. During this time span, the funding liquidity of banks in BRICS was increasing at persistent pace. For instance, the level of deposits has increased dramatically from 2006 to 2015. Mid 2008 the funding liquidity met with a precipitous drop. Notably, this suggests that banks tend to maintain higher deposits next to minimum liquidity requirement to avoid distress which compels them particularly to sell their assets at fire-sale and to benefit investment opportunities in the future. They have a fear that they cannot accumulate funds through accessing the markets instead they borrow additional funds from central banks. The holding of these funds serves as a precautionary buffer during crises.

13
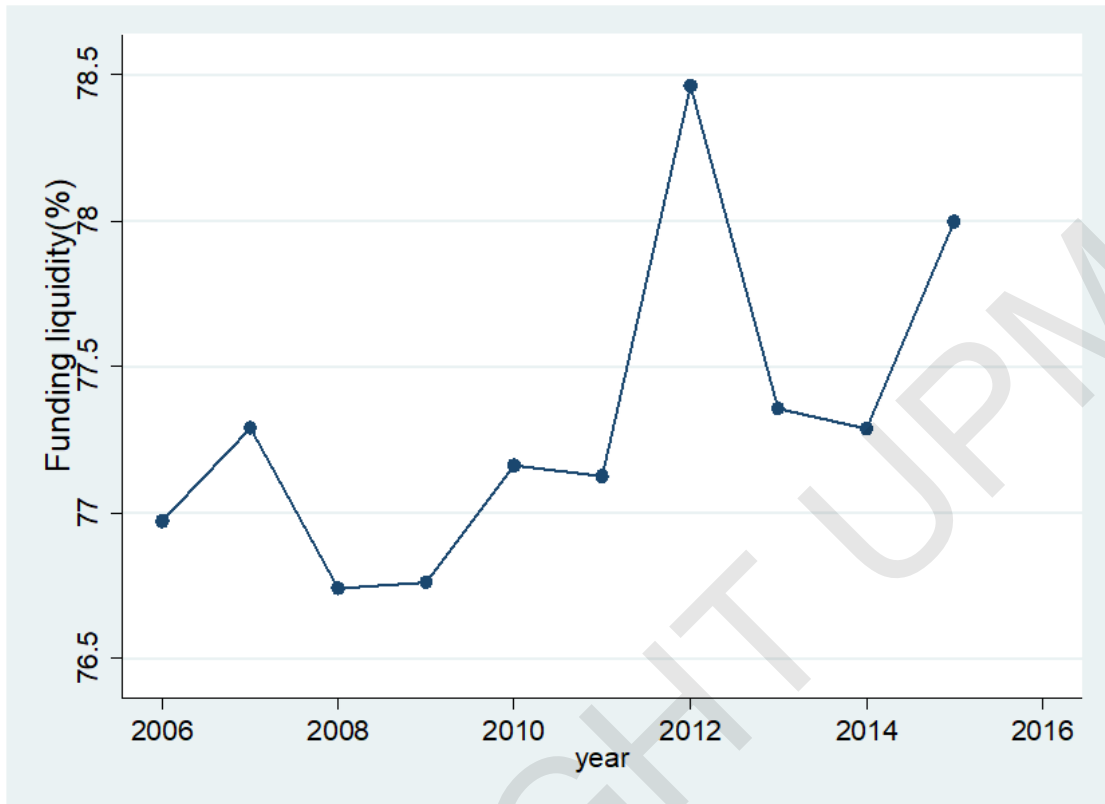
Figure 1.5 : Funding liquidity in BRICS
(Source : Bureau van Dijk Bankscope and author's calculation)

The bank regulators across the world pay special attention to banks that are considered as systematically important (i.e., large and complex) as they pose a challenge to banking stability. For instance, bank size has been increasing substantially for or the last two decades making banks too-big-to-fail. However, how size impacts the relationship between NSFR, capital, funding liquidity and bank risk-taking in BRICS remains relatively unknown as the existing literature has ignored. Indeed, there are divergent views in bank size. Some have argued that larger banks are riskier because they usually take excessive risks associated with too big to fail hypothesis and that is an overt sign of recent financial crisis (De Jonghe, Diepstraten, & Schepens, 2015). To address, regulators suggested an additional surcharge of up to 2.5% on large banks as capital-based measures (Laeven et al., 2016) and limit of size that will lead to less riskier. In addition, they recommended that bank activities are to be restricted (Vickers, 2011). Others have argued that an increase in bank size improves the banking stability through the economies of scale and portfolio diversification and advocated banks to grow in size by exploiting innovation, technology and deregulation and they disputed that such restrictions on bank size would change banks' resource allocation which undermines the efficiency of capital allocation and increases costs substantially to real economic activities (Laeven et al., 2016). For seeking a better solution, they suggested emphasizing additional capital and rather than a reduction in too big to fail banks (Farhi & Tirole, 2012).

Figure 1.6 demonstrates the growth of bank size with the measure of natural logarithm over the sample period from 2006 to 2015. As shown the above figure, the average bank size increased consistently before the recent financial crisis and follows stable in bank growth with mid of the global financial turmoil, especially for the period between 2008 and 2009. Subsequently, banks grew sharply during 2010 and 2014, in this period banks exploit economies of scale that enhance their value. With the beginning of 2015, the size dropped slightly, but it indicates clearly that post-crisis has induced a sharp increase in bank size.
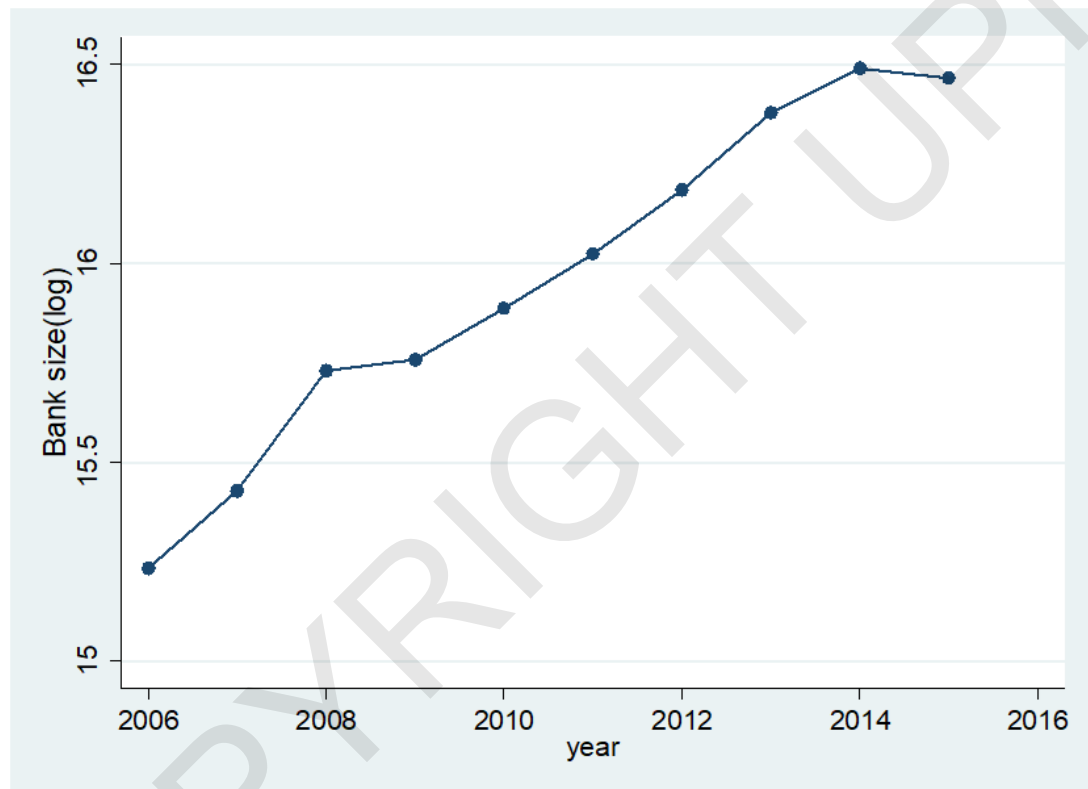
Figure 1.6 : Bank size in BRICS
(Source : Bureau vanDijk Bankscope and author's calculation)

1.3 Statement of the problem

The recent international financial turmoil has highlighted that the maturity mismatch problem, managers' incentive to take excessive risks, lenient regulations, insufficient capital, reliance on short-term financing and flaws in corporate governance were cited as the risk factors that caused the crisis of 2007-2009 which led to the collapse of many financial institutions (Hlatshwayo et al., 2013; Hoque, Andriosopoulos, Andriosopoulos, & Douady, 2015; Jobst, 2014). The empirical evidence showed that the liquidity shortage was another risk determinant (Hugonnier & Morellec, 2017). In response, Basel III new net stable funding requirement (NSFR) and capital requirements were introduced. In particular, NSFR aims to enhance liquidity buffers

of individual banks, to increase their long-term stable funding, to use minimum share of short-term debt in an effort to limit their risk-taking, to reduce maturity mismatch problem and to prevent liquidity distress from becoming insolvency risk (Laeven & Levine, 2009; Wei et al., 2017). However, these new regulatory measures may have unintended consequences because banks change the structure of their balance sheets to improve their stable funding and liquidity. Subsequently, these reactions can reduce credit supply in one hand and can encourage bank managers to take excessive risks on the other hand which thus sow the seeds of an impending crisis (H.-K. Chen, Liao, Lin, & Yen, 2018). Lack of experience in the likely effects of the regulatory standards sheds ample light on several issues which are stated as follows.

First, it is uncertain whether and how banks in emerging countries, especially in BRICS countries, respond to Basel III new liquidity requirements as bank regulators have never imposed before on banks such tighter liquidity constraints. Banks may make adjustments in numerous ways which are likely to have different welfare implications. First, banks make upward adjustments to their liquidity position by increasing capital or decreasing the percentage of assets in loans, decreasing loan commitments to building loans in the future, reducing their asset growth rates, and decreasing their dividend payout ratios (DeYoung, Distinguin, & Tarazi, 2018). Second, banks attempt to comply with NSFR requirement through liquidity arbitrage which is similar to the efforts by banks to avoid risk-based-capital requirements. Because they move credit risk exposures off their balance sheets on the one hand or conceal some of their risk exposures to illiquid investments by reducing their required stable funding (RSF) to operate with less cost of stable funds on the other hand, finally, banks may intentionally curtail credit supply in order to comply with liquidity constraints (Roulet, 2018). Theoretically, there is a consensus of banks' liquidity adjustment, but empirical evidence of whether and how banks in BRICS comply with NSFR requirement and bank-specific factors that affect the speeds with which banks can converge to their desired NSFR remain unclear.

Second, another critical issue that arises after the implementation of NSFR is that if stricter liquidity requirement reduces bank risk-taking behavior and makes banks sounder, more stable, less value-destroying and going forward as well. The relationship between NSFR and bank risk-taking is subject to the theoretical views which provide positive and negative effects (Hong et al., 2014; Hugonnier & Morellec, 2017). In the first view, an increase in NSFR is thought to be detrimental to bank stability as bank managers –aiming of maximizing their compensations and their shareholders' values– tend to take excessive risks by benefitting higher liquidity (Battaglia & Gallo, 2017). The other view is that higher liquidity holdings allow banks to become self-insurers and reduce potential bank risk-taking behavior, which in turn improve the financial stability of banking system (Jacob & Munro, 2018; Wei et al., 2017).

Third, the issue is that the stylized evidence (Figures 1.2–1.4) shows that bank risk-taking behavior and short-term funding liquidity are increasing at an alarming rate over the period, while, on the other hand, NSFR and capital are decreasing. The joint

effects of NSFR and capital on bank risk-taking behavior in emerging economies also remains ambiguous. Banking theory posits that bank capital and NSFR are interrelated phenomena and bank assets and liabilities are jointly associated with liquidity provision enhancing real economic activities, but it also creates liquidity risk and credit risk (Diamond & Dybvig, 1983). Strong evidence demonstrates that capital alone is not adequate to prevent banks from failures (Bitar et al., 2018). But higher capital can reduce substantially lending activities (Roulet, 2018) and the relationship between capital and bank risk-taking provides mixed and inconclusive results (Anginer, Demirguc-Kunt, & Zhu, 2014; Lee & Hsieh, 2013).

Fourth, the issue is that there is little understanding how bank regulation and supervision like a stringent capital requirement, activity restrictions, and official supervisory power and private monitoring condition the relations between NSFR, funding liquidity and bank risk-taking. In particular, when banks are awash with liquidity, several issues within banks can arise. Due to limited liability bank managers tend to take more risks in a sense they engage in excessive lending by underpricing downsize risk as their compensations are based on the volume of loans and bonuses depend on a quantity of loans (Acharya & H. Naqvi, 2012). Also, banks with a flush of liquidity undermine the market discipline and trigger overinvestment signifying higher risk-taking behavior (Acharya & H. Naqvi, 2012). An additional issue is to consider bank heterogeneity as implementing new policies regarding liquidity (NSFR) and capital requirements.

Therefore, this study carries a comprehensive analysis to investigate the effects of NSFR, capital and funding liquidity on bank risk-taking in BRICS countries and examine conditional effects of bank regulation and supervision on these relations.

1.4   Research questions

Consistent with the above issues, several questions have been raised about the impact of bank funding liquidity and capital on bank risk-taking behavior using measures inspired by Basel III new liquidity requirement. Consequently, the specific questions of the study are as follows:

1.   What are the adjustment speeds of banks in BRICS countries toward target NSFR?
2.   What is the joint effect of NSFR and capital on bank risk-taking in BRICS countries?
3.   To what extent does funding liquidity influence the risk-taking by banks in BRICS countries?
4.   Is there a causal relationship between capital and the NSFR of banks in BRICS countries?

17

1.5   Research objectives

In this study, the general objective is to investigate the impact Basel III Net Stable Funding Ratio (NSFR) and on bank risk-taking in BRICS countries. Moreover, the objective is to examine whether the relationship between NSFR and bank risk-taking is conditional on bank regulation and supervision. The specific research objectives are as follows:

1. To investigate adjustment speeds to target NSFR of banks in BRICS countries.
2. To examine the joint effect of NSFR and capital on the bank risk-taking in BRICS countries.
3. To find out the relationship between funding liquidity on the bank risk-taking in BRICS countries.
4. To determine the interrelationship between regulatory capital ratio and NSFR of banks in BRICS countries.

1.6   Scope of the study

This study focuses on Basel III requirements which entail more liquidity and better-quality capital enabling banks to better withstand potential bank failures (M. Chen, Wu, Jeon, & Wang, 2017; Laeven & Valencia, 2013). More precisely, the study seeks to examine whether banks adjust their net stable funding ratio and how the adjustment occurs because much uncertainty exists in what actions banks will take. Under the new regulatory framework, some of the banks' actions are unexpected and may likely damage the safety and soundness of banking system which results in unintentional counterproductive for the real economy. Furthermore, the study covers funding liquidity, incorporates bank regulation and the recent financial crisis in the empirical models straight forward to analyze their roles in the relationships between funding liquidity and bank risk-taking in BRICS countries.

The motivation behind adopting this topic is associated with the importance of NSFR and capital ratio and their effects on bank risk-taking behavior. The recent financial crisis was stemmed from maturity mismatches and the structural liquidity requiring banks to maintain sufficient amount of long-term stable funding which leads to decrease the maturity mismatch problems became imperative (Kim & Sohn, 2017). The similar veins, the regulation also emphasized the significance of capital ratio designed to increase capital buffers and to reduce the banks' insolvency risk since the capital shortage was cited as critical factor limiting banks' ability to issue loans during the recent financial crisis.

The study covers emerging markets, especially BRICS countries. There are several reasons why the study focuses on banks in the BRICS countries. Firstly, the banks in BRICS have witnessed greater bank risk-taking (Fig. 1.2), lower capital ratio (Fig1.3) and tremendous declines in profits (IMF Report, 2017). Secondly, they also encounter

greater loan default problems after the financial crisis and demonstrates that these problems present challenges for policy makers in these countries (Maliszewski et al., 2016). To put it different, higher nonperforming loans are the overt signs of banks' excessive risk-taking which will have unfavorable impacts on bank stability and will then harm the economic activities. Thirdly, funding liquidity has increased significantly over the period (Fig. 1.5) and higher funding liquidity signifies the banks' reliance on the short-term financing which was recognized as the major factor of the recent crisis (Wei et al., 2017).

Moreover, the economic importance of this region provides policy makers a number of economic demands that are critical for developing effective and precise policies in case of implementing NSFR. The overall economic growth rates of emerging and advanced economies are estimated annually at 6.6 % and 2.5 %, respectively, whereas the economic growth of BRICS countries is estimated at 8.1% per annum; that is, it shows that economic growth of BRICS countries exceeds both economies (Radulescu, Panait, & Voica, 2014). Despite the developing countries are more dependent on banking system than advanced nations because their financial markets are less developed (Kroszner, Laeven, & Klingebiel, 2007).

Finally, the existing literature on the effects of Basel III NSFR and capital requirements have been mainly explored in developed economies. Little research on the effects of these requirements on bank risk-taking exists if any has been unexplored in the emerging markets in general and in BRICS countries in particular. Given the heterogeneity in markets, empirical results from the developed markets may not be generalized for emerging economies (Chowdhury, Uddin, & Anderson, 2018). Neglecting such variations, policy to implement the new regulations in BRICS counties may conflict with their different and multiple objectives promoting their economic growth, curbing inflation, stabilizing exchange rates (M. Chen et al., 2017).

1.7   Significance of the study

The study contributes to the debate on financial reforms which became a focus of Basel III frameworks after the recent financial crisis. The reforms attempt to increase liquidity and capital ratios considering banks' off-balance sheet items to reduce mainly their incentives for excessive risk-taking behavior which consequently leads to the likelihood of bankruptcy. However, under the conditions of regulatory requirements, bank risk-taking may not be similar across regions, countries or size as well as adjustment speeds toward desired liquidity measure, demanding a further discussion about the reasons behind these heterogeneous relationships. This study shows a pivotal role of Basel III regulations in explaining the effects of liquidity and capital ratios on bank risk-taking without jeopardizing banks' lending activities which may impair the economic growth. The financial reforms are of paramount importance for policy implications. Therefore, the contributions of this study can be best treated under three dimensions: academics, policymakers and bank practitioners.

From the academic point, this work makes contributions to the existing literature in the following four dimensions. First, the research on banks' adjustment to the implementation of the NSFR requirement in BRICS economies is scarce. Few studies, such as Ly et al. (2017) and DeYoung and Jang (2016) have examined the adjustment speeds of banks towards desired liquidity. Unlike this study adopts BRICS countries opposing developed industries, specifically focused on U.S and EU banks. Additionally, the study employs a dynamic partial adjustment model to estimate the target NSFR for each bank in every year of panel data. Providing evidence on how the size explains the banks' different responses in case of adjustments of NSFR. In a panel analysis, it is worth noting that there have been growing studies on dynamic corrected least square dummy variables (LSDVC) estimation technique. Dang et al. (2015) have underlined that the possible persistence in financial variables which is the key determinant for series correlation as well as fractional nature in the dependent variables render the use of other panel models inappropriate. Even if the system generalized method of moments (SYS-GMM) method is used, it may usually offer inconsistent estimates which, in turn, lead to wrong inferences. To overcome this issue, the study employs the dynamic corrected least square dummy variables (LSDVC) approach developed by Kiviet (1995), and extended by Bruno (2005) to estimate the model for the case of BRICS economies. Therefore, to the best of the researcher's knowledge, this is one of few studies that consider the adjustment speeds of banks in BRICS countries. Moreover, the study uses dynamic trade-off theory which is widely popular in corporate finance developing a novel model to investigate how bank-specific variables influence the speeds with which banks adjust partially their target net stable funding ratio.

Second, it contributes to the emerging literature on the potential joint impacts of net stable funding ratio and capital ratio on bank risk-taking behavior in BRICS economies. To the best of the researcher's knowledge, up to date, little is known about the link and it is not clear how a combination of capital and liquidity requirements affects the management of banks' balance sheets which poses an empirical challenge. Moreover, the study investigates whether the effects of NSFR and capital ratio on bank risk-taking differ across bank size, financial crisis period and bank regulation. In this context, the bank regulation refers to capital stringency, the degree of supervisory power, private monitoring, and restrictions on bank activities. If there is a systemic risk, large banks pose substantial impacts on the economy, while the effect of small banks on the economy is little. To that effect, scholars strongly argue that a partition of banks according to their sizes, such as small banks, medium banks and large banks plays an essential role in bank risk-taking behavior which consequently affects banking stability (Vazquez & Federico, 2015). Another reason for considering banks separately is related to the complexity in a business model and legal structure of large banks presenting significant challenges. Indeed, banks which operate across borders put pressure to regulators because of differences in bank regulation frameworks and fiscal policies. Besides larger banks tend to work with substantial lower liquidity positions than smaller banks (DeYoung et al., 2018). Furthermore, the study embeds the theory of financial intermediation to evaluate how liquidity and capital requirements influence bank risk-taking behavior. To sum up, the study contributes to liquidity and capital literature empirically and theoretically.

20

Third, the study adds to funding liquidity literature explaining the impacts of funding liquidity on bank risk-taking in BRICS countries (Khan et al., 2017). The study also contributes to literature on liquidity risk management (Bonner, Van Lelyveld, & Zymek, 2015; DeYoung & Jang, 2016). Specifically, the study expands this literature by investigating the interaction of funding liquidity and bank regulation on bank risk-taking behavior using four measures of bank risk-taking, two measures are used in main model, while the other two are employed as robustness checks. In doing so, the study provides a theoretical framework for evaluating the relationship between funding liquidity, bank regulation and bank risk-taking allowing developing testable implications about policies of banks in BRICS countries.

Fourth, the study adds to the existing literature on capital and liquidity using simultaneous equations estimator. Though the empirical literature shows that liquidity and capital might be jointly determined and theory of financial intermediation posits various channels through which liquidity and capital are interrelated (Distinguin, Roulet, & Tarazi, 2013), specifically the relationship between NSFR and capital ratio is an underexplored research area.

From a strand of bank regulators, the study offers clear and comprehensive insights to bank regulators, enabling them formulate precise and effective banking regulatory frameworks to better monitor and discipline bank managers that deliberately take excessive risks in the one hand; to reduce problems of maturity mismatch of banks' liabilities and assets and perverse risk factors which may possible pose threats to the banking stability on the other hand. Furthermore, the findings lend support for regulators to exclude smaller banks from having to meet the new Basel III liquidity and capital regulations. Because in practice, implementing the minimum net stable funding ratio by small banks net stable funding ratio increases unnecessary costs.

From the viewpoint of bank practitioners, the findings of this study are of interest to bank executives. More specifically, the managers must give higher attention to NSFR. The ratio enables them to evaluate better the banks' ability to comply with Basel III liquidity requirements which will substantially impact on banks' current liquidity risk management practices, especially large banks.

1.8   The organization of the chapters

The study is organized as follows. Chapter one develops the introduction, including the background of the study, statement of the problem, research questions, research objectives, scope and motivation, the significance, and organization of the study. Chapter two focuses on concepts and definitions, theories and theoretical background, empirical literature and hypothesis developments, and literature summary and gap. Chapter three consists of four empirical models and their respective econometric estimations that are employed to seek solutions to research objectives, research design, sources of data, and measurements of variables. Chapter four presents the empirical

results and discussions. Finally, chapter five covers summary, conclusion and policy implications.

REFERENCES

Abdul-Rahman, A., Sulaiman, A. A., & Said, N. L. H. M. (2017). Does financing structure affects bank liquidity risk? *Pacific-Basin Finance Journal*.

Abedifar, P., Molyneux, P., & Tarazi, A. (2013). Risk in Islamic banking. *Review of Finance, 17*(6), 2035-2096.

Abou-El-Sood, H. (2016). Are regulatory capital adequacy ratios good indicators of bank failure? Evidence from US banks. *International Review of Financial Analysis, 48*, 292-302.

Acharya, & Mora, N. (2015). A crisis of banks as liquidity providers. *The Journal of Finance, 70*(1), 1-43.

Acharya, & Naqvi, H. (2012). The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of Financial Economics, 106*(2), 349-366.

Acharya, Shin, H. S., & Yorulmazer, T. (2011). Crisis resolution and bank liquidity. *Review of Financial studies, 24*(6), 2166-2205.

Acharya, V., Engle, R., & Richardson, M. (2012). Capital shortfall: A new approach to ranking and regulating systemic risks. *The American Economic Review, 102*(3), 59-64.

Acharya, V., & Naqvi, H. (2012). The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of Financial Economics, 106*(2), 349-366.

Adhikari, B. K., & Agrawal, A. (2016). Does local religiosity matter for bank risk-taking? *Journal of Corporate Finance, 38*, 272-293.

Adrian, T., & Brunnermeier, M. K. (2012). CoVaR. *The American Economic Review, 106*(7), 1705-1741.

Agoraki, M.-E. K., Delis, M. D., & Pasiouras, F. (2011). Regulations, competition and bank risk-taking in transition countries. *Journal of Financial Stability, 7*(1), 38-48.

Akerlof, G. A. (1978). The market for "lemons": Quality uncertainty and the market mechanism. In *Uncertainty in Economics* (pp. 235-251): Elsevier.

Allahrakha, M., Cetina, J., & Munyan, B. (2018). Do higher capital standards always reduce bank risk? The impact of the Basel leverage ratio on the US triparty repo market. In (Vol. 32, pp. 3-16): Elsevier.

Aluko, O. A., & Ajayi, M. A. (2018). Determinants of banking sector development: Evidence from Sub-Saharan African countries. *Borsa Istanbul Review, 18*(2), 122-139.

Anderson, T. W., & Hsiao, C. (1982). Formulation and estimation of dynamic models using panel data. *Journal of econometrics, 18*(1), 47-82.

Anginer, D., Demirguc-Kunt, A., & Zhu, M. (2014). How does competition affect bank systemic risk? *Journal of Financial Intermediation, 23*(1), 1-26.

Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2014). Causality and endogeneity: Problems and solutions. *The Oxford handbook of leadership and organizations, 1*, 93-117.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies, 58*(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics, 68*(1), 29-51.

Ashraf, Rizwan, M. S., & L'Huillier, B. (2016). A net stable funding ratio for Islamic banks and its impact on financial stability: An international investigation. *Journal of Financial Stability, 25*, 47-57.

Ashraf, B. N., Arshad, S., & Hu, Y. (2016). Capital regulation and bank risk-taking behavior: Evidence from pakistan. *International Journal of Financial Studies, 4*(3), 16.

Ashraf, B. N., Zheng, C., & Arshad, S. (2016). Effects of national culture on bank risk-taking behavior. *Research in International Business and Finance, 37*, 309-326.

Baltagi, B. (2008). *Econometric analysis of panel data*: John Wiley & Sons.

Baltagi, B. H., & Wu, P. X. (1999). Unequally spaced panel data regressions with AR (1) disturbances. *Econometric Theory, 15*(6), 814-823.

Baltas, K. N., Kapetanios, G., Tsionas, E., & Izzeldin, M. (2017). Liquidity creation through efficient M&As: A viable solution for vulnerable banking systems? Evidence from a stress test under a panel VAR methodology. *Journal of Banking & Finance, 83*, 36-56.

Bandyopadhyay, A., & Barua, N. M. (2016). Factors determining capital structure and corporate performance in India: Studying the business cycle effects. *The Quarterly Review of Economics and Finance, 61*, 160-172.

Banerjee, R. N., & Mio, H. (2017). The impact of liquidity regulation on banks. *Journal of Financial Intermediation*.

Barry, T. A., Lepetit, L., & Tarazi, A. (2011). Ownership structure and risk in publicly held and privately owned banks. *Journal of Banking & Finance, 35*(5), 1327-1340.

Barth, J., Caprio, G., & Levine, R. (2004). Bank regulation and supervision: what works best? *Journal of Financial Intermediation, 13*(2), 205-248.

Barth, J. R., Caprio, G., & Levine, R. (2006). *Rethinking bank regulation: Till angels govern*: Cambridge University Press.

Barth, R., Lin, C., Ma, Y., Seade, J., & Song, F. M. (2013). Do bank regulation, supervision and monitoring enhance or impede bank efficiency? *Journal of Banking & Finance, 37*(8), 2879-2892.

Basel III, A. (2010). Global Regulatory Framework for More Resilient Banks and Banking Systems, 2010: Basel Committee for Banking Supervision [cit. 2011-11-02]. *Cited from http://www. bis. org/publ/bcbs189. htm*.

Baselga-Pascual, L., Trujillo-Ponce, A., & Cardone-Riportella, C. (2015). Factors influencing bank risk in Europe: Evidence from the financial crisis. *The North American Journal of Economics and Finance, 34*, 138-166.

Battaglia, F., & Gallo, A. (2017). Strong boards, ownership concentration and EU banks' systemic risk-taking: Evidence from the financial crisis. *Journal of International Financial Markets, Institutions and Money, 46*, 128-146.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2006). Bank concentration, competition, and crises: First results. *Journal of Banking & Finance, 30*(5), 1581-1603.

Ben Bouheni, F. (2014). Banking regulation and supervision: can it enhance stability in Europe? *Journal of Financial Economic Policy, 6*(3), 244-269.

Berger, A. N., & Bouwman, C. H. (2009). Bank liquidity creation. *Review of Financial Studies, 22*(9), 3779-3837.

Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises? *Journal of Financial Economics, 109*(1), 146-176.

Berger, A. N., & Bouwman, C. H. (2017). Bank liquidity creation, monetary policy, and financial crises. *Journal of Financial Stability, 30*, 139-155.

Berger, A. N., Bouwman, C. H., Kick, T., & Schaeck, K. (2016). Bank liquidity creation following regulatory interventions and capital support. *Journal of Financial Intermediation, 26*, 115-141.

Berger, A. N., DeYoung, R., Flannery, M. J., Lee, D., & Öztekin, Ö. (2008). How do large banking organizations manage their capital ratios? *Journal of Financial Services Research, 34*(2-3), 123-149.

Berger, A. N., & Sedunov, J. (2017). Bank liquidity creation and real economic output. *Journal of Banking & Finance, 81*, 1-19.

Bhargava, A., Franzini, L., & Narendranathan, W. (1982). Serial correlation and the fixed effects model. *The Review of Economic Studies, 49*(4), 533-549.

Bhattacharya, S., & Thakor, A. V. (1993). Contemporary banking theory. *Journal of financial Intermediation, 3*(1), 2-50.

Bitar, M., Pukthuanthong, K., & Walker, T. (2018). The effect of capital ratios on the risk, efficiency and profitability of banks: Evidence from OECD countries. *Journal of International Financial Markets, Institutions and Money, 53*, 227-262.

Bitar, M., Saad, W., & Benlemlih, M. (2015). Bank Risk and Performance in the MENA Region: The Importance of Capital Requirements. *Economic Systems, Forthcoming*.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics, 87*(1), 115-143.

Bogliacino, F., Piva, M., & Vivarelli, M. (2012). R&D and employment: An application of the LSDVC estimator using European microdata. *Economics Letters, 116*(1), 56-59.

Bolton, P., Santos, T., & Scheinkman, J. A. (2009). *Outside and inside liquidity*. Retrieved from

Bolton, P., Santos, T., & Scheinkman, J. A. (2011). Outside and inside liquidity. *The Quarterly Journal of Economics, 126*(1), 259-321.

Bonner, C., Van Lelyveld, I., & Zymek, R. (2015). Banks' Liquidity Buffers and the Role of Liquidity Regulation. *Journal of Financial Services Research, 48*(3), 215-234.

Borio, C., & Zhu, H. (2012). Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism? *Journal of Financial Stability, 8*(4), 236-251.

Born, B., & Breitung, J. (2016). Testing for serial correlation in fixed-effects panel data models. *Econometric Reviews, 35*(7), 1290-1316.

Boudt, K., Paulus, E. C., & Rosenthal, D. W. (2017). Funding liquidity, market liquidity and TED spread: A two-regime model. *Journal of Empirical Finance, 43*, 143-158.

Bougatef, K., & Mgadmi, N. (2016). The impact of prudential regulation on bank capital and risk-taking: The case of MENA countries. *The Spanish Review of Financial Economics*.

Bouwman, K., Buis, B., Pieterse-Bloem, M., & Tham, W. W. (2015). A practical approach to constructing price-based funding liquidity factors. *International Review of Economics & Finance, 40*, 90-97.

Boyd, J. H., Chang, C., & Smith, B. D. (1998). Moral hazard under commercial and universal banking. *Journal of Money, Credit and Banking*, 426-468.

213

Brei, M., Gambacorta, L., & Von Peter, G. (2013). Rescue packages and bank lending. *Journal of Banking & Finance, 37*(2), 490-505.

Brunnermeier, M. K. (2009). Deciphering the liquidity and credit crunch 2007-2008. *Journal of Economic perspectives, 23*(1), 77-100.

Brunnermeier, M. K., & Oehmke, M. (2013). The maturity rat race. *The Journal of Finance, 68*(2), 483-521.

Brunnermeier, M. K., & Pedersen, L. H. (2009). Market liquidity and funding liquidity. *Review of Financial studies, 22*(6), 2201-2238.

Bruno, G. (2005). *Estimation and inference in dynamic unbalanced panel data models with a small number of individuals*: Università commerciale Luigi Bocconi.

Bryant, J. (1980). A model of reserves, bank runs, and deposit insurance. *Journal of Banking & Finance, 4*(4), 335-344.

Bun, M. J., & Kiviet, J. F. (2003). On the diminishing returns of higher-order terms in asymptotic expansions of bias. *economics Letters, 79*(2), 145-152.

Casu, B., & Girardone, C. (2006). Bank competition, concentration and efficiency in the single European market. *The Manchester School, 74*(4), 441-468.

Chalermchatvichien, P., Jumreornvong, S., & Jiraporn, P. (2014). Basel III, capital stability, risk-taking, ownership: Evidence from Asia. *Journal of Multinational Financial Management, 28*, 28-46.

Chang, X., & Dasgupta, S. (2009). Target behavior and financing: how conclusive is the evidence? *The Journal of Finance, 64*(4), 1767-1796.

Chen, H.-K., Liao, Y.-C., Lin, C.-Y., & Yen, J.-F. (2018). The effect of the political connections of government bank CEOs on bank performance during the financial crisis. *Journal of Financial Stability, 36*, 130-143.

Chen, M., Wu, J., Jeon, B. N., & Wang, R. (2017). Monetary policy and bank risk-taking: Evidence from emerging economies. *Emerging Markets Review, 31*, 116-140.

Chen, N., Huang, H.-H., & Lin, C.-H. (2017). Equator principles and bank liquidity. *International Review of Economics & Finance*.

Chen, W.-P., Lin, S. L., Lu, J., & Wu, C.-C. (2018). The impact of funding liquidity on market quality. *The North American Journal of Economics and Finance, 44*, 153-166.

Chiaramonte, L., & Casu, B. (2016). Capital and liquidity ratios and financial distress. Evidence from the European banking industry. *The British Accounting Review*.

Chiu, J., Chung, H., Ho, K.-Y., & Wang, G. H. (2012). Funding liquidity and equity liquidity in the subprime crisis period: Evidence from the ETF market. *Journal of Banking & Finance, 36*(9), 2660-2671.

Choi, B. P., Park, J., Ho, C.-L., & Johnson, D. (2016). Liquidity Transformation: An Examination of US Life Insurers. *Managerial Finance, 42*(7).

Chowdhury, A., Uddin, M., & Anderson, K. (2018). Liquidity and macroeconomic management in emerging markets. *Emerging Markets Review, 34*, 1-24.

Cornett, M. M., McNutt, J. J., Strahan, P. E., & Tehranian, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics, 101*(2), 297-312.

Cox, N. (2006). WINSOR: Stata module to Winsorize a variable. Retrieved from https://EconPapers.repec.org/RePEc:boc:bocode:s361402

Craig, B. R., & Dinger, V. (2013). Deposit market competition, wholesale funding, and bank risk. *Journal of Banking & Finance, 37*(9), 3605-3622.

Cummings, J. R., & Durrani, K. J. (2016). Effect of the Basel Accord capital requirements on the loan-loss provisioning practices of Australian banks. *Journal of Banking & Finance, 67*, 23-36.

Dang, V. A., Kim, M., & Shin, Y. (2012). Asymmetric capital structure adjustments: New evidence from dynamic panel threshold models. *Journal of Empirical Finance, 19*(4), 465-482.

Dang, V. A., Kim, M., & Shin, Y. (2014). Asymmetric adjustment toward optimal capital structure: Evidence from a crisis. *International Review of Financial Analysis, 33*, 226-242.

Dang, V. A., Kim, M., & Shin, Y. (2015). In search of robust methods for dynamic panel data models in empirical corporate finance. *Journal of Banking & Finance, 53*, 84-98.

de Bandt, O., Camara, B., Maitre, A., & Pessarossi, P. (2017). Optimal capital, regulatory requirements and bank performance in times of crisis: Evidence from France. *Journal of Financial Stability*.

De Haan, J., & Poghosyan, T. (2012). Size and earnings volatility of US bank holding companies. *Journal of Banking & Finance, 36*(11), 3008-3016.

De Haan, L., & van den End, J. W. (2013). Banks' responses to funding liquidity shocks: Lending adjustment, liquidity hoarding and fire sales. *Journal of International Financial Markets, Institutions and Money, 26*, 152-174.

De Jonghe, O., Diepstraten, M., & Schepens, G. (2015). Banks' size, scope and systemic risk: What role for conflicts of interest? *Journal of Banking & Finance, 61*, S3-S13.

Deli, Y. D., & Hasan, I. (2016). Real effects of bank capital regulations: Global evidence. *Journal of Banking & Finance*.

Delis, M. D., Hasan, I., & Tsionas, E. G. (2014). The risk of financial intermediaries. *Journal of Banking & Finance, 44*(3), 1-12.

DeMiguel, V., Martin-Utrera, A., & Nogales, F. J. (2013). Size matters: Optimal calibration of shrinkage estimators for portfolio selection. *Journal of Banking & Finance, 37*(8), 3018-3034.

Demir, E., & Ersan, O. (2017). Economic policy uncertainty and cash holdings: Evidence from BRIC countries. *Emerging Markets Review, 33*, 189-200.

Demirgüç-Kunt, A., & Detragiache, E. (2011). Basel Core Principles and bank soundness: Does compliance matter? *Journal of Financial Stability, 7*(4), 179-190.

Demirguc- Kunt, A., Detragiache, E., & Merrouche, O. (2013). Bank capital: Lessons from the financial crisis. *Journal of Money, Credit and Banking, 45*(6), 1147-1164.

Dermine, J. (2015). Basel III leverage ratio requirement and the probability of bank runs. *Journal of Banking & Finance, 53*, 266-277.

Dewatripont, M., Rochet, J.-C., & Tirole, J. (2010). *Balancing the banks: Global lessons from the financial crisis*: Princeton University Press.

DeYoung, R., Distinguin, I., & Tarazi, A. (2018). The joint regulation of bank liquidity and bank capital. *Journal of financial Intermediation, 34*, 32-46. doi:https://doi.org/10.1016/j.jfi.2018.01.006

DeYoung, R., & Jang, K. Y. (2016). Do banks actively manage their liquidity? *Journal of Banking & Finance, 66*(2), 143-161.

Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of political economy, 91*(3), 401-419.

Diamond, D. W., & Rajan, R. G. (2000). A theory of bank capital. *The Journal of Finance, 55*(6), 2431-2465.

Diamond, D. W., & Rajan, R. G. (2001). Liquidity Risk, Liquidity Creation and Financial Fragility: A Theory of Banking." Journal of Political Economy 109. 287-327.

Diamond, D. W., & Rajan, R. G. (2009). The credit crisis: Conjectures about causes and remedies. *American Economic Review, 99*(2), 606-610.

Dietrich, A., Hess, K., & Wanzenried, G. (2014). The good and bad news about the new liquidity rules of Basel III in Western European countries. *Journal of Banking & Finance, 44*, 13-25.

Distinguin, I., Roulet, C., & Tarazi, A. (2013). Bank regulatory capital and liquidity: Evidence from US and European publicly traded banks. *Journal of Banking & Finance, 37*(9), 3295-3317.

Doumpos, M., Gaganis, C., & Pasiouras, F. (2015). Central bank independence, financial supervision structure and bank soundness: An empirical analysis around the crisis. *Journal of Banking & Finance, 61*, S69-S83.

Drehmann, M., & Nikolaou, K. (2013). Funding liquidity risk: definition and measurement. *Journal of Banking & Finance, 37*(7), 2173-2182.

Drukker, D. M. (2003). Testing for serial correlation in linear panel-data models. *Stata Journal, 3*(2), 168-177.

Fama, E. F., & French, K. R. (2000). Forecasting Profitability and Earnings*. *The Journal of Business, 73*(2), 161-175.

Farhi, E., & Tirole, J. (2012). Collective moral hazard, maturity mismatch, and systemic bailouts. *The American Economic Review, 102*(1), 60-93.

Fernández, A. I., & Gonzalez, F. (2005). How accounting and auditing systems can counteract risk-shifting of safety-nets in banking: Some international evidence. *Journal of Financial Stability, 1*(4), 466-500.

Fidrmuc, J., & Lind, R. (2018). Macroeconomic Impact of Basel III: Evidence from a Meta-Analysis. *Journal of Banking & Finance*.

Fiordelisi, F., Marques-Ibanez, D., & Molyneux, P. (2011). Efficiency and risk in European banking. *Journal of Banking & Finance, 35*(5), 1315-1326.

Flannery, M. J., & Hankins, K. W. (2013). Estimating dynamic panel models in corporate finance. *Journal of Corporate Finance, 19*, 1-19.

Flannery, M. J., & Rangan, K. P. (2006). Partial adjustment toward target capital structures. *Journal of financial economics, 79*(3), 469-506.

Frank, M. Z., & Goyal, V. K. (2007). Trade-off and pecking order theories of debt. *Handbook of empirical corporate finance, 2*, 135-202.

Gallitschke, J., Seifried, S., & Seifried, F. T. (2017). Interbank interest rates: Funding liquidity risk and XIBOR basis spreads. *Journal of Banking & Finance, 78*, 142-152.

Garel, A., & Petit-Romec, A. (2017). Bank capital in the crisis: It's not just how much you have but who provides it. *Journal of Banking & Finance, 75*, 152-166.

Gennaioli, N., Shleifer, A., & Vishny, R. W. (2013). A model of shadow banking. *The Journal of Finance, 68*(4), 1331-1363.

Gobat, J., Yanase, M., & Maloney, J. F. (2014). The Net Stable Funding Ratio: Impact and Issues for Consideration.

Goodhart, C. (2013). Ratio controls need reconsideration. *Journal of Financial Stability, 9*(3), 445-450.

Gorton, G., & Winton, A. (2000). Liquidity provision, bank capital, and the macroeconomy. *University of Minnesota, Working Paper*.

Grosse, R. (2017). The global financial crisis—Market misconduct and regulation from a behavioral view. *Research in International Business and Finance, 41*, 387-398.

Gujarati, D. N. (2009). *Basic econometrics*: Tata McGraw-Hill Education.

Gurley, J. G., & Shaw, E. S. (1955). Financial aspects of economic development. *The American Economic Review, 45*(4), 515-538.

Hall, A. R. (2005). *Generalized method of moments*: Oxford university press.

Hamilton, B. H., & Nickerson, J. A. (2003). Correcting for endogeneity in strategic management research. *Strategic organization, 1*(1), 51-78.

Haque, F., & Brown, K. (2017). Bank ownership, regulation and efficiency: Perspectives from the Middle East and North Africa (MENA) Region. *International Review of Economics & Finance, 47*, 273-293.

Haritchabalet, C., Lepetit, L., Spinassou, K., & Strobel, F. (2017). Bank capital regulation: are local or central regulators better? *Journal of International Financial Markets, Institutions and Money*.

Hasman, A., & Samartín, M. (2017). Capital and liquidity in a dynamic model of banking. *Economic Modelling, 64*, 172-177.

Hlatshwayo, L., Petersen, M., Mukuddem-Petersen, J., & Meniago, C. (2013). Basel III Liquidity Risk Measures and Bank Failure. *Discrete Dynamics in Nature and Society, 2013*.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *Stata Journal, 7*(3), 281-312.

Hong, H., Huang, J.-Z., & Wu, D. (2014). The information content of Basel III liquidity risk measures. *Journal of Financial Stability, 15*(6), 91-111.

Hoque, H., Andriosopoulos, D., Andriosopoulos, K., & Douady, R. (2015). Bank regulation, risk and return: Evidence from the credit and sovereign debt crises. *Journal of Banking & Finance, 50*, 455-474.

Horváth, R., Seidler, J., & Weill, L. (2014). Bank capital and liquidity creation: Granger-causality evidence. *Journal of Financial Services Research, 45*(3), 341-361.

Hossain, M. Z., Khan, M. A. R., & Sadique, M. S. (2018). Basel III and perceived resilience of banks in the BRICS economies. *Applied Economics, 50*(19), 2133-2146.

Hou, X., Li, S., Li, W., & Wang, Q. (2018). Bank diversification and liquidity creation: Panel Granger-causality evidence from China. *Economic Modelling, 71*, 87-98.

Hovakimian, A., Hovakimian, G., & Tehranian, H. (2004). Determinants of target capital structure: The case of dual debt and equity issues. *Journal of financial economics, 71*(3), 517-540.

Hovakimian, A., & Li, G. (2011). In search of conclusive evidence: How to test for adjustment to target capital structure. *Journal of Corporate Finance, 17*(1), 33-44.

Hryckiewicz, A., & Kozlowski, L. (2018). The consequences of liquidity imbalance: When net lenders leave interbank markets. *Journal of Financial Stability, 36*, 82-97.

Hugonnier, J., & Morellec, E. (2017). Bank capital, liquid reserves, and insolvency risk. *Journal of Financial Economics, 125*(2), 266-285.

Ibrahim, M. H., & Rizvi, S. A. R. (2018). Bank lending, deposits and risk-taking in times of crisis: A panel analysis of islamic and conventional banks. *Emerging Markets Review, 35*, 31-47.

IMF Report, I. M. F. (2017). *Global Financial Stability Report: Getting the Policy Mix Right*

Jacob, P., & Munro, A. (2018). A prudential stable funding requirement and monetary policy in a small open economy. *Journal of Banking & Finance, 94*, 89-106.

Jayadev, M. (2013). Basel III implementation: Issues and challenges for Indian banks. *IIMB Management Review, 25*(2), 115-130.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American economic review, 76*(2), 323-329.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics, 3*(4), 305-360.

Jobst, A. A. (2014). Measuring systemic risk-adjusted liquidity (SRL)—A model approach. *Journal of Banking & Finance, 45*, 270-287.

Johnson, T. C. (2006). Dynamic liquidity in endowment economies. *Journal of Financial Economics, 80*(3), 531-562.

Jokipii, T., & Monnin, P. (2013). The impact of banking sector stability on the real economy. *Journal of International Money and Finance, 32*(2), 1-16.

Judson, R. A., & Owen, A. L. (1999). Estimating dynamic panel data models: a guide for macroeconomists. *Economics letters, 65*(1), 9-15.

Kahou, M. E., & Lehar, A. (2017). Macroprudential policy: A review. *Journal of Financial Stability, 29*, 92-105.

Kapoor, S., & Kaur, M. (2017). Basel III Norms: A SWOT and TOWS Approach. *Vision, 21*(3), 250-258.

Kashyap, A. K., Rajan, R., & Stein, J. C. (2002). Banks as liquidity providers: An explanation for the coexistence of lending and deposit- taking. *The Journal of Finance, 57*(1), 33-73.

Kashyap, A. K., Stein, J. C., & Hanson, S. (2010). An analysis of the impact of 'substantially heightened' capital requirements on large financial institutions. *Booth School of Business, University of Chicago, mimeo, 2*.

Kaur, M., & Kapoor, S. (2015). Adoption of Basel norms: a review of empirical evidences. *Journal of Financial Regulation and Compliance, 23*(3), 271-284.

Ketokivi, M., & McIntosh, C. N. (2017). Addressing the endogeneity dilemma in operations management research: Theoretical, empirical, and pragmatic considerations. *Journal of Operations Management, 52*, 1-14.

Khan, M. S., Scheule, H., & Wu, E. (2017). Funding liquidity and bank risk taking. *Journal of Banking & Finance, 82*, 203-216.

Kim, D., & Sohn, W. (2017). The effect of bank capital on lending: Does liquidity matter? *Journal of Banking & Finance, 77*, 95-107.

King, M. R. (2013). The Basel III net stable funding ratio and bank net interest margins. *Journal of Banking & Finance, 37*(11), 4144-4156.

Kiviet, J. F. (1995). On bias, inconsistency, and efficiency of various estimators in dynamic panel data models. *Journal of econometrics, 68*(1), 53-78.

Klomp, J., & De Haan, J. (2012). Banking risk and regulation: Does one size fit all? *Journal of Banking & Finance, 36*(12), 3197-3212.

Kroszner, R. S., Laeven, L., & Klingebiel, D. (2007). Banking crises, financial dependence, and growth. *Journal of Financial Economics, 84*(1), 187-228.

Laeven, L., & Levine, R. (2007). Is there a diversification discount in financial conglomerates? *Journal of financial economics, 85*(2), 331-367.

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics, 93*(2), 259-275.

Laeven, L., Ratnovski, L., & Tong, H. (2016). Bank size, capital, and systemic risk: Some international evidence. *Journal of Banking & Finance, 69*(1), S25-S34.

Laeven, L., & Valencia, F. (2013). Systemic banking crises database. *IMF Economic Review, 61*(2), 225-270.

Lee, C.-C., & Hsieh, M.-F. (2013). The impact of bank capital on profitability and risk in Asian banking. *Journal of international money and finance, 32*, 251-281.

Lee, C.-C., Hsieh, M.-F., & Yang, S.-J. (2014). The relationship between revenue diversification and bank performance: Do financial structures and financial reforms matter? *Japan and the World Economy, 29*, 18-35.

Lei, A. C., & Song, Z. (2013). Liquidity creation and bank capital structure in China. *Global Finance Journal, 24*(3), 188-202.

Lepetit, L., & Strobel, F. (2013). Bank insolvency risk and time-varying Z-score measures. *Journal of International Financial Markets, Institutions and Money, 25*(3), 73-87.

Liao, S., Sojli, E., & Tham, W. W. (2015). Managing systemic risk in The Netherlands. *International Review of Economics & Finance, 40*, 231-245.

Lin, W. T., Chuang, C.-H., & Choi, J. H. (2010). A partial adjustment approach to evaluating and measuring the business value of information technology. *International Journal of Production Economics, 127*(1), 158-172.

Louhichi, A., & Boujelbene, Y. (2017). Bank capital, lending and financing behaviour of dual banking systems. *Journal of Multinational Financial Management, 41*, 61-79.

Luo, Y., Tanna, S., & De Vita, G. (2016). Financial openness, risk and bank efficiency: Cross-country evidence. *Journal of Financial Stability, 24*, 132-148.

Ly, K. C., Chen, Z., Wang, S., & Jiang, Y. (2017). The Basel III Net Stable Funding Ratio adjustment speed and systemic risk. *Research in International Business and Finance, 39*, 169-187.

Ly, K. C., & Shimizu, K. (2018). Funding liquidity risk and internal markets in multi-bank holding companies: Diversification or internalization? *International Review of Financial Analysis, 57*, 77-89.

Mahdi, I. B. S., & Abbes, M. B. (2017). Relationship between Capital, Risk and Liquidity A comparative study between Islamic and conventional banks in MENA region. *Research in International Business and Finance*.

Mahmood, H., Gan, C., & Nguyen, C. (2018). Maturity transformation risk factors in Islamic banking: Implication of Basel III liquidity regulations. *Managerial Finance*.

Maliszewski, W., Arslanalp, M. S., Caparusso, J., Garrido, J., Guo, M. S., Kang, J. S., . . . Liao, W. (2016). *Resolving China's Corporate Debt Problem*: International Monetary Fund.

McMillan, D. G., & Camara, O. (2012). Dynamic capital structure adjustment: US MNCs & DCs. *Journal of Multinational Financial Management, 22*(5), 278-301.

Mensi, W., Hammoudeh, S., Reboredo, J. C., & Nguyen, D. K. (2014). Do global factors impact BRICS stock markets? A quantile regression approach. *Emerging Markets Review, 19*, 1-17.

Mohamed, D. A., Binti, M. F., & Bin, A. N. A. (2018). Funding liquidity risk and bank risk-taking in BRICS countries: An application of system GMM approach. *International Journal of Emerging Markets, 13*(1), 231-248. doi:doi:10.1108/IJoEM-03-2017-0086

Myers, S. C. (1984). The capital structure puzzle. *The journal of finance, 39*(3), 574-592.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of financial economics, 13*(2), 187-221.

Nadeem, A. B. (2017). Political institutions and bank risk-taking behavior. *Journal of Financial Stability, 29*(2), 13-35.

Nerlove, M. (1958). Distributed lags and Demand Analysis for Agricultural and other Commodities, United States Department of Agriculture, Handbook No 141, Xerox University Microfilms. *Ann Arbor, Michigan, USA, June*.

Nguyen, M., Perera, S., & Skully, M. (2017). Bank market power, asset liquidity and funding liquidity: International evidence. *International Review of Financial Analysis, 54*, 23-38.

Nickell, S. (1981). Biases in dynamic models with fixed effects. *Econometrica: Journal of the Econometric Society, 49*(6), 1417-1426.

Noman, A. H. M., Gee, C. S., & Isa, C. R. (2018). Does bank regulation matter on the relationship between competition and financial stability? Evidence from Southeast Asian countries. *Pacific-Basin Finance Journal, 48*, 144-161.

Ogden, J. P., & Wu, S. (2013). Reassessing the effect of growth options on leverage. *Journal of Corporate Finance, 23*, 182-195.

Oh, J. Y. J. (2014). Ambiguity aversion, funding liquidity, and liquidation dynamics. *Journal of Financial Markets, 18*, 49-76.

Ozili, P. K., & Outa, E. (2017). Bank loan loss provisions research: A review. *Borsa Istanbul Review*.

Öztekin, Ö., & Flannery, M. J. (2012). Institutional determinants of capital structure adjustment speeds. *Journal of financial economics, 103*(1), 88-112.

Pakravan, K. (2014). Bank capital: the case against Basel. *Journal of Financial Regulation and Compliance, 22*(3), 208-218.

Pereira, J. A. C. M., & Saito, R. (2015). How banks respond to Central Bank supervision: Evidence from Brazil. *Journal of Financial Stability, 19*, 22-30.

Perera, S., & Skully, M. (2017). Bank market power, asset liquidity and funding liquidity: International evidence. *International Review of Financial Analysis, 54*, 23-38.

Qian, X., Tam, L. H., & Zhang, B. (2014). Systematic liquidity and the funding liquidity hypothesis. *Journal of Banking & Finance, 45*, 304-320.

Radulescu, I. G., Panait, M., & Voica, C. (2014). BRICS countries challenge to the world economy new trends. *Procedia Economics and Finance, 8*, 605-613.

Repullo, R. (2004). Capital requirements, market power, and risk-taking in banking. *Journal of financial Intermediation, 13*(2), 156-182.

Riordan, M. H. (1995). 11 Competition and bank performance: a theoretical perspective. *Capital markets and financial intermediation*, 328.

Rodrik, D. (2014). The past, present, and future of economic growth. *Challenge, 57*(3), 5-39.

Rokhim, R., & Min, I. (2018). Funding Liquidity and Risk Taking Behavior in Southeast Asian Banks. *Emerging Markets Finance and Trade*, 1-9.

Roodman, D. (2006). *How to do xtabond2: an introduction to 'difference'and 'system.* Paper presented at the GMM in Stata', Center for Global Development Working Paper No. 103.

Roodman, D. (2009a). How to do xtabond2: An introduction to difference and system gmm in stata. *Stata Journal, 9*(1), 86-136.

Roodman, D. (2009b). A note on the theme of too many instruments. *Oxford Bulletin of Economics and statistics, 71*(1), 135-158.

Rossignolo, A. F., Fethi, M. D., & Shaban, M. (2013). Market crises and Basel capital requirements: Could Basel III have been different? Evidence from Portugal, Ireland, Greece and Spain (PIGS). *Journal of Banking & Finance, 37*(5), 1323-1339.

Rothschild, M., & Stiglitz, J. (1976). Equilibrium in competitive insurance markets: An essay on the economics of imperfect information. *The quarterly journal of economics*, 629-649.

Roulet, C. (2018). Basel III: Effects of capital and liquidity regulations on European bank lending. *Journal of Economics and Business, 95*, 26-46.

Ruozi, R., & Ferrari, P. (2013). Liquidity risk management in banks: economic and regulatory issues. In *Liquidity Risk Management in Banks* (pp. 1-54): Springer.

Sarkar, S., Sarkar, S., Sensarma, R., & Sensarma, R. (2016). The relationship between competition and risk-taking behaviour of Indian banks. *Journal of Financial Economic Policy, 8*(1), 95-119.

Saurina, J. (2009). Dynamic provisioning. *The Experience of Spain, World Bank, Washington DC*.

Schultz, E. L., Tan, D. T., & Walsh, K. D. (2010). Endogeneity and the corporate governance-performance relation. *Australian journal of Management, 35*(2), 145-163.

Schwerter, S. (2011). Basel III's ability to mitigate systemic risk. *Journal of financial regulation and compliance, 19*(4), 337-354.

Shehzad, C. T., & De Haan, J. (2015). Supervisory powers and bank risk taking. *Journal of International Financial Markets, Institutions and Money, 39*, 15-24.

Shleifer, A., & Vishny, R. W. (1988). *The grabbing hand: Government pathologies and their cures*: Harvard Univ. Press ,Cambridge, MA.

Shleifer, A., & Vishny, R. W. (2002). *The grabbing hand: Government pathologies and their cures*: Harvard University Press.

Shleifer, A., & Vishny, R. W. (2010). Unstable banking. *Journal of financial economics, 97*(3), 306-318.

Shrieves, R. E., & Dahl, D. (1992). The relationship between risk and capital in commercial banks. *Journal of Banking & Finance, 16*(2), 439-457.

Spence, M. (1973). Job market signaling. *The quarterly journal of Economics, 87*(3), 355-374.

Tran, V. T., Lin, C.-T., & Nguyen, H. (2016). Liquidity creation, regulatory capital, and bank profitability. *International Review of Financial Analysis, 48*, 98-109.

Triki, T., Kouki, I., Dhaou, M. B., & Calice, P. (2017). Bank regulation and efficiency: What works for Africa? *Research in International Business and Finance, 39*, 183-205.

Uhde, A. (2016). Risk-taking incentives through excess variable compensation: Evidence from European banks. *The Quarterly Review of Economics and Finance, 60*, 12-28.

Ullah, S., Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management*.

Umar, M., Sun, G., Ashton, J., & Ashton, J. (2016). Interaction among funding liquidity, liquidity creation & stock liquidity of banks: evidence from BRICS countries. *Journal of Financial Regulation and Compliance, 24*(4).

VanHoose, D. (2007). Theories of bank behavior under capital regulation. *Journal of Banking & Finance, 31*(12), 3680-3697.

Vazquez, F., & Federico, P. (2015). Bank funding structures and risk: Evidence from the global financial crisis. *Journal of Banking & Finance, 61*, 1-14.

Vickers, J. S. (2011). *Independent Commission on Banking final report: recommendations*: The Stationery Office.

Vousinas, G. L. (2015). Supervision of financial institutions: The transition from Basel I to Basel III. A critical appraisal of the newly established regulatory framework. *Journal of Financial Regulation and Compliance, 23*(4), 383-402.

Wei, X., Gong, Y., & Wu, H.-M. (2017). The impacts of Net Stable Funding Ratio requirement on Banks' choices of debt maturity. *Journal of Banking & Finance, 82*, 229-243.

Werner, R. A. (2016). A lost century in economics: Three theories of banking and the conclusive evidence. *International Review of Financial Analysis, 46*, 361-379.

Wintoki, M. B., Linck, J. S., & Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics, 105*(3), 581-606.

Wooldridge, J. (2012). Introductory Econometrics: A Modern Approach, (Boston: Cengage Learning).

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*: MIT press.

Zavertiaeva, M., & Nechaeva, I. (2017). Impact of Market Timing on the Capital Structure of Russian Companies. *Journal of Economics and Business, 92*, 10-28.

Zhang, J., Jiang, C., Qu, B., & Wang, P. (2013). Market concentration, risk-taking, and bank performance: Evidence from emerging economies. *International Review of Financial Analysis, 30*, 149-157.

Zhou, Q., Faff, R., & Alpert, K. (2014). Bias correction in the estimation of dynamic panel models in corporate finance. *Journal of Corporate Finance, 25*, 494-513.

Zhu, W., & Yang, J. (2016). State ownership, cross-border acquisition, and risk-taking: Evidence from China's banking industry. *Journal of Banking & Finance, 71*, 133-153.