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Three essays on banking policy & government intervention in the US banking sector

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# Three essays on banking policy & government intervention in the US banking

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# sector

PhD Thesis 2019

Mohamed Ali Supervised by: Santiago Carbo-Valverde Saverio Stentel Stentella Lopes Yener Altunbas

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#### Abstract

This thesis presents evidence on how government intervention and regulation affect financial stability, and analyses how these public actions may affect the banking industry. The first empirical chapter discusses three major regulatory Acts: The Gramm-Leach-Bliley Act of 1999 (GLB), The Sarbanes-Oxley Act of 2002 (SOX) and The Dodd-Frank Act 2010 (DF) and focuses on the impact of off-balance sheet (OBS) activities on bank credit risk performance. Results show that in the presence of deregulation, banks with more OBS usage tend to have better credit risk performance. We employ different credit risk proxies include non-performing assets/total asset, non-performing loans/total loans, provision for loan losses/total assets and loan loss reserves/total assets. These yield more significant results than loan loss reserves. Market discipline is highlighted as an optimising transparency, and disclosure of the risks associated with an entity. It works in concert with regulatory systems to increase the safety and soundness of the market.

The following chapter focuses on the Trouble Assets Relief Program (TARP) and tests whether Banking Holding Companies (BHCs) make use of internal capital market to repay TARP capital injection. This is based on the Source of Strength Doctrine. A revised version of this doctrine that was part of the American Reinvestment and Recovery Act (ARRA) of 2009. The Act defines this as the ability of a company that directly or indirectly owns or controls an insured depository institution to provide financial assistance to such insured depository institution. Agencies are empowered to require that such BHCs submit reports regarding its financial health. Results show that it is less likely for banks who are part of a BHC to repay the Treasury. Moreover, the initiation of the ARRA Act of 2009 had no effect on Treasury repayments. This suggests that BHC had a competitive disadvantage in repaying capital injections.

The next chapter discusses the FDIC's Temporary Debt Guarantee Program (TDGP) which was intended to increase liquidity within the industry. This chapter distinguishes between participant and non-participant institutions in the TDGP and examines the evolution of loan supply before the launch of the TDGP and after the injection of funding for unsecured senior debt. Results show that, as intended by the FDIC, TDGP decreases loan supply but increases liquidity available to participating depository institutions. Moreover, large banks did not have a stronger liquidity position compared to smaller banks; even though large banks participated more in bailouts and interventions. Depository institutions that took part in TDGP

and TARP had lower liquidity positions and less loan supply than depository institutions that did not take part in TDGP nor TARP.

This thesis contributes to the literature on financial stability and regulation of the banking industry in the United States of America (US), it explores three main regulatory Acts: Gramm-Leach-Bliley Act of 1999, Sarbanes-Oxley Act 2002, Dodd-Frank Act 2010. The data used in the thesis comes from the SNL database. The first empirical chapter results showed that de-regulation and the concurrent high OBS usage had a negative significant effect on credit risk. Considering that OBS activities help boosts bank's fee income, the results show that with deregulation, banks despite their size and capital constraints partake in high OBS usage and tend to have better credit risk management than banks with less emphasis on OBS activity. Moreover, bank size and Capitalization were not associated with a change in credit risk as previous studies have assumed. We find a correlation between high OBS usage and strong banking performance, lending orientation and efficiency. Commercial banks can rely on investing in OBS activity to better allocate and manage credit risk. This, however, cannot be done under harsh regulatory standards; a deregulated industry will encourage banks to invest in OBS activities. The second empirical chapter focuses on the Troubled Asset Relief Program which aimed to improve the stability of the financial system and increase the availability of credit. This chapter aligns with the moral hazard theory, which could be described in two variations. Under the increased moral hazard theory, risk taking increases when there is a perceived increase in the probability of future bailouts. On the other hand, under the decreased moral hazard theory, the surge in capital from the TARP injections may reduce moral hazard, resulting in shifts into safer portfolios, affecting the overall loan and guarantee supplies. We found little difference between banks that entered TARP after executive pay restrictions that were added to the investments in February 2009. What we do find is that those latter participants were significantly smaller and had significantly less capital and more problem assets. The results showed that being part of a bank group did not result in a higher probability to repay TARP. In fact, bank groups were less likely to repay TARP, depository institutions did not show significance in post ARRA initiation, while accounting metrics such as performance and bank size had no significance on the financial institutions inclination to pay back TARP. Non-performing assets to total assets were a significant contributing factor at 5%, and we infer that regulated financial institutions with less non-performing assets to total assets are more likely to repay TARP. Results also reveal that when new government legislation was introduced in 2009, financial institutions were not motivated to pay back the Treasury. We

contribute to the growing literature on TARP, as well as the literature on bank groups around financial crises and regulatory reforms. In the third empirical chapter, I analyse the main goals of the FDIC's TDGP initiative. The FDIC gave depository institutions funds for senior unsecured debt. The FDIC wanted to accomplish a spike in liquidity within the industry by lowering the cost of funds and strengthening liquidity. Some allegations were made that TARP participants used funding from the TDGP to repay Treasury, while testing to see if large depository institutions had an advantage of liquidity compared to smaller competitors. The chapters results showed that TDGP participants had lower loan growth rates than nonparticipants. We find the same results in the second test in which we measured to see if TDGP participants had better loan supply measurements after the FDIC's initiation in 2008. Both these test show that for every 1% increase in loan growth rate approximately there was approximately a 9% decrease for TDGP participants. Testing the model to incorporate all the hypotheses, we saw that TDGP participants had around 1 % less loan supply than non participants, while TARP participants were also less likely to issue loans by around 2.5%. TARP and TDGP depository institutions had less liquidity and less loan supply, which could suggest that the funds received from one government intervention could have gone to repay the other as allegations suggested.

#### **Dedication**

I dedicate this work to the people who have made this possible. I start with my parents who have always supported me in all my endeavours and have made this journey possible I truly could not have reached where I am today without their support, I love you truly. My siblings (May, Ahmed, Ali) thank you for being you and accepting me, you are the best. My lovely children (Ali, Talia, Dalia) you are the torch that guides me in dark times, you always keep me smiling and pushing forward. My In-Laws (Parents In-Law, Hisham, Nada, Mohammed, Rana) thank you all for your support, thank you for being there and giving me you most precious gem. To the precious gem, to my better half, to my love (Zaina) my lovely wife, you have been my pillar, thank you so much for standing by me and sacrificing so much to see our family grow: you are the greatest.

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# Abbreviations

American Reinvestment and Recovery Act	ARRA
Bank Holding Company	BHC
Bank-Holding Company Act	BHC Act
Board of Governors of the Federal System	FRB
Capital Purchase Program	CPP
Chief Executive Officer	CEO
Chief Financial Officer	CFO
Consumer Price Index	CPI
Credit Default Obligation	CDO
Discount Window	DW
Dodd-Frank	DF
Federal Bureau of Investigation	FBI
Federal Deposit Insurance Act	FDI Act
Financial Accounting Standards	FAS
Financial Holding Company	FHC
Government-Sponsored Enterprise	GSE
Interest on Lawyer Trust Accounts	IOLTAs
International Monetary Fund	IMF
Middle East and North Africa	MENA
Off-Balance-Sheet Activities	OBS
Public Company of Accounting Oversight Board	PCAOB
Return on Average Assets	ROAA
Return on Average Equity	ROAE
Seasoned Equity Offering	SEO
Securities and Exchange Commission	SEC
Temporary Liquidity Guarantee Program	TLGP
Term Auction Facility	TAF
Term Securities Lending Facility	TSLF
The Dodd-Frank Wall Street Reform and Consumer Protection Act	Dodd-Frank
The Emergency Economic Stabilization Act	EESA
The Federal Deposit Insurance Corporation	FDIC
The Gramm-Leach-Bliley Act	GLB
The Office of the Comptroller of the Currency	OCC
The Primary Dealer Credit Facility	PDCF
The Sarbanes-Oxley Act	SOX
Transaction Account Guarantee Program	TAGP
Troubled Asset Relief Program	TARP
United States of America	US

## Acronyms

ARRA "American Recovery and Reinvestment Act dummy" Bank "Bank name" Bank group "Dummy variable to banks that have a parent bank and have taken TARP CPP Banks "Capital Purchase Programs Banks" DF "Dodd-Frank Act 2010" EA "Equity/Assets"NPAA "Non-Performing Assets/ Total Assets" ER "Efficency Ratio" Eq issue "Equity Issues of Banks as dummy variable" FE Fixed Effects funding"Year outstanding "the year the bank paid back Treasury" Gap ratio "Gap Ratio" GLB "Gramm Leach Bliley Act of 1999" High "Off-Balance-sheet items at the high 75<sup>th</sup> percentile" Interaction "Interaction between regulation dummies" Liquidity ratio "Liquidity Ratio" Loan growth rate "Loan Growth Rate" Large bank "Large Banks" LD "Loan/Deposits" LLRA "Loan Loss Reserves/Total Assets" NLOGOBS "Off-Balance-Sheet items-(reindexed cpi to USD1995q1)" NPLL "Non-Performming Loans/ Total Loans" PLLTA "Provision of loan losses/Total Assets" Post "Years after the 2008 financial crisis" Repaid "Banks that have repaid funding back to TARP" Roaa "Return on Average Assets" ROAE "Return on Average Equity" Size "Natural Logarithm of Total Assets" SNLKEY "SNL's Data base key identifier for each bank" SOX "Sarbanes Oxley Act 2002" TA "Total Assets-(reindexed cpi to USD1995q1)" TARP "Temporary Asset Relief Program" TARP Sub "Dummy variable representing regulated Banks that have taken part in CPP and are subsidiaries to companies that own 50% or more of the regulated Banks" Tdgp dummy "Temporary Debt Guarantee Program" Time "Years from 1995q1 to 2015q3" TIER1CAP "Tier1 Capital"

#### **Chapter 1: Introduction**

The common thread of the three chapters of this thesis is the focus on bank regulation. This thesis focuses on the financial stability and regulation of the banking industry in the United States of America (US), it explores three main premises of regulatory Acts. Before discussing these Acts, we present a small historic background to provide context for these Acts and the banking industry in the US. Banking started since the inception of the US. Alexander Hamilton was a statesman, one of the US Founding Fathers, and the first Secretary of the Treasury. He was the main author of the economic policies of the George Washington administration, he recognized that, "Most commercial nations have found it necessary to institute banks, and they have proved to be the happiest engines that ever were invented for advancing trade." Since then, the US has developed into the largest world economy with the most developed financial market. The path from then to now has been influenced by a variety of factors and an everchanging regulatory framework. Conflicting objectives governed the change in the regulatory environment, the desire for greater financial stability and more economic freedom spur less regulation. On the other hand, security from economic meltdowns and unfair practices spur more regulation.

The First Bank of the United States was established in 1791. Even though it brought a relative degree of financial and economic stability, the First Bank of the United States was opposed for being unconstitutional. Many feared that it relegated undue powers to the federal government, and its charter was not renewed in 1811. In 1816, the Bank of the United States would receive a charter being the second bank to open its doors, but it too would later accede to political fears over the amount of control it gave the federal government. It was dissolved in 1836. A new era of "free banking" emerged with several states passing laws in 1837 that abolished the requirement to obtain an officially legislated charter to operate a bank. The free banking era, branded as it was by a complete absence of federal control and regulation, would come to an end with the National Banking Act of 1863 that replaced the old state banks with nationally chartered ones. The Office of the Comptroller of the Currency (OCC) was created

to issue these new bank charters and to oversee that national banks abided by the requirement to back all note issuance with holdings of US government securities.

In 1907, the first US bank panic occurred when it became apparent that banking system was out of date. The money and credit of the nation were becoming increasingly concentrated in the hands of relatively few men. Subsequently, under the presidency of Woodrow Wilson, the Federal Reserve Act of 1913 was approved to seize control of the nation's finances from banks while at the same time creating a mechanism that enables a more elastic currency, and greater supervision over the nation's banking infrastructure. Although the newly established Federal Reserve sought to improve the nation's payments system and create a more flexible currency, its misinterpretation of the financial crisis following the 1929 stock market crash served to whip the nation in a severe economic crisis, known as the Great Depression. The Depression lead to even more banking regulation instituted by President Franklin D. Roosevelt as part of the provisions of the New Deal. The Glass-Steagall Act of 1933 created the Federal Deposit Insurance Corporation (FDIC), which implemented regulation of deposit interest rates, and separated commercial from investment banking. The Banking Act of 1935 served to abolishing the first two banks in US history.

In 1980, Congress passed the Depository Institutions Deregulation and Monetary Control Act, which deregulated financial depository institutions, while strengthening the Federal Reserve's control over monetary policy. Afterwards, restrictions on the opening of bank branches in different states, in place since the McFadden Act of 1927, were removed under the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994. Later on, the Gramm-Leach-Bliley Act of 1999 repealed significant aspects of the Glass-Steagall Act as well as the Bank Holding Act of 1956, both of which had assisted in separating investment banking and insurance services from commercial banking. From 1999 onwards, a bank could offer unified commercial banking, securities, and insurance services. The expansion of bank offerings was praised for the ability to diversify risks. In 2007, the sub-prime mortgage crisis exploded into a global financial crisis. US banks that had become "too big to fail", required government bailouts, and the US government started to rethink again the financial regulatory framework. The Obama administration passed the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010, aimed at many of the apparent weaknesses within the US financial system. Chapter two discusses the past literature and the regulations we focus on in this thesis, which adds context and background material. We begin with a discussion on the relationship between regulation and bank risk, focusing on how the relaxation of bank regulation resulted in banks becoming riskier. We also briefly discuss the importance of non-interest income in the banking industry. A discussion of the main regulatory Acts used in the study follows: We start with the Gramm-Leach-Bliley Act of 2009 (GLB), and outline what this reform did to the industry and how it fits in the third chapter of this thesis. The second reform discussed is the Sarbanes-Oxley Act of 2002 (SOX). Even though this Act mainly involved reporting standards, it changed how depository institutions used their off-balance sheet activities (OBS) as a response to the increased transparency requirements and the more stringent monitoring of financial statements. We then discuss the Emergency Economic Stabilization Act (EESA): this Act entailed subsections that affect other parts of the study such as the Dodd-Frank Act of 2010 (DF), the Temporary Debt Guarantee Program (TDGP), the Troubled Asset Relief Program (TARP), the American Recovery and Reinvestment Act (ARRA) and the Source of Strength Doctrine.

Chapter three focuses on how OBS usage interacts with the regulatory framework to define risk taking in commercial banking. Section 20 of the Gramm-Leach-Bliley Act of 1999 allowed banking subsidiaries to become familiar with the services in different sectors of the financial industry that were off limits pre-GLB. This created a loophole in banking regulation. The introduction of the Sarbanes-Oxley Act of 2002 gave depository institutions more resilience on financial tools such as OBS usage and this influenced risk taking according to internal control over financial reporting section 906 of SOX: it states that "wilful failure" to portray the true condition of the company's operations and finances is a crime. Misrepresenting the riskiness of OBS activities on financial statements became a crime, and a banking institution would be punished if caught doing so in an audit. The Dodd-Frank Act lays restrictions on proprietary trading linking certain innovative financial tools, giving a way for OBS activities to hedge for credit risk.

We use a sample of 3,840 depository institutions from 1995-2015 and divide it between high and low OBS users. We take several approaches to analyse the credit risk positions from the OBS usage and regulatory change from 1995-2015. Many previous studies look at larger Bank Holding Companies (BHC). Focusing instead on commercial banks allows a wider spectrum of bank size when they share traditional banking activities dissimilar to the BHC's. The chapter focuses on two main OBS activities: Letters of Credit and Unused Commitments, which are non-innovative, common and a core of banking activities. The high usage of OBS activity determines credit risk positions. This is done by taking the OBS variable (letters of credit + unused commitments) and using the top 75th percentile of OBS users as the means of measurement, emphasising who uses OBS activities regardless of bank size. We regress credit risk proxies with certain regulatory Act and High OBS activities and then interact the regulatory Acts with High OBS activities. Results indicate that the passage of GLB increased the link between risk taking and OBS usage. On the other hand, the passage of SOX and DF decrease OBS usage. These results show that the link between OBS usage and risk-taking increased after the introduction of GLB and deregulation. A possible explanation is the increase in the possibilities of risk hedging with OBS. In time of stringent regulation like the introduction of SOX and DF, results suggest less successful attempts of OBS usage to mitigate risks. Chapter three findings expand and contribute to the literature in two aspects. First deregulation with the use of financial tools like letters of credit and unused commitments can be used as a hedging tool to mitigate credit risk in depository institutions. Second, deregulation allows for better risk mitigation through increased OBS usage. Correspondingly, stringent regulation and monitoring leads to less risk mitigation through the decrease in OBS usage.

Chapter four focuses on BHC owned commercial bank's ability to repay the Treasury's assistance to financial distressed banks during the financial crisis of 2007-2008. The initial program was based on The Troubled Asset Relief Program (TARP), led by the U.S. Treasury's Office of Financial Stability that emerged from the Dodd-Frank Act of 2010. We focus mainly on the Capital Purchase Program (CPP), a program through which the Treasury provided banks with needed capital.

In return, the Treasury received preferred stock or debt securities. Most CPP recipients pay the Treasury a 5 % dividend on preferred shares for the first five years and a 9 % rate afterwards. The Treasury also received warrants to purchase common shares or other securities. These warrants allow taxpayers to get additional returns as banks recover. Banks exit the program by purchasing these stocks and warrants from the treasury at market prices. 707 regulated financial institutions took part in the CPP, the data set covers over 220 regulated financial institutions including commercial banks and Bank Holding Companies (BHCs). It consists of a total of 9696 depository institutions over the period 2004-2016. We consider a participant in the program as "TARP" participant if they took part in CPP and "non-TARP" if they did not. We also define if a depository institution is owned by a parent company or if a depository institution owns more than one depository institution as being part of a "bank group". We explore through

a statistical model if depository institutions in groups or that are owned by a parent company are more likely to repay the Treasury. American Reinvestment and Recovery Act (ARRA) of 2009. By the Source of Strength Doctrine, parent BHCs have a duty to help subsidiaries in financial distress. This legal obligation may facilitate or hinder the likelihood of early capital repayment. Belonging to a group may facilitate early repayment in normal times when a small number of banks that belong to the group are facing capital shortfalls. However, in times of crisis when several banks belonging to the group may be facing difficult times, being part of a group may have the opposite effect and hinder capital repayment. Results show that it was less likely for banks in groups to repay the Treasury, and the initiation of the American Reinvestment and Recovery Act (ARRA) of 2009 had no implication for financial institutions to repay the Treasury. Results show that accounting measurements such as bank size, bank performance also had no effect on the likelihood of depository institutions paying back, while asset quality did. An institution with a higher asset quality ratio, was more likely to pay the Treasury back. Moral hazard provides one explanation for these results. This study aligns with the moral hazard theory, which states, there may be increases in risk taking because of a perceived increased probability of future bailouts. In economic theory, moral hazard is a situation where the behaviour of one party may change to the disadvantage of another after the transaction has taken place. Moral hazard could also result from a situation in which a hidden action occurs.

Moral hazard can be divided into two types when it involves asymmetric information of the outcome of a random event. An *ex-ante* moral hazard is a change in behaviour prior to the outcome of the random event, whereas *ex-post* involves behaviour after the outcome. For example, in the case of a bank making a loan to a small business that is high risk. The small business becoming overly risky would be ex-ante moral hazard, but if the venture failed when it was profitable is ex-post moral hazard. Ex-ante moral hazard is described as decreased moral hazard theory in this thesis.

This chapter contributes to the topic of government interventions after the crisis, we take a closer look at the "Source of Strength Doctrine", the impact financial institutions had if they were part of a bank group. We consider subsidiaries of BHC's and FHC's and whether they issued more equity than non-participating subsidiaries, and test to see if banks in groups repay TARP back more efficiently than stand-alone financial institutions.

Chapter five discusses Temporary Debt Guarantee Program (TDGP) of The Temporary Liquidity Guarantee Program (TLGP), a program initiated by the Federal Deposit Insurance Corporation (FDIC). We discuss the notion of liquidity prior to and after the initiation, distinguishing between two different liquidity objectives of the FDIC's TDGP initiation and their relevant effects on the industry.

The chapter analyses four main questions. The first: Does the supply of loans increase after the TDGP initiation for TDGP depository institutions? The second: Does liquidity strength increases for TDGP participating depository institutions after the initiation? The third: Do TARP participants, who also participated in TDGP, use TDGP funds to repay the Treasury? Lastly: Do larger banks have higher loan supply and stronger liquidity positions? We use data from the SNL database to distinguish between depository institutions that 'opted-in' and those that 'opted-out' of the program. This provides two groups to compare, examining if our proxies changed within two periods.

The first period consisted of years prior to the completion of injecting funds from 2004 until the end of the TDGP funding session in 2012. The second-time period is from 2013 until 2016 when depository institutions would have dispersed their funding and liquidated the market. We took a similar approach to Aspal and Dhawan (2016) in which they used the CAMELS rating system to select which category to select proxies for. Liquidity is the "L" in the CAMELS rating. We chose the growth rate of loans to represent the bank's loan supply and considered two proxies for strength of liquidity. The first is the liquidity ratio, a variable used by the SNL data base to calculate the liquidity strength of a depository institution. The second proxy is the Gap ratio, which we mainly use for sensitivity testing of a depository institution's exposure to interest rate sensitivity. We distinguish institution by size and use a dummy variable to represent large banks and another dummy variable to represent depository institutions that took part in the TDGP and TARP programs. We show that TDGP participants did have stronger liquidity positions after receiving FDIC funding. Moreover, capital support is associated with statistically significant decreases in loan supply and an increase in liquidity strength. This suggests that most of the changes in liquidity creation occur in the short term and remain in place in the long run. TARP participants who also participated in the TDGP did not use their TDGP funds to strengthen their liquidity positions or to increase loan supply. These funds were used to repay the Treasury, as frequently alleged by the media. The results were significant that both loan supply and liquidity showed decreased values compared to depository institutions that did not take part in either program. Bank size does not significantly affect the strength of liquidity while TDGP participants had less loan supply than nonparticipating depository institutions. This chapter reinforces the decreased moral hazard theory in which the increase of liquidity strength could lead to a more stable banking sector.

The overview of the thesis is as follows; chapter one was the introduction, chapter two is the background on regulation and government intervention stimulus packages. Chapter three discuss OBS, regulation and credit risk and if fee income makes a difference to credit risk management by using OBS activities. Chapter four looks at the Troubled Asset Relief Program and if being part of a banking group helps repay the Treasury, since regulation does require Bank Holding Companies to assist their subsidiaries in times of need. Chapter five focuses the Temporary Liquidity Guarantee Program, an initiative of the FDIC It covers certain aspects of how the FDIC attempts to address liquidity issues that emerged from the recent financial crisis while exploring allegations that participants of the FDIC program used those funds to repay Treasury, and participants of the Capital Purchase Program (CPP) under TARP. Chapter six concludes the thesis reflecting on what was contributed and what can be done next.

#### **Chapter 2: Background: Analysis of the main regulatory events**

#### **2.1 Introduction**

There have been many regulatory reforms in the US, as we have seen some examples in the previous section. This chapter discusses them in detail and the government financial interventions that the US economy has faced since 1999. We begin with the Gramm-Leach-Bliley Act of 1999 and end with the Dodd-Frank Act of 2010. Many situations arose within these eleven years. Humans are governed by laws to keep us in check, financial institutions need laws and regulations to keep them in check also. It is a constant challenge to find a balance between an industry's need to be innovative and growth-oriented, and to maintain public safety and economic security.

Not all the regulations discussed here are specific to banks. Some are broader and affect other institutions. However, all these regulations affect the banks we focus on in this thesis. We explain in this chapter the more recent regulation that form the bulk of our analysis. Harsher or a more relaxed regulatory framework affects the whole economy and not only just a specific sector. Sometimes, even a targeted regulation to banks for example has a more general effect on the overall business culture, which affects how business is conducted and the risks firms and banks take.

#### 2.2 Regulation with respect to Banking risk

Former studies report that bank regulation and supervision have diminutive, if any effect on banking risk. Klomp and Haan (2011 question this relationship between bank regulation and banking risk finding that bank regulation and supervision do not have an undeviating impact on banking risk (Klomp and Haan, 2011). However, measures for regulation and supervision do not have much effect on low-risk banks but do on high-risk banks (Klomp and Haan, 2011). In previous years developed countries banking systems have become increasingly cohesive and relaxed about greater product and service deregulation. This is improving competition and accentuating the efficiency of financial institutions (Valverde et al., 2003). Determinants on bank risk-taking in previous studies that examine the relationship a bank's capital and risk positions often yield conflicting predictions. Altunbas et al., (2007) analyse the relationship between these determinants and find that the financial strength of the corporate sector has a positive influence in the relationships between capital, risk and efficiency.

Earlier regulations such as the Banking Act of 1933 and the Bank Holding Act of 1956show there were high restrictions on the ability of US banks to conduct the activities associated with securities, insurance companies, merchant banks and other financial companies; some of these activities would incorporate using loan commitments and letters of credit(Barth et al., 2000), a few ways of hedging risk. Since then deregulation has encouraged non-traditional activities, the first initiative being the Riegle-Neal Act of 1994, which eradicated obstacles to spreading out across state frontiers. This gave banks the ability to acquire other banks in different states. This was done by converting multiple bank charters into bank branches; this allowed for stronger competition between banks. This was associated with risk mitigation due to more branches available and a wider range of clients (DeYoung and Rice, 2004).

Another major deregulation in the US was the Gramm-Leach-Bliley Act of 1999 giving access for banks to expand into non-traditional activities, and the generation of non-interest income in large quantities in term of securities underwriting, loan sales and insurance sales. It provided consent for the formation of a new category of holding company, which permitted banks as subsidiaries to own other subsidiaries that participate in all other financial activities, shifting risk between them. It gave banks a green light to engage in all money-making activities, the while also enabling new technological advances in internet use and leeway to items such as loan securitization, credit scoring and expansion of financial instruments and derivatives (Barth et al., 2000; DeYoung and Rice, 2004).

Many studies focus on the importance of deregulation and how it affects bank performance and risk taking, and the potential for system failure. More research and policy implications are addressing the issue of increasing regulation since main effects of introducing deregulation acts have been examined by academic studies and implemented within the Dodd-Frank Act of 2010. There have been many suggestions regarding policy implications and revision of previous policy regarding bank regulation. The Cadbury Report of 1992 legitimated the widening of enterprise control practices to encompass risk management and corporate governance issues and played a big role in off-balance sheet activities (Bhimani, 2009). The Sarbanes-Oxley Act, which was passed "to protect investors by improving the accuracy and reliability of corporate disclosures made pursuant to the securities laws, and for other purposes (Sarbanes-Oxley Act page 1.)" was citied in Kros and Nadler's paper on the Impact of Sarbanes-Oxley Act on off-balance sheet supply chain activities (Kros and Nadler, 2010). Bank risk is well known to be driven by regulatory, macroeconomic and structural conditions, while risk management is decisive in conveying the applicable retort of monetary policy (Delis and Kouretas, 2011; Mishkin, 2010). Work on this subject is narrow. Banks must adjust to the environment they are in, if regulation changes on how banks perform risk taking methods change as well, regulation does change when banks take excessive risk, monitory policy is meant to monitor how banks are using their money to protect customer interest as well as the economies. So, regulation, macroeconomic and structural conditions have an effect on how bank risk is handled.

As capital regulation both influences and reflects the measurement, management and pricing of risk, a minimum capital standard affects the behaviour of banking risk. The first way is the capital threshold effect examining how banks tweak their portfolios in response to change in capital regulation and their attitudes towards risk and its assessment. The second is the capital framework effect this is the arrangement of bank risk management and their attitude and assessment towards risk and its measurement technology (Borio and Zhu, 2012).

Regulation covers many aspects of banks fundamental operations, and day to day activities, as banks still use interest-based income for profit generation, a more preferred generating method is used, non-interest income which is a fee-based income has entered day to day operations, the next section takes a closer look at non-interest income and what previous studies have resulted in findings regarding a methodology of profit generation.

# To facilitate the presentation of the information in this chapter, we provide the following Regulatory Timeline:

Table 1 Regulatory Timeline

Date	Act/Event	Comments
1781	First commercial Bank	- Bank of North America
1787	U.S. constitution gives congress the power to "coin money and regulate the value thereof"	
1791 – 1811	First Bank of the United States	
1816	First mutual savings bank	Philadelphia savings and society fund
1816 - 1836	Second bank of the United States	
1831	First savings and loan	Oxford Provident Building Association
		<ul> <li>Refers to the practices of banks chartered under vicarious</li> </ul>
1836 – 1863	Wildcat banking	state law during the period of non-federally regulated state
		banking, also known as the Free Banking Era
1863	National Currency Act	<ul> <li>Office of the comptroller of the currency</li> </ul>
1864	National Bank Act	<ul> <li>Federal charted Bank</li> </ul>
		- Uniform currency
		- Tax on state bank notes
1865	People begin using checks	
1909	First credit union	
1913		<ul> <li>Furnish "elastic currency"</li> </ul>
	Federal Reserve Act	- Establishes Federal reserve system as central banking system
		of the U.S.
1927	MacEaddon Act	- National Banks could branch to some extent permitted state
		banks

1929	Stock market crash	
1932	Federal Home and loan Act	
1929 – 1939	Great Depression	<ul> <li>Securities and exchange commission</li> <li>Federal Deposit Insurance for CB &amp; SL's</li> <li>Banking Act of 1933 (Glass – Steagall) separate commercial Banking from investment banking</li> <li>Federal Home Loan Banking System</li> </ul>
1956 & 1970	Bank Holding Company Act	<ul> <li>Restricted interstate ownership of banks</li> <li>BHC's couldn't engage in activities deemed by the Federal Reserve to be "closely related to banking"</li> <li>Defined a bank</li> </ul>
1960 – 1966	Bank Merger Act	<ul> <li>Establishes merger guidelines and denotes competition as criteria</li> </ul>
1968	Saving and Loan Holding Company Act	<ul> <li>Permit unitary SLH's to engage in any activity even those unrelated to S&amp;L business</li> </ul>
1970	Federal Credit Union Act	<ul> <li>Federal Deposit</li> <li>Insurance for Credit Union</li> </ul>
1978	International Banking Act	<ul> <li>Puts foreign banks on equal footing with U.S. banks.</li> </ul>
1980	Savings and Loan Crisis: Depository Institution Deregulation and Monetary Control Act	<ul> <li>Phases out deposit rate ceiling by April 1, 1986</li> <li>Allow NOW Account at all depository institutions</li> <li>Allow S&amp;L's to make consumer loans and issue credit cards</li> </ul>
1982	Saving and Loan Crisis: Garn-St Germain Depository Institution Act	<ul> <li>Allows possibility of interstate and inter-institutional mergers</li> <li>Gives S&amp;L's authority to make some commercial loans</li> </ul>
1987	Saving and Loan Crisis: Competitive Equally Bank Act	- Limits growth of nonbank banks
1989	Saving and Loan Crisis: Financial Institutions Reform Recovery and Enforcement Act	<ul> <li>Changes structure of S&amp;L institution regulation</li> <li>Replaces FHLBB with OTS</li> <li>Replaces FSLIC with SAIF</li> </ul>
1991	Federal Deposit Insurance Corporation Improvement Act	- Mandates "prompt corrective action"
1994	Riegle Neil Interstate Banking and Branching Act	<ul> <li>BHC's can acquire banks nationwide after September 29, 1995</li> <li>Branching nationwide</li> </ul>
1999	Gramm-Leach-Bliley Financial Services and Moderation Act	<ul> <li>Repeal last remnants of the Glass-Stegall Act of 1933</li> <li>Expands the permissible scope of activities for bank holding and bank subsidiaries</li> </ul>
2006	Financial Services Regulatory Relief Act	
2008	Emergency Economic Stabilization Act	
2009	American Recovery and Reinvestment Act	
2010	Dodd-Frank Act	

#### 2.3 Why Regulate?

#### Why Regulate:

In order to see why banks are heavily regulated, we will briefly be stating how banks operate and where does the money supply come from, we convey later how it is important on how regulation is set also to protect consumers and their deposits. For most regulators, the word 'bank' evokes the image of some special functions. All 'banks' perform the following roles to some extent: Maturity transformation, credit creation, credit allocation. While some banks go further and provide; Advisory services for the financial needs of businesses and individuals, transaction advisory services such as on mergers and acquisitions, asset management services which involves investing client money, capital market dealer services such as flotation in the stock market and market making and brokerage services for stock market trading. During the past century, three different theories of banking were foremost at different times: (a) The currently prevalent financial intermediation theory of banking says that banks sell deposits and then lend these out, just like other non-bank financial intermediaries. (b) The older fractional reserve theory of banking states that each individual bank is a financial intermediary without the power to create money, but the banking system collectively can create money through the process of multiple deposit. (c) The credit creation theory of banking, chief a century ago, argues that each individual bank creates credit and money newly when granting a bank loan. It does not consider banks as financial intermediaries that gather deposits to lend out. The theories differ in their accounting treatment of bank lending as well as in their policy implications. The theory of banks as intermediaries provides the rationale for capital adequacy-based bank regulation Werner (2016).

What to regulate depends on the prevailing understanding of the role of banks Werner (2016). During the past forty years when the financial intermediation theory of banking has been dominant, bank regulation has focused on capital adequacy. During the earlier thirty years or so, when the fractional reserve theory of banking was dominant, reserve requirements featured as the main way to regulate bank activity.

#### **Basis for Regulating Financial and Banking Markets:**

Banks are regulated for the following reasons:

1. There is a need to protect the consumer: "caveat emptor" ("let the buyer beware") is considered insufficient – putting too much responsibility on the consumer for many goods and services that lack transparency.

2. To screen the abuse of oligopolistic and monopoly power. The degree of monopoly power held by firms will affect the pricing of their products. Governments react either by introducing measures to encourage greater competition and/or monitoring the price set by these firms, and if necessary, intervening to force the firms to reduce prices.

3. To protect the public from criminal activity.

4. To deal with the effects of externalities: the effects of the actions of one agent in the economy on others, which is not reflected through the price mechanism. There are positive and negative externalities.

In financial markets:

1. Protecting the investor: the quality of many financial products is not easily observed, which makes it important for the investor to be kept fully informed about the risks incurred when purchasing a financial product. Investors are expected to assume some of this responsibility, but often, government directives are needed to ensure financial firms provide adequate information.

2. The concentration of financial firms in the market place: the financial sector is made up of many different markets, from retail banking markets to global bond markets. The competitive structure of each of these markets varies considerably. Global markets tend to be more competitive if firms from all over the world are active in them. Some domestic markets have only a few firms offering banking services.

3. Illegal activities: agents who engage in financial fraud, money laundering and tax evasion.

4. Externalities: the problem is actions by agents which undermine the stability of the financial system. In the financial markets, contagion often results in negative externalities.

There are various cases where central banks or other financial regulators have intervened to rescue a bank or banks to protect the rest of the banking system. Contagion, or the spread of bank problems from one bank to the banking system, arises for several reasons. To the extent that banks offer homogeneous products to customers, they are collectively exposed to the same risk. At the micro level, a marginal borrower will seek out all the banks until one makes the

loan. At the macro level, all banks are affected by events such as changes in monetary policy (Heffernan, 2005).

#### Systemic risk, Bank fragility & Contagion:

The financial system is exposed to risk and risks come in many forms, but the three major categories are 1) liquidity risk 2) credit risk and 3) market risk. A financial system which allocates risks to the institutions best equipped to mitigate those works well. However, if the total risk taken is excessive or if it is distributed so financial providers end up with a kind of risk that they have less capacity to bear, it poses a threat to the stability of the whole system. When the banking system is threatened with massive losses, the risk is systemic in nature and must be handled, as in the recent crisis, at the level of the banking system. At the heart of systemic risk are contagion effects, various forms of external effects. That a comprehensive view of systemic risk must integrate bank failure contagion with financial markets spill over effects and payment and settlement risks. At the very basis of the concept of "narrow" sense is the notion of contagion is often a strong form of external effect in working from one institution, market or system to the others (de Bandt and Hartmann, 2000). In a "broad" sense the concept also includes wide systematic shocks which by themselves adversely affect many institutions or markets at the same time. In this sense, systemic risk goes much beyond the vulnerability of single banks to runs in a fractional reserve system (de Bandt and Hartmann, 2000). A shock that initially affects one institution can become systemic and infect the larger local economy. The globalization of banking implies further that shocks affecting a bank or country can now affect not only the local real economy but also the financial system and real economy in other countries. The 2007-2009 financial crisis has shown that a nation with a fragile banking system may affect the fragility of the financial system in countries in the same region through crossborder linkages and common exposures and raise concerns for regional banking system fragility. (Elahi et al., 2012)

Looking at the financial fragility hypothesis; systemic risk, potential contagion effects, are of special concern in the financial system? There are three interrelated features of financial systems that can provide a basis for this financial fragility hypothesis: (i) the structure of banks, (ii) the interconnection of financial institutions through direct exposures and settlement systems and (iii) the information intensity of financial contracts and related credibility problems (de Bandt and Hartmann, 2000). An assessment to which extent systemic risk is

relevant for economic and financial policies can be undertaken in which a classical distinction of three functions for public policies: the allocation function, the stabilisation function and the distribution function. It appears that systemic risk is, first, relevant for allocation policies. Strong systemic events, such as contagious failures, may involve external effects. Therefore, individually rational bank management may lead to a higher level of systemic risk than would be socially optimal. This could even be the fundamental rationale for the regulation and supervision of banks (de Bandt and Hartmann, 2000).

Second, a systemic crisis affecting many financial institutions or markets can – either be by a credit crunch or debt deflation - lead to a recession or even to a depression. In such situations macroeconomic stabilisation policies, such as monetary or fiscal expansions, may be used to maintain a suitable level of liquidity in the banking system and diminish the recessionary impact on the real economy. While, in the case of systemic risk, allocation and stabilisation problems can be closely intertwined. If contagion is very strong, then the microeconomic risk allocation problem can degenerate to a macroeconomic destabilisation (de Bandt and Hartmann, 2000). Cautiously regulating the banking system is undoubtedly a major objective for financial regulators because of the enormous cost of banking system instability. A thorough understanding of the underlying causes of systemic banking crisis is a prime challenge for a careful financial regulator. Focus on the behaviour of the banking system because what may appear sound at the micro level may be quite fragile and flawed at the macro level. Regulatory mechanisms, such as bank closure policy and capital adequacy requirements that are commonly based on a bank's individual risk, fail to mitigate aggregate risk-shifting incentives, and can in fact heighten systemic risk. (Elahi et al., 2012).

In the past, banks may, in the absence of a safety net, be prone to runs. At some occasions, individual runs may spill over to other parts of the banking sector, possibly leading to a full-scale panic. While the theory of individual runs is well developed, the same cannot until very recently apply to bank contagion, which brings in the systemic component. One can distinguish two main channels through which contagion in banking markets can work: the real or exposure channel and the informational channel. The former relates to the potential for domino effects through real exposures in the interbank markets and/or in payment systems. The information channel relates to contagious withdrawals when depositors are imperfectly informed about the type of shocks hitting banks (idiosyncratic or systematic) and about their physical exposures to each other (asymmetric information). In principle, these two fundamental channels can work in conjunction as well as quite independently (de Bandt and Hartmann, 2000).

In summary the banking system is principally exposed to contagion effects, when lack of confidence associated with one poorly performing bank spreads to other, healthy banks. It arises because customers know that if a bank run would occur, liquidated bank assets will decline in value very swiftly, customers will want to withdraw their deposits before a run. Hence, even sound banks may be subject to a bank run. If most banks are affected, the financial system may well collapse. The vulnerability of banking to contagion creates systemic risk; the risk that disturbances in a financial institution or market will spread across the financial system, leading to widespread bank runs by wholesale and retail depositors, and possibly, collapse of the banking system. Many countries offer some form of deposit protection to bolster confidence and counter bank runs. These schemes escalate moral hazard problems, and part of the regulatory role will be to ensure such problems are minimised. An extensive collapse will result in the loss of intermediation, money transmission and liquidity services offered by banks which, in turn, will cause an inefficient allocation of resources in the economy (Heffernan, 2005). Worst case scenario, the economy could revert to barter exchange. Systemic banking risks are provoked by the interbank and Euromarkets, play a crucial role in the global banking scene. The interbank market acts as a risk absorber and risk spreader but at the same time makes the global banking system vulnerable to certain exogenous shocks.

#### Micro and Macro prudential regulation:

Additional problems arise because of the macroeconomic role played by banks; they help to implement government monetary policy. Governments may use the banks (changing a reserve ratio or setting a base rate) to achieve certain inflation and/or monetary growth targets. If the banking system collapses, there may be a dramatic reduction in the money supply, with the usual macroeconomic implications. Bank failures can create substantial negative externalities or social costs, in addition to the obvious private costs of failure. Most countries, to minimise the chance of governments having to rescue a bank or banks, the national banking systems are singled out for special regulation, known as prudential regulation, which is a more comprehensive than regulation of other sectors of the economy, even other parts of the financial sector. The prudential regulation of banks is concerned with minimising the social costs of bank failure but at the same time, ensuring that banks do not take advantage of the fact they are singled out for special regulation, and possibly protection. Prudential regulation focuses on bank regulation at the micro level, i.e. ensuring each bank behaves in a prudent manner, to prevent systemic failure arising from contagion if one bank fails.

On the other hand, we have macroprudential regulation, which can be defined as preventing the banking system as whole from getting into trouble because they are exposed to the same collective risks, so an entire banking system can encounter problems simultaneously. The objective of a macroprudential approach is to limit the risk of episodes of financial distress with significant losses in terms of the real output for the economy. That of the micro prudential approach is to limit the risk of episodes of financial distress of their impact on the overall economy. So, defined, the impartial of the macroprudential approach falls squarely within the macroeconomic tradition. That of its micro prudential counterpart is best rationalised in terms of consumer protection (Borio, 2003).

As portfolio allocation theory states, correlations across securities, and the distinction between systematic and idiosyncratic risk, are of the essence making the macroprudential a top-down approach. By contrast, the micro prudential approach is bottom-up. It sets prudential controls in relation to the risk of each individual security. The result for the overall portfolio arises purely because of aggregation. Correlations across securities are ignored. Further in consideration to risk we can state; the macroprudential perspective assumes that risk is in part endogenous with respect to the behaviour of the financial system since the macroprudential approach measures risk in terms of the dispersion of an economy's output, it also recognises that the financial system has first-order effects on it. These effects are ignored in the micro prudential perspective. The micro prudential approach assumes that it is exogenous (Borio, 2003).

In actual practice the micro elements of prudential standards are generally calibrated with respect to the risks incurred by individual institutions. The widespread use of peer group analysis in assessing risk is micro. The benchmark here is the average performance of institutions, regardless of what this implies in the aggregate. And micro prudential is also a certain reluctance to contemplate adjustments in standards or the intensity of supervision that would internalise macroeconomic consequences. While, macroprudential authorities for banks often list among their objectives preventing systemic risk, the notion could be considered vague enough to accommodate goals that could fall short of a macro approach: not all situations where systemic risk is invoked need involve potentially significant costs for the real economy. Equally, it is not unusual for the intensity of supervision to be personalised to the size and complexity of institutions systemic significance. And the monitoring of risk goes well beyond peer group analysis. It routinely looks at aspects such as concentration of exposures across

institutions and vulnerabilities to common shocks, like those associated with asset prices, sectoral, regional or macroeconomic developments (Borio et al., 2001).

Borio (2003), states that there are several reasons on why to strengthen the macroprudential framework. First, the macroprudential objective incorporates the rationale for its micro prudential counterpart. The output costs of financial instability can be very large, and their incidence widely felt. Acknowledging measurement difficulties; studies indicate that the costs of banking crises can easily run into double digits of GDP (Borio, 2003). Output and growth opportunities are unavoidable. Severe financial distress can shock the effectiveness of standard macroeconomic tools, such as monetary and fiscal policies. The micro prudential objective is rationalised in terms of depositor protection, there is a sense in which its macroprudential counterpart subsumes it. For the macroprudential objective is implied in terms of the size of the losses incurred by economic agents.

Second, as a result of a better balance between market and official discipline, strengthening the macroprudential orientation holds out the promise of better economic performance. Since a micro prudential approach seeks to limit the failure of each institution, regardless of its systemic significances, it is debatably more likely to result in an overly protective regulatory and supervisory framework. Any failure, however unimportant for the economy, could seriously damage the reputation of supervisors. The risk is that market forces may be muted unreasonably. Resources can be misallocated, and growth opportunities predetermined. If underpinned by overly generous safety net arrangements, a micro prudential approach could even undermine the very objective it is supposed to attain. It is well known that numbed incentives to monitor and limit risk can ultimately generate costly instability referred to as the moral hazard problem (Borio, 2003). The search of depositor protection objectives is best done through a combination of a macroprudential orientation and more targeted protection schemes. This said depositor protection schemes are not undesirable, however, limited schemes can act as effective pre-commitment apparatuses. By limiting the incidence of losses on the more susceptible segments of society, they can relieve political economy pressures to "bail out" institutions. They can ease a more selective attitude towards the resolution of financial distress and thereby reinforce a shift towards a macroprudential orientation.

Third, the nature of financial instability is such that a strict micro prudential approach is less likely to deliver a safe and sound financial system. Systemic risk suggests that financial stability can be tenable through a micro prudential approach, an analysis of the origin of financial crises with significant macroeconomic costs suggests that a macroprudential perspective is important. This analysis also reveals certain characteristics of risk perceptions that hold evidences about possible policy responses. The division between the cross-sectional and time dimension of risk, especially system-wide risk, is crucial, additionally, incentives play an important role (Borio, 2003).

There has been a joint let-down to address a key objective and that is mitigation of systemic risk. Central banks and supervisory agencies still struggle to put enough energy into the development of macroprudential tools that can, in conjunction with monetary policy, be used to address the build-up of exposures to aggregate risks. Treasury departments have been slow to address the scope of special resolution regimes that mitigate the systemic impact of failure and that can address moral hazard incentives arising from implicit safety nets. Prudential overseers delay establishment and applying better prudential standards for large and complex institutions whose failure can have a major disruptive effect on financial markets. Central banks have not always been successful in endorsing systemically vigorous procedures for the clearing and settlement of trades in rapidly-evolving financial markets (Werner, 2016).

#### The cost of bank regulation:

Financial deregulation denotes the implementation of policies that reduce the restrictions imposed on banks, such as the lifting of restrictions on banks entry, on permissible activities, and on interest rates. The primary aim of deregulation policies is to ease competition and improve the efficiency of financial intermediaries. Yet, the effects of deregulation on the financial sector are controversial (Kroszner and Strahan, 2014). Earlier studies find evidence such as the average annual growth rates for US banks during the deregulation periods between the early 1980's up to the early 1990s' to be negative or close to zero. Quantifying that the low performance of US banks to financial deregulation as it raised banks' cost of funding and increased competition from non-bank financial intermediaries. These results are shared among studies which also document poor performance and little efficiency improvements during the post-deregulatory period in the US (Berger and Mester, 2001; Kroszner and Strahan, 1998). While, studies focusing on Europe tend to show that deregulatory policies positively impacted on bank efficiency (Hasan and Marton, 2003).

Empirical evidence on the effect of deregulatory policies on bank productivity growth and efficiency is inconclusive. This may relate to the fact that deregulation relates to many different

policy initiatives that can impact on bank performance in different ways. The existing literature tends to treat deregulation as one policy, instead of considering its multi-faceted nature. Also, deregulation is a continuous process, that might not be able to be captured within this review. In addition to the fact that deregulation happens over time and through different policy initiatives, another complication results from the fact that often governments attempt to preempt the potential negative effects of deregulation by implementing policies which aim to strengthen the regulatory framework and the resilience of financial institutions. This brings up the issue of prudential regulation and to the enforcement of a mixture of supervisory policies that aim to monitor banks' activities and restrictive policies that aim to protect the banking sector from excessive risk taking.

Prudential re-regulation has evolved in several ways. First, the objective of official supervision shifted from monitoring banks' activities to fostering banks' internal management. Second, capital standards tightened over time. Third, private monitoring that relies on market mechanisms to discipline banks' activities became a key tool of the supervisory system. These elements constitute the three pillars of international banking practices on capital adequacy and regulation known as the Basel Accords. Theoretical arguments suggest that the instruments of prudential regulation may have opposite effects on bank performance. There are three pillars of capital regulation: (i) minimum capital requirements; (ii) supervisory review and (iii) market discipline. Barth et al., (2004) provide an insight on the association between re-regulatory policies and bank development, performance and stability. The authors find that tightening activity restrictions lowers banks' efficiency.

Higher capital may lower banks' cost of borrowing as banks are perceived as safer and less likely to fail if we keep that in mind. However, the obligation of higher capital ratios might burden banks with unnecessary costs. Official supervision may reduce market failures by monitoring banks and improving the quality of bank lending (Santos, 2001). Supervisors, however, may abuse their powers to benefit their associates and extract bribes with negative effects on bank intermediation. Finally, the success of market discipline is conditional on two premises: a) investors must be able to identify banks' financial conditions in a timely and accurate manner; b) investors' reactions to a change in the financial conditions of a bank must influence the behaviour of other banks (Lang et al., 2008). Since the banking sector is very complex, the operative application of private monitoring is difficult even in developed economies. A reliance on private monitoring may lead to the exploitation of depositors and poor bank performance. Demirgüç-Kunt et al., (2008) assess the effects of bank regulations,

market structure and national institutions on the cost of intermediation. The regulatory environment is captured by variables on bank entry, reserve requirements, activity restrictions and an overall index of bank freedom. They find that tightening regulations on bank entry, bank activities, reserve requirements and bank freedom increase the cost of intermediation, but the role of these regulatory variables becomes insignificant when controlling for economic freedom or property rights protection. These results support the view that bank regulations cannot be viewed on a standalone basis. In addition, the authors show that policies that enforce accurate information disclosure and private monitoring work best to improve bank efficiency, whereas they find no statistically significant evidence that capital requirements and official supervisory power improve bank performance.

#### 2.4 Non-Interest Income in a brief

The collective existence of non-interest income at commercial banks has been extensively recognized and deliberated within the financial press and regulatory publications, though few academic studies have explored the impact of increased non-interest income on the financial performance and stability of commercial banks (DeYoung and Rice, 2004). DeYoung and Roland (2001) also claimed that bank loans are relationship based and as a result have high switching costs, while most fee-based activities are not relationship based. Hence, notwithstanding credit risk fluctuations in interest rates, interest income from loans may be less unstable than non-interest income from fee-based activities (DeYoung and Roland, 2001). Since fee-based activities entail banks holding little or no fixed assets, unlike for income-based activities, fee-based involve little or no regulatory capital. This is why non-interest income involves revenue from banks securitizations and other off-balance sheet and non-interest activities such as loan sales, back up lines of credit and risk sharing through derivatives and such, (Barrell et al., 2012).

OBS is a form of non-interest income, the link OBS and NII have is when financial institutions use OBS items they contribute a different stream of revenue than Interest income products such as loans. This is all theoretically speaking leading to a better risk-return trade-off on an expanded efficient frontier. However, banks can also use diversification benefits to take more risk, holding less capital and granting more loans. As a matter of fact, in the United States, researchers find that OBS activities triggered a substantial increase in the volatility of banks' net operating revenue growth Stiroh and Rumble, (2006).

DeYoung and Rice (2004) state that in past studies it is found that non-interest income ratios increased in all banking sectors through all industrialised countries from 1982-1990. Non-interest income ratios are greater and have grown exponentially. Moreover, with the increasing number of non-interest income banks, intermediation activities are becoming a less essential part of banking business schemes. De Young and Rice's results on an econometric model using a panel data set on US commercial banks covering the period 1989-2001 find strong statistical associations between non-interest income and banks characteristics. A main and crucial finding is that an increase in non-interest income tends to be associated with higher profitability, higher variation in profits and worsened risk-return trade off overtime (DeYoung and Rice, 2004).

The relevance of increased understanding of the factors that determine bank risk have been emphasized by the large costs imposed upon several participants in the banking system by the negative outcomes of bank portfolio choice (Williams, 2016). Prior to the global financial crisis, the impact of bank income diversification upon bank risk had attracted increased academic attention in response to regulatory changes, mainly in the United States. This was particularly in response to the introduction of the Gramm–Leach–Bliley Act, which allowed bank holding companies to offer both commercial and investment banking. As discussed by DeYoung and Torna (2013 few researchers have blamed the last financial crisis on increased non-traditional activity in the banking sector. Increased emphasis of bank income upon non-interest income as opposed to the more traditional interest margin income, resulted from both regulatory changes and changes the operations of the banking system's competitive milieu. Furthermore, Brunnermeier et al., (2012) demonstrate that banks with higher non-interest income display higher levels of systemic risk. Due to all these factors, the issue of the impact upon bank risk of income composition is of increased importance.

The global financial crisis was brought on by the collapse of a few systemically important financial institutions. But hundreds of smaller US banks and thrifts also failed during the crisis and in its aftermath, Many commentators (Brunnermeier et al., 2012; DeYoung and Torna 2013) immediately blamed the episode on the most recent changes in bank regulation— in particular, the Gramm–Leach–Bliley Act of 1999 that allowed banks to engage more freely in non-traditional activities such as investment banking, venture capital, security brokerage, insurance underwriting and asset securitization—and argued that bank supervisors were lax and/or unprepared for the challenges of deregulated financial markets(DeYoung and Torna, 2013). GLB enhanced this trend to changes in banks' business models and income mixes that
were already underway. For example, noninterest income at U.S. banks peaked at 44% of operating income in 2003, up from 35% in 1993 and 24% in 1983 DeYoung and Torna (2013); movement away from traditional interest was made possible by numerous innovations in information, communications and financial technologies, and was made necessary by increasing competition from other financial institutions and markets for banks' depositors and borrowers. This reduced banks' share of economy-wide financial assets; banks however, retained stakes in the cash flows associated with those assets by originating loans, servicing loans, guaranteeing loans, and providing other services in exchange for fee income. GLB not only eased this transition, but also allowed banks to replace lost business by shifting into less traditional financial activities.

DeYoung and Rice, (2004) separate noninterest income into three categories: noninterest income from non-traditional Stakeholder activities (i.e., investment banking, venture capital, proprietary trading or other activities that do or may require the bank to hold risky assets); noninterest income from non-traditional Fee-for-Service activities (i.e., securities brokerage, insurance sales or other activities that do not require the bank to hold risky assets); and noninterest income from Traditional Fee banking activities permitted prior to deregulation (e.g., depositor services, fiduciary services). This three-way nomenclature of noninterest income allows them to estimate whether the new activities permitted by deregulation increased the probability of bank failure, while also allowing them to test for differential impacts among the newly permitted activities. The definition of non-traditional Fee-for-Service activities is used for using OBS activities in this study.

Barrell et al (2012) have noted that former authors proposed that non-interest income was created by implied off-balance sheet assets with the same risk and return characteristics as that of on-balance sheet activity as designated by net interest income. Variables netting off-balance sheet activity was neglected in most early warning models mainly due to lack of data for off-balance sheet activities. They find that the change in a proxy of off-balance sheet activity of banks derived from the share of non-interest income is significant in a logit model featuring bank capital adequacy, liquidity, changes in house prices and current account balance to GDP. Their study is based on 14 OECD countries from the years 1980-2008 they use total non-interest income as the basis of their measure for off-balance sheet activity and suggest that fee-based income is not risk-free due to risk of volatile demand for such services as well as reputation risk that may arise from it (Barrell et al., 2012).

Lozano-Vivas and Pasiouras (2010) investigate the influence of containing nontraditional activities as an output in estimating cost and profit efficiency of banks, averring that contemporary studies have included off-balance sheet items or non-interest income as part of bank output, consequently giving confirmation on the impact of non-traditional activities on bank efficiency. Their study employs the stochastic frontier approach to generate cost and profit efficiencies for each bank along the sample, which consisted of an unbalanced dataset of 4960 observations from 752 publicly quoted commercial banks operating in 87 countries from 1999-2006. All bank-specific data was obtained from Bankscope database. They used unconsolidated data but where these were not obtainable, they used consolidated data that were set under international accounting standards.

They discovered that on average cost efficiency increases whether they use off-balance sheet or non-interest income as an indicator of non-traditional activities. By means of profit efficiency the outcomes are varied. The presence of Off-balance activities does not have a statistically substantial stimulus on profit efficiency whereas non-interest income does. Observing variances in the effect of environmental and regulatory conditions on cost and profit inefficiency is reliant on whether non-traditional activities are incorporated in the output vector or not. The effects show that the presence of non-traditional activities does not significantly influence the directional impact of environmental factors prominent to higher efficiency when non-traditional activities are taken into account (Lozano-Vivas and Pasiouras, 2010).

Whether banks use interest-based or non-interest-based income to generating profit, pricing policies will affect banks day-to-day operations. The use of OBS activities will also be swayed by these policies. Former studies present an assortment of results that deal with OBS, pricing policies and risks that arise from the subject.

#### **2.5 Gramm-Leach-Bliley Act**

By the year 2000, consolidation in the banking industry had been an ongoing trend for twenty years. The number of commercial banks in the United States had fallen from more than 14,000 in the mid 1980's to fewer than 9,000 in the late 1990's, while the average size of those banks had grown. This was part of a broader trend of consolidation in financial services industries. The financial services had been divided into; commercial banking, investment banking, and insurance - beginning in the late 1980s, some commercial banking organizations had started moving into underwriting securities and a few had also begun selling insurance. By 1999, financial integration was well underway, and Congress decided to act. President Clinton

signed the Financial Services Modernization Act (also known as the Gramm-Leach-Bliley Act), rewriting the financial regulation rulebook and giving the Fed new supervisory powers.

The Banking Act of 1933 (Glass-Steagall) set up a wall of separation between certain sectors of the financial services industry. It has two main aspects. First it created the Federal Deposit Insurance Corporation (FDIC). Second it regulated the relationship between investment banks and commercial banks. The separation of banking activities was a political response to the late 1920's stock market crash and to the general belief that banks had taken excessive risk with depositors' savings in the financial markets. The regulatory barrier between commercial and investment banking was also justified by potential conflicts of interest as banks were accused of promoting securities they underwrote (Gilbert and Scott, 2001), mixing the core functions of investment and commercial banking. However, the wording of the Banking Act made some financial integration possible, which led to the mixing of certain transactions. While section 20 of the law separated commercial and investment banking, the policy permitted some integration between commercial and investment banking. Though the act prohibited bank affiliation with firms that were "engaged principally" in underwriting and dealing securities. This was intended to protect the financial stability of the industry and the economy and made it possible for bank holding companies to create subsidiaries or acquire firms involved in some underwriting or dealing, if most of their activities were otherwise permissible (Yeager et al., 2007). The tendency of banks to operate in sectors traditionally considered outside of their scope increased gradually up to the late 90s. In 1998 Citicorp, a bank holding company, announced plans to merge with Travellers Insurance, forming Citigroup. This merger was not yet permissible under existing regulations, but it was made in anticipation of a change in the law then under discussion in Congress.

The Gramm-Leach-Bliley Act of 1999 (GLB) addressed these changes in the financial sector. It was intended to promote the benefits of financial integration for consumers and investors while safeguarding the soundness of the banking and financial systems. The primary change was the creation of a new kind of financial institution: The Financial Holding Company (FHC). An FHC was essentially an extension of the concept of a bank holding company—an umbrella organization that could own subsidiaries involved in different financial activities. This was something of a compromise, as security and insurance underwriting and sales by depository institutions would still be restricted, but banks could be part of a larger corporation that was involved in those activities. Allowing this kind of association repealed portions of the Banking Act and created new regulations for FHCs. The law placed cross-marketing

restrictions to prevent a bank and a nonbank subsidiary of an FHC from marketing the products or services of the other entity. These restrictions were intended to prevent banks from promoting securities underwritten by other subsidiaries to their customers. In addition, restrictions remained on financial transactions between banks and nonbank subsidiaries. That responsibility for regulation and enforcement fell primarily upon the Federal Reserve.

The Fed's supervision of FHCs is based on the concept of functional regulation. The Fed supervises the consolidated organization, while primarily relying on the reports and supervision of the appropriate state and federal authorities for the FHC subsidiaries. The subsidiary depository institutions must be well-capitalized and well managed in accordance with existing bank regulations, and they must have at least satisfactory ratings under the Community Reinvestment Act. If any of the subsidiaries cease to be well managed or capitalized, the FHC would face corrective supervisory action and be prohibited from undertaking new financial activities until the problems were addressed. To illustrate this, we can see that the Securities and Exchange Commission would regulate the registered securities brokers, dealers, and investment advisers; while state insurance commissioners would oversee licensed insurance companies; and the appropriate state and federal banking agencies would supervise banks and thrifts. The law kept in place the existing regulators for financial subsidiaries of FHCs but gave the Fed the role of "umbrella supervisor." The goal of the law was to protect banks and their customers from risks taken on at financial subsidiaries, while ensuring that the protections for banks were not extended to nonbank affiliates, thereby creating perverse incentives for risk management (Calabria, 2009).

There are questions about how much GLB impacted on the financial markets and whether it had any influence on the recent financial crisis. Before its approval in 1999, investment banks were already allowed to trade and hold financial assets such as: mortgagebacked securities, derivatives, credit-default swaps, collateralized debt obligations. The shift of investment banks into holding substantial trading portfolios resulted from their increased capital base enabled by most investment banks becoming publicly held companies, a structure allowed under Glass-Steagall. Also, very few financial holding companies decided to combine investment and commercial banking activities. The two investment banks whose failures have come to symbolize the financial crisis, Bear Stearns and Lehman Brothers, were not affiliated with any depository institutions. Rather, had either Bear or Lehman possessed a large source of insured deposits, they would likely have survived their short-term liquidity problems. The fact that the Gramm-Leach-Bliley Act was signed made possible for these firms to be bought and some impact of the crisis was absorbed due to these new deregulatory parameters.

# 2.6 Sarbanes Oxley Act

During the deregulation phase begun in the early 1990's and culminating with the GLB act, the US government also passed the Sarbanes Oxley Act to regulate certain aspects of the financial sector. Critics have painted deregulation as simply a path to boosting financial sector profits at the expense of excessive risk-taking. Advocates believe in a more measured approach through a reduction of compliance burdens and increased availability of capital into the marketplace. In 2002, long before the last financial crisis, Congress was faced with a different kind of crisis. In the wake of several high-profile accounting scandals at large companies, such as Enron, Congress began a classic case of "rectification," which ultimately caused the collapse of the world's largest public accounting firm at the time. They passed the Sarbanes-Oxley Act with one of its most burdensome mandates: Section 404. Section 404 requires public firms to have effective systems of internal controls, but only mandates that an outside accounting firm provide a verification that these controls are effective in preventing fraud. The fraudulent actions of certain firms called into question the integrity of the industry and shocked authorities into increasing regulation on reporting to protect the financial stability of the industry.

The Sarbanes–Oxley Act of 2002, is a United States federal law that set new or expanded requirements for all U.S. public company boards, management and public accounting firms. There are also several provisions of the Act that also apply to privately held companies; for example, the obstinate destruction of evidence to impede a Federal investigation. The Act, which contains eleven sections, was the political response to several major corporate and accounting scandals, including Enron and WorldCom. The bill covered the responsibilities of a public corporation's board of directors, added criminal penalties for certain misconduct, and required the Securities and Exchange Commission to create regulations to define how public corporations comply with the law. Sarbanes–Oxley increased the oversight role of boards of directors and the independence of the outside auditors who review the accuracy of corporate financial statements. Scandals cost investors billions of dollars when the share prices of affected companies collapsed and shook public confidence in the US securities markets. The act also covers issues such as auditor independence, corporate governance, internal control assessment, and enhanced financial disclosure.

A variety of factors created the conditions in which a series of large corporate frauds occurred between 2000 and 2002. The remarkable, highly-publicized frauds at Enron, WorldCom, and Tyco exposed significant problems with conflicts of interest and incentive compensation practices. The Senate Banking Committee undertook a series of hearings on the problems in the markets that had led to a loss of hundreds of billions of dollars in market value. The hearings set out to lay the foundation for legislation. It was concluded that inadequate oversight of accountants, lack of auditor independence, weak corporate governance procedures, stock analysts' conflict of interests, inadequate disclosure provisions, and grossly inadequate funding of the Securities and Exchange Commission were the major problems. In this chapter, banking practices are discussed in relation to the Sarbanes-Oxley Act and how this Act affected accounting practice and reporting in banking. The Act also contributes to accounting transparency in the banking sector. This made the financial statements clearer for regulators and investors alike. In the first main chapter we discuss the Market discipline hypothesis and its effect on the industry, the Sarbanes Oxley Act contributes to these results. Title IV elevates our main apprehension of the eleven titles that describe specific mandates and requirements for financial reporting. Each title consists of several sections, summarized below (Dah et al., 2014; Vakkur et al., 2010). The following titles reflect on the Sarbanes - Oxley Act and which titles reflect on the research:

## 1. Public Company Accounting Oversight Board (PCAOB)

Title I consists of nine sections and establishes the Public Company Accounting Oversight Board, to provide independent oversight of public accounting firms providing audit services. It also creates a central oversight board tasked with registering auditors, defining the specific processes and procedures for compliance audits, inspecting and policing conduct and quality control, and enforcing compliance with the specific mandates. This reflects on how regulatory authorities should monitor accounting practices.

## 2. Corporate Responsibility

Title III consists of eight sections and mandates that senior executives take individual responsibility for the accuracy and completeness of corporate financial reports. It defines the interaction of external auditors and corporate audit committees and specifies the responsibility of corporate officers for the accuracy and validity of corporate financial reports. It enumerates specific limits on the behaviours of corporate officers and describes specific forfeitures of benefits and civil penalties for non-compliance.

#### 3. Enhanced Financial Disclosures

Title IV consists of nine sections. It describes enhanced reporting requirements for financial transactions, including off-balance-sheet transactions, pro-forma figures and stock transactions of corporate officers. It requires internal controls for assuring the accuracy of financial reports and disclosures, and mandates both audits and reports on those controls. It also requires timely reporting of material changes in financial condition and specific enhanced reviews by the SEC or its agents of corporate reports.

## 4. Analyst Conflicts of Interest

Title V consists of only one section, which includes measures designed to help restore investor confidence in the reporting of securities analysts. It defines the codes of conduct for securities analysts and requires disclosure of knowable conflicts of interest.

#### 5. Studies and Reports

Title VII consists of five sections and requires the Comptroller General and the SEC to perform various studies and report their findings. Studies and reports include the effects of consolidation of public accounting firms, the role of credit rating agencies in the operation of securities markets, securities violations and enforcement actions, and whether investment banks assisted Enron, Global Crossing and others to manipulate earnings and complicate true financial conditions.

From the eleven titles, title IV emphases use of off-balance sheet activities, as these activities have a broad definition in the financial field: we use off-balance sheet activities to define commitments and letters of credit. Since these activities are not initially disclosed on the balance sheet, investors may overlook their risks. The Sarbanes Oxley Act is used as a point in the study to look at the use of regulation to limit use of off-balance sheet activities as speculative instruments, or if the use of off-balance sheet activities has been used to hedge and mitigate risk.

# 2.7 Emergency Economic Stabilization Act

The Sarbanes–Oxley Act was a political response to major corporate scandal but was not sufficient to avoid increasing risk taking and misreporting in banking Keys et al., (2010), which eventually culminated in the bankruptcy of Lehman in 2008. The Emergency Economic Stabilization Act of 2008 was signed into law on October 3, 2008 right after Lehman's failure. This legislation was the most significant economic intervention by the United States Government in the nation's financial services industry since the Great Depression. The primary component of the legislation is the Troubled Asset Relief Program "TARP" which authorizes the Secretary of the US Department of the Treasury to purchase residential and commercial mortgage loans, mortgage-backed securities or other obligations. Other important provisions of the TARP include: loss mitigation techniques such as authorization for Treasury to obtain equity or debt from participating banks and to pursue independent recoupment from financial institutions under certain conditions; procedures for contracting and oversight, mechanisms to avoid foreclosure; limits on compensation to executives of companies receiving assistance; procedures for reviewing and modifying mark to market accounting; temporary increases in FDIC coverage; and miscellaneous considerations. The Secretary's authority to purchase and insure troubled assets terminated on December 31, 2009, which was later extended through October 3, 2010, upon certification by the Secretary to Congress that such an extension was necessary and with disclosure of anticipated costs to the taxpayers of such an extension.

The Emergency Economic Stabilization Act covers many important facets of the global financial crisis of 2008, including the purchase of troubled assets. The Troubled Asset Relief Program (TARP) allowed the Government of the US to purchase troubled assets from financial institutions. The program also establishes an Office of Financial Stability within the Treasury Department to implement TARP in consultation with the Board of Governors of the Federal Reserve System, the FDIC, the Comptroller of the Currency, the Director of the Office of Thrift Supervision and the Secretary of Housing and Urban Development. It requires the Treasury Secretary to establish guidelines and policies to carry out the purposes of this Act. It also includes provisions to prevent unjust enrichment by participants of the program (Lambert et al., 2017).

The Emergency Economic Stabilization Act requires the Secretary to coordinate with foreign authorities and central banks to establish programs like TARP. It covers losses and administrative costs, as well as allowing taxpayers to share in equity appreciation, and requiring that the Treasury receive non-voting warrants from participating financial institutions. The Secretary is required, within 2 business days of exercising authority under this Act, to publicly disclose the details of any transaction. While the authorisation of the full \$700 billion as requested by the Treasury Secretary for implementation of TARP allows the Secretary to immediately use up to \$250 billion in authority under this Act. Upon a Presidential certification of need, the Secretary may access an additional \$100 billion. The final \$350 billion may be accessed if the President transmits a written report to Congress requesting such authority. The

Secretary may use this additional authority, unless within 15 days Congress passes a joint resolution of disapproval, which may be considered, on an expedited basis. It requires the Comptroller General of the United States to conduct ongoing oversight of the activities and performance of TARP, and to report every 60 days to Congress. The Comptroller General is required to conduct an annual audit of TARP.

In addition, TARP is required to establish and maintain an effective system of internal controls. The Emergency Economic Stabilization Act directs the Comptroller General to conduct a study and report back to Congress on the role in which leverage, and sudden deleveraging of financial institutions was a factor behind the current financial crisis, while providing for the authorization and appropriation of funds consistent with Section 115. And it provides standards for judicial review, including injunctive and other relief, to ensure that the actions of the Secretary are not arbitrary, capricious, or not in accordance with law. The Act also provides that the authority to purchase and guarantee assets terminate on December 31, 2009. The Secretary may extend the authority for an additional year upon certification of need to Congress (Li, 2013).

The Emergency Economic Stabilization Act establishes the Office of the Special Inspector General for the Troubled Asset Relief Program to conduct, supervise, and coordinate audits and investigations of the actions undertaken by the Secretary under this Act. The Special Inspector General is required to submit a quarterly report to Congress summarizing its activities and the activities of the Secretary under this Act. The Act raises the debt ceiling from \$10 trillion to \$11.3 trillion. It also details the way the legislation will be treated for budgetary purposes under the Federal Credit Reform Act. The Emergency Economic Stabilization Act strengthens the Hope for Homeowners program to increase eligibility and improve the tools available to prevent foreclosures. It establishes a Congressional Oversight Panel to review the state of the financial markets, the regulatory system, and the use of authority under TARP. The panel is required to report to Congress every 30 days and to submit a special report on regulatory reform prior to January 20, 2009. The panel will consist of 5 outside experts appointed by the House and Senate Minority and Majority leadership. While it prohibits the misuse of the FDIC logo and name to falsely represent that deposits are insured. It strengthens enforcement by appropriate federal banking agencies and allows the FDIC to take enforcement action against any person or institution where the banking agency has not acted. The Emergency Economic Stabilization Act requires any federal financial regulatory agency to cooperate with the FBI and other law enforcement agencies investigating fraud,

misrepresentation, and malfeasance with respect to development, advertising, and sale of financial products. And it provides the Federal Reserve with the ability to pay interest on reserves (Li, 2013).

The Emergency Economic Stabilization Act also requires the Federal Reserve to provide a detailed report to Congress, in an expedited manner, upon the use of its emergency lending authority under Section 13(3) of the Federal Reserve Act and make technical corrections to the Truth in Lending Act. It protects the Exchange Stabilization Fund from incurring any losses due to the temporary money market mutual fund guarantee by requiring the program created in this Act to reimburse the Fund. It prohibits any future use of the Fund for any guarantee program for the money market mutual fund industry. The Act restates the Securities and Exchange Commission's authority to suspend the application of Statement Number 157 of the Financial Accounting Standards Board if the SEC determines that it is in the public interest and protects investors. The Act also requires the SEC, in consultation with the Federal Reserve and the Treasury, to conduct a study on mark-to-market accounting standards as provided in Financial Accounting Standards (FAS) 157, including its effects on balance sheets, impact on the quality of financial information, and other matters, and to report to Congress within 90 days on its findings. While it required that in 5 years, the President submit to the Congress a proposal that recoups from the financial industry any projected losses to the taxpayer. Nothing in this Act shall limit the authority of the Secretary or the Federal Reserve under any other provision of law (Barth et al., 2008).

Budget related requirements mandate that information used by the Treasury Secretary in connection with activities under this Act be made available to Congressional Support Agencies. It requires Congressional Budget Office and the Office of Management and Budget to report cost estimates and related information to Congress and the President regarding the authorities that the Secretary of the Treasury has exercised under the Act. And the President must include in his annual budget submission to the Congress certain analyses and estimates relating to costs incurred because of the Act; and specify scoring of the Act for purposes of budget enforcement. Tax provisions detail certain changes in the tax treatment of losses on the preferred stock of certain Government-Sponsored Enterprise (GSEs) for financial institutions. Tax provisions also applied limits on executive compensation and golden parachutes for certain executives of employers who participated in the auction program. While it extended law tax forgiveness on the cancellation of mortgage debt (Barth et al., 2008). The Emergency Economic Stabilization Act was established in 2008 and a revision on the executive compensation section of the Act came in 2009 under the American Recovery and Reinvestment Act of 2009 to try and protect tax payers as much as possible. TARP was the main outcome of the Emergency Economic Stabilization Act which covered many aspects of the recent financial crisis, while other government interventions were available for depository institutions that were optional such as the Temporary Liquidity Guarantee Program.

The insurance of troubled assets incorporates if the Secretary establishes the TARP program, the Secretary is required to establish a program to guarantee troubled assets of financial institutions. The Secretary is also required to establish risk-based premiums for such guarantees sufficient to cover anticipated claims. The Secretary must report to Congress on the establishment of the guarantee program. Considerations include using authority under to take a few deliberations into account, including the interests of taxpayers, minimizing the impact on the national debt, providing stability to the financial markets, preserving homeownership, the needs of all financial institutions regardless of size or other characteristics, and the needs of local communities. The Secretary is required to examine the long-term viability of an institution in determining whether to directly purchase assets under the TARP (Barth et al., 2008).

The Financial Stability Oversight Board is established to review and make recommendations regarding the exercise of authority under the Emergency Economic Stabilization Act. In addition, the Board must ensure that the policies implemented by the Secretary protect taxpayers, are in the economic interests of the United States, and are in line with the prescriptions of the Emergency Economic Stabilization Act. The Board is comprised of the Chairman of the Board of Governors of the Federal Reserve System, the Secretary of the Treasury, the Director of the Federal Home Finance Agency, the Chairman of the Securities and Exchange Commission and the Secretary of the Department of Housing and Urban Development. Reports are developed monthly within 60 days of the first exercise of authority under this Act and every month thereafter, the Secretary is required to report to Congress its activities under TARP, including detailed financial statements. Tranche Reports; For every \$50 billion in assets purchased, the Secretary is required to report to Congress a detailed description of all transactions, a description of the pricing mechanisms used, and justifications for the financial terms of such transactions. Regulatory modernization reports were, prior to April 30, 2009, that the Secretary is required to submit a report to Congress on then current state of the

financial markets, the effectiveness of the financial regulatory system, and to provide any recommendations (Farruggio et al., 2013).

While, Rights; Management; Sale of Troubled Assets; Revenues and Sale Proceeds; establishes the right of the Secretary to exercise authorities under this Act at any time. This provides the Secretary with the authority to manage troubled assets, including the ability to determine the terms and conditions associated with the disposition of troubled assets. Requires profits from the sale of troubled assets to be used to pay down the national debt. Contracting procedures allows the Secretary to waive provisions of the Federal Acquisition Regulation where compelling circumstances make compliance contrary to the public interest. Such waivers must be reported to Congress within 7 days. If provisions related to minority contracting are waived, the Secretary must develop alternate procedures to ensure the inclusion of minority contractors. It also allows the FDIC to be selected as an asset manager for residential mortgage loans and mortgage-backed securities. Where there are conflicts of Interest the Secretary is required to issue regulations or guidelines to manage or prohibit conflicts of interest in the administration of the program (Song and Uzmanoglu, 2016).

Regarding foreclosure mitigation efforts for mortgages and mortgage-backed securities acquired through TARP, the Secretary must implement a plan to mitigate foreclosures and to encourage servicers of mortgages to modify loans through Hope for Homeowners and other programs. Allows the Secretary to use loan guarantees and credit enhancement to avoid foreclosures. The Secretary is required to coordinate with other federal entities that hold troubled assets to identify opportunities to modify loans, considering net present value to the taxpayer. This leads to assistance to homeowners which requires federal entities that hold mortgages and mortgage-backed securities, including the Federal Housing Finance Agency, the FDIC, and the Federal Reserve to develop plans to minimize foreclosures. Federal entities are required to work with servicers to encourage loan modifications, considering net present value to the taxpayer (Lambert et al., 2017).

The American Recovery and Reinvestment Act of 2009 imposed some restrictions for executive compensation to banks that take part to TARP. More specifically, if the Treasury buys assets directly from an institution, the institution must observe standards limiting incentives, allowing claw-back and prohibiting golden parachutes. When Treasury buys assets at auction, an institution that has sold more than \$300 million in assets is subject to additional taxes, including a 20% excise tax on golden parachute payments triggered by events other than

retirement, and tax deduction limits for compensation limits above \$500,000. This was made possible from the American Recovery and Reinvestment Act of 2009. The American Recovery and Reinvestment Act imposed restrictions and standards throughout to financial institutions provided with financial assistance under TARP (Kim, 2010).

The restrictions and standards required were as follows: limits on compensation incentives for risk-taking by SEOs. TARP recipients must ensure:

(i) limits on compensation that exclude incentives for senior executive officers of the institution to take unnecessary and excessive risks that threaten the recipient's value during the period in which any obligation arising from financial assistance provided under the TARP remains outstanding. Under the newly amended Act, a company's SEOs are the five most highly compensated employees of a public company, whose compensation is required to be disclosed pursuant to the Securities Exchange Act of 1934, and their counterparts for non-public companies.

TARP recipients are required to

(ii) prohibit any compensation plan that would encourage manipulation of the company's reported earnings to enhance the compensation of any of its employees (Thatcher, 2009).

The American Recovery and Reinvestment Act requires TARP recipients to

(iii) implement provisions to recover bonuses, retention awards, or incentive compensation paid to any SEO or any of the next twenty most highly compensated employees based on statements of earnings, revenues, gains, or other criteria that are later found to be materially inaccurate. TARP recipients are prohibited from making

(iv) "golden parachute payments," or severance payments, to a SEO or any of the next five most highly-compensated employees during the TARP obligation period. The American Recovery and Reinvestment Act prohibits TARP recipients from

(v) paying or accruing any bonus, retention award, or incentive compensation during the TARP obligation period. This prohibition provides an exception for the payment of longterm restricted stock by such TARP recipient, provided that such long term restricted stock does not fully vest during the TARP obligation period; has a value that does not exceed one third of the receiving employee's total annual compensation; and is subject to such other terms and conditions as the Secretary may determine is in the public interest (Thatcher, 2009).

Publicly registered TARP recipients must establish a

(vi) Board Compensation Committee comprised entirely of independent directors, for reviewing employee compensation plans. This Committee is required to meet at least semiannually to discuss and evaluate employee compensation plans considering an assessment of any risk posed to the TARP recipient by such plans. However, in the case of TARP recipients that are not publicly registered companies and that have not received more than \$25,000,000 of financial assistance through TARP, the duties of the Board Compensation Committee outlined above must be carried out instead by the company's board of directors.

The board of directors of TARP recipients must establish a company-wide policy regarding

(vii) excessive or luxury expenditures. This category may include excessive expenditures on: (a) entertainment or events, (b) office and facility renovations, (c) aviation or other transportation services, or (d) other activities or events that are not reasonable expenditures for conferences, staff development, reasonable performance incentives, or other similar measures conducted in the normal course of the company's business operations. The scope of this provision's application depends on the amount of financial assistance that a TARP recipient has received (Kim, 2010).

(viii) Any proxy or consent for a shareholder meeting of a TARP recipient during the TARP obligation period must permit a separate shareholder vote to approve the compensation of executives, as disclosed pursuant to the compensation disclosure rules of the Securities and Exchange Commission (SEC). The shareholder vote described will not be binding on the company's board of directors, will not be construed as overruling a decision by the board, and will not create or imply any additional fiduciary duty by the board. The American Recovery and Reinvestment Act prompts the SEC to spread final rules and regulations regarding this provision within one year of the date of enactment.

TARP recipients are subject to a \$500,000 cap on the

(ix) deductibility of annual compensation for each of their Seasoned Equity Offering (SEOs) under the provisions of Internal Revenue Code Section 162. While this limit technically applies during the TARP obligation period, it may also serve to limit the deductibility of

deferred compensation paid to a SEO in a future year, where the compensation is paid in a year not subject to the TARP limits but was earned during a year in which the TARP limits were in place.

The Secretary of the U.S. Treasury shall review bonuses, retention awards, and other compensation paid to the SEOs and the next twenty most highly-compensated employees of each entity receiving TARP assistance before The American Recovery and Reinvestment Act enactment, to determine whether any such payments were inconsistent with the purposes of The American Recovery and Reinvestment Act or the TARP or were otherwise contrary to the public interest. In the event such a determination is made, ARRA requires the Secretary to engage in negotiations with the TARP recipient and the receiving employee for appropriate reimbursements to the federal government with respect to compensation or bonuses.

Finally,

(x) the Chief Executive Officer (CEO) and Chief Financial Officer (CFO) of each TARP recipient are required to provide a written certification of compliance with the foregoing requirements. Publicly traded companies must file these certifications with the SEC, together with annual filings required under securities laws, while private companies will be required to file their certifications with the Secretary of the Treasury.

## 2.7.1 Troubled Asset Relief Program (TARP)

The Troubled Asset Relief Program (TARP) is a program set out to purchase toxic assets and equity from financial institutions to strengthen the economy. President George W. Bush on October 3, 2008 signed off the relief program. This was the response in 2008 to address the subprime mortgage crisis. The Emergency Economic Stabilization Act (EESA) of 2008 created the TARP program, originally TARP was authorized expenditures of \$700 billion. The Dodd–Frank Wall Street Reform and Consumer Protection Act, signed into law in 2010, reduced the amount to \$475 billion. By October 11, 2012, the Congressional Budget Office stated that total disbursements would be \$431 billion, and estimated the total cost, including grants for mortgage programs that have not yet been made, would be \$24 billion (Puddu and Waelchli, 2015).

The Emergency Economic Stabilization Act of 2008 (EESA) requires financial institutions selling assets to TARP to issue equity warrants (a security that entitles its holder to purchase shares in the company issuing the security for a specific price), or senior debt

securities (for non-publicly listed companies) to the Treasury. While in terms of the warrants, Treasury will only receive warrants for non-voting shares, or will agree not to vote. This measure is designed to protect the government by giving Treasury the possibility of profiting through its new ownership stakes in these institutions. The idea is that if the financial institutions benefit from government assistance and recover their former strength, the government will also be able to profit from their recovery.

TARP permitted Treasury to purchase or insure up to \$700 billion of "troubled assets," defined as "(1) residential or commercial obligations will be bought, or other instruments that are based on, or related to such mortgages, that in each case was originated or issued before March 15, 2008, the purchase of which the Secretary determines, promotes financial market stability; and (2) any other financial instrument that the Secretary, after consultation with the Chairman of the Board of Governors of the Federal Reserve System, determines the purchase of which is necessary to promote financial market stability, but only upon transmittal of such determination, in writing, to the appropriate committees of Congress."

This meant that Treasury could purchase illiquid, difficult-to-value assets from banks and other financial institutions. TARP is intended to improve the liquidity of these assets by purchasing them using secondary market mechanisms, thus allowing participating institutions to stabilize their balance sheets and avoid further losses. TARP does not allow banks to recuperate losses already incurred on troubled assets, but officials expect that once trading of these assets resumes, their prices will stabilize and ultimately increase in value, resulting in gains to both participating banks and the Treasury itself. The concept of future gains from troubled assets comes from the hypothesis in the financial industry that these assets are oversold, as only a small percentage of all mortgages are in default, while the relative fall in prices represents losses from a much higher default rate (Taliaferro, 2009).

Another important goal of TARP is to encourage banks to resume lending again at levels seen before the crisis, both to each other and to consumers and businesses. An objective of TARP is to see if it can stabilize bank capital ratios, it should theoretically allow them to increase lending instead of storing cash to cushion against future troubled assets or crisis. Increased lending leads to "relaxing" of credit, which the government hopes will restore order to the financial markets and improve investor confidence in financial institutions and the markets.

#### 2.7.1.2 Capital Purchase Program (CPP)

From October 2008 through December 2009, the Treasury invested almost \$205 billion in 707 financial institutions as part of federal efforts to help stabilize U.S. financial markets. The investments were made through the Capital Purchase Program (CPP), the first and largest initiative under the Troubled Asset Relief Program. Under this authority, in October 2008 Treasury created CPP to provide capital to practicable financial institutions by purchasing preferred shares and subordinated debt. In return for its investments, Treasury received dividend or interest payments and warrants; these warrants gave the option to buy shares of common stock or preferred stock at a predetermined price on or before a specified date. The program was closed to new investments on December 31, 2009. Since then, Treasury has continued to oversee and divest its CPP investments, collect dividend and interest payments, and sell warrants (GAO,2016).

Since CPP was created to aid the stabilization of the financial markets and banking system, the Treasury sought, rather than purchasing troubled mortgage-backed securities and whole loans, as initially envisioned under TARP, Treasury used CPP investments to strengthen the capital levels of financial institutions. Treasury determined that strengthening capital levels was the more effective mechanism to help stabilize financial markets, encourage interbank lending, and increase confidence in the financial system. Under CPP, qualified financial institutions were eligible to receive an investment of 1–3 percent of their risk-weighted assets, up to \$25 billion. In exchange for the investment, Treasury generally received preferred shares that would pay dividends. Risk-weighted assets are all assets and off-balance-sheet items held by an institution, weighted for risk according to the capital standards of the federal banking regulators. In terms of subordinated debt S-corporations issued these securities rather than preferred shares to preserve the special tax status of the institutions that are classified as a federal business type that provides certain tax and other benefits.

At the end of 2014, all the institutions with outstanding preferred share investments were required to pay dividends at a rate of 9 percent, rather than the 5 percent rate in place for the previous 5 years. Treasury also receive warrants to purchase shares of common or preferred stock or a senior debt instrument to further protect taxpayers and help ensure returns on the investments. Institutions can repay CPP investments with the approval of their primary federal bank regulator, and after repayment, institutions are permitted to repurchase warrants on common stock from Treasury. Treasury largely has wound down its CPP investments, and as of February 29, 2016, had received \$226.7 billion in repayments and income from its CPP

investments, exceeding the amount originally disbursed by almost \$22 billion. The repayments and income amounts included almost \$200 billion in repayments and sales of original CPP investments, as well as about \$12 billion in dividends and interest, almost \$7 billion in proceeds more than costs, and about \$8 billion from the sale of warrants. After accounting for write-offs and realized losses from sales totalling about \$5 billion, CPP had almost \$0.3 billion in outstanding investments as of February 29, 2016. Write-offs and realized losses include losses sustained from investments in the 32 institutions that have gone into bankruptcy or receivership and any losses sustained when Treasury sold its investments in CPP institutions (GAO, 2106).

As of February 29, 2016, 16 of the 707 institutions that originally participated in CPP remained in the program. Of the 691 institutions that had exited the program, 261 repurchased their preferred shares or subordinated debentures in full. Another 165 institutions refinanced their shares through other federal programs, 28 through the Community Development Capital Initiative and 137 through the Small Business Lending Fund, another Treasury fund that was separate from TARP. An additional 190 institutions had their investments sold through auction, 39 institutions had their investments restructured through non-auction sales, and 32 institutions went into bankruptcy or receivership. The remaining 4 merged with other institutions (GAO, 2016).

Treasury assumes most of the remaining CPP institutions to exit through restructurings but do not have a specific end date for exiting all their CPP investments. The US Government does not require Treasury to set a specific date on which the program will expire. Although Treasury has not changed its exit strategy, which consists of repayments, restructurings, and auctions, the extent to which each approach has been used has shifted over time.

• Repayments allow financial institutions, with the approval of their regulators, to redeem their preferred shares in full. Institutions have the contractual right to redeem their shares at any time. As of February 29, 2016, 261 institutions had exited CPP through repayments. Institutions must demonstrate that they are financially strong enough to repay the CPP investments to receive regulatory approval to proceed with a repayment exit.

• Restructurings allow troubled financial institutions to negotiate new terms or discounted redemptions for their investments. Raising new capital from outside investors (or a merger) is a prerequisite for a restructuring. With this option, Treasury receives cash or other securities that generally can be sold more easily than preferred stock, but the restructured investments are sometimes sold at a discount to par value. According to Treasury officials, Treasury

facilitated restructurings as an exit from CPP in those cases in which new capital investment and redemption of the CPP investment by the institutions otherwise was not possible. Treasury officials said that they approved the restructurings only if the terms represented a fair and equitable financial outcome for taxpayers. Treasury completed 39 such restructurings through February 29, 2016.

• Auctions; Treasury conducted the first auction of CPP investments in March 2012 and has continued to use this strategy to sell its investments. As of February 29, 2016, Treasury had conducted a total of 28 auctions of stock from 190 CPP institutions. Through these transactions, Treasury received about \$3 billion in proceeds, which was about 80 percent of the investment's face amount. As previously reported, Treasury has sold investments individually to date, but noted that combining smaller investments—into pooled auctions—remained an option. Whether Treasury sells stock individually or in pools, the outcome of this option will depend largely on investor demand for these securities and the quality of the underlying financial institutions (GAO, 2006).

## 2.8 Dodd Frank Act of 2010

The Dodd-Frank Wall Street Reform and Consumer Protection Act, is better known and most often referred to as Dodd-Frank Act of 2010. Dodd-Frank is a bill of law that places major regulations on the financial industry. It grew out of the 2008 financial crisis with the intention of preventing another collapse of a major financial institution like Lehman Brothers. Banks passed Dodd-Frank to protect consumers and to avoid abusive lending and mortgage practices. One of its main goals was to have banks subjected to a the following regulations: the Volcker rule which prohibits banks from owning, investing, or sponsoring hedge funds, private equity funds, or any proprietary trading operations for their own profit. Also, terms on monitoring risky derivatives such as Credit Default Swaps must be reported to the SEC and the Act also incorporated the Consumer Financial Protection Bureau which protects whistle blowers. The Dodd-Frank act includes the possibility of breaking up an institution if it is determined to be "too big to fail" (Koba, 2012). To do that, the act created the Financial Stability Oversight Council. It looks out for risks that affect the entire financial industry. The Council is chaired by the Treasury Secretary, has nine members including the Federal Reserve, the Securities and Exchange Commission and the new Consumer Financial Protection Bureau. It also oversees non-bank financial firms like hedge funds. If any of the banks gets too big in the council's determination, they could be regulated by the Federal Reserve, which can ask a bank to increase its reserve requirement. Under Dodd-Frank, banks are also required to have plans for a quick and orderly shutdown if the bank becomes insolvent (Omarova, 2011).

An important part of the Dodd Frank Act is The Volcker Rule which prohibits banks from owning, investing, or sponsoring hedge funds, private equity funds, or any proprietary trading operations for their own profit. To help banks figure out which funds are for their profits and which funds are for customers, the Fed gave banks two years to divest their own funds in get in line with the rule before enforcement. However, banks can keep any funds that are less than three percent of revenue (Kelleher et al., 2016). The Volcker Rule does allow some trading, if it's necessary for the bank to run its business. For example, banks can engage in currency trading to offset their own holdings in a foreign currency.

Dodd-Frank factors other issues such as derivatives and requires them to be regulated by the SEC or the Commodity Futures Trading Commission. To help make them more transparent, a clearinghouse must be set up so these derivative trades can be transacted in public. But Dodd-Frank left it up to the regulators to determine exactly the best way to put this clearinghouse into place. And not all derivatives will be subject to the law. The Securities and Exchange Commission and the Commodity Futures Trading Commission approved a rule that would exempt some energy companies, hedge funds and banks from derivative oversight. The Dodd Frank Act also created a new Federal Insurance Office under the Treasury Department, which would identify insurance companies that created risk to the entire system. Insurance firms were caught in a major liquidity crisis when their credit ratings were downgraded in September 2008. The US Federal Reserve Bank had to step in and create an \$85 billion emergency fund to help meet increased financial pay-outs. Dodd-Frank created an Office of Credit Rating at the Securities and Exchange Commission (SEC) to regulate credit ratings agencies (Kelleher et al., 2016). The agencies were criticized for helping to create the 2008 recession by misleading investors through over-rating derivatives and mortgage-backed securities—and saying the investment tools were worth more than their actual value. As part of the new rules, the Securities and Exchange Commission can require agencies to submit their rating systems for review and can de-certify an agency that gives misleading ratings.

Dodd-Frank also created the Consumer Financial Protection Bureau, to protect consumers from 'devious business' practices by banks. The Consumer Financial Protection Bureau consolidated several existing consumer protection responsibilities in other government agencies. They also work with regulators in large banks to stop transactions that hurt consumers, such as risky lending. The Bureau also provides consumers with access to information about mortgages and credit scores along with a 24-hour toll-free consumer hotline to report issues with financial services. Another of their aspects is overseeing credit reporting agencies, credit and debit cards, payday and consumer loans— but not auto loans from dealers. On another note the Dodd Frank helps to fight corruption and insider trading, as the Dodd-Frank Act contains a whistle-blowing provision. Someone with information about security violations can report it to the government for a financial reward.

For many on Wall Street, Dodd-Frank is seen as an overreaction to the recession of 2008, one that will push investors away, burden financial institutions with cumbersome rules, and stop overall economic growth. Others see it to protect their investors and cut down on unnecessary risk as well as protect consumers. There are some critics, who say the regulations don't go far enough to reign in an out-of-control Wall Street bent on taking risks and then being bailed out by public tax dollars. Those in favour of the bill say that had the rules been in place, the recession might not have happened—while many analysts say that if the markets, Congress, and regulators had just followed the existing rules, the financial collapse could have been avoided (Amadeo, 2017).

There are areas where Dodd-Frank has either increased both economic growth and financial stability or enhanced one of them at a minimal cost to the other(Wallison, 2015). Dodd-Frank's most valuable contributions have included higher prudential standards, including for capital; the new resolution authority that has manifested in the single-point-ofentry strategy; creating the Consumer Financial Protection Bureau; and subjecting derivatives transactions to greater transparency and oversight. Higher capital requirements make institutions more resilient to financial stress events and crises. The Federal Deposit Insurance Corporation's single point of entry approach establishes standard procedures for safely winding down a failed institution, improving financial stability and addressing the "too big to fail" issue. The Consumer Financial Protection Bureau consolidates oversight responsibilities, minimizes risky gaps in the regulatory infrastructure, and has improved protections for consumers. Derivatives exchange and clearing brings greater transparency to a major source of financial transactions that used to be largely unregulated (Omarova, 2011).

Other areas where Dodd-Frank has either harmed both financial stability and economic growth or was detrimental to one with limited gain to the other fall into this category (Amadeo,

2017): requiring the Federal Reserve to make emergency loans available to an entire category of institutions rather than a single firm and forcing the FDIC to seek and obtain a joint resolution from Congress before providing temporary liquidity guarantees on certain kinds of debt. These provisions can be expected to reduce financial stability during periods of stress with no corresponding effect of enhancing economic growth, this is due to need of congressional approval for the FDIC to act as quickly as possible. Other provisions seem to achieve some benefits but with significant costs to efficiency and economic growth. The Volcker Rule, which bans commercial banks from engaging in proprietary trading, and the Lincoln Amendment, which prohibits entities engaged in swaps from receiving federal assistance, creates costly trade-offs. Critics have complained that the Volcker Rule is complex, ambiguous, and expensive, making it difficult for banks to adhere to its requirements and for regulators to implement and oversee it (Elliott, 2012). Others suggest that the Lincoln Amendment's goals can be achieved by the Volcker Rule, making the Lincoln Amendment redundant and its cost and regulatory burdens unnecessary (Amadeo, 2017).

In other areas, Dodd-Frank made some progress, but did not go far enough. Important improvements could still be made through greater regulatory consolidation, heightened authority for the Financial Stability Oversight Council and more independence for the Office of Financial Research according to critics. Finally, other provisions have created uncertain trade-offs between stability and economic growth, and it's too soon to accurately gauge their impact on the economy and financial system. New requirements and standards for leverage ratios, capital buffers, stress testing, liquidity, and long-term debt holdings all fall into this category (Omarova, 2011).

# 2.9 Temporary Debt Guarantee Program

The Federal Deposit Insurance Corporation (FDIC) released the Temporary Liquidity Guarantee Program (TLGP), which guaranteed certain senior unsecured debt issued by eligible banking institutions and provided unlimited deposit insurance through 2009 for certain transaction accounts. An Interim Rule implementing the TLGP was published on October 23, 2008 and an amendment to the Interim Rule on November 7, 2008. The FDIC received numerous comments on the Interim Rule, and some of these comments, on matters such as revising the debt guarantee to a "payment when due" guarantee, charging lower assessments for guaranteed debt with shorter maturities and excluding short-term (30 days or less) debt from the guarantee, were incorporated into the Final Rule. Overall, these changes improved the value of the guarantees provided under the TLGP. Eligible institutions had to decide by December 5, 2008 whether to stay in or opt out of all or part of the TLGP. The FDIC estimated that \$1.4 trillion of debt would benefit from the debt guarantee if all eligible institutions participate (Wutkowski, 2008).

There are two parts to the TLGP: a guarantee, through the earlier of maturity and June 30, 2012, of certain senior unsecured debt issued by participating institutions between October 14, 2008 and June 30, 2009 (the debt guarantee); and unlimited deposit insurance through December 31, 2009 for certain transaction accounts at FDIC-insured participating institutions (the transaction account guarantee). All eligible institutions are supposed to participate in both guarantees unless they opt out of one or both programs. Institutions participating in the debt guarantee must implement a Master Agreement with the FDIC. Under the Final Rule, categories of institutions eligible to participate in the TLGP include FDIC-insured depository institutions as well as U.S. bank holding companies and U.S. savings and loan holding companies, provided that, they have at least one chartered and operating FDIC-insured depository institution within their holding company structure. In addition, the FDIC, in consultation with an institution's primary federal banking regulator, may elect affiliates of FDIC-insured depository institutions as eligible entities for participation in the debt guarantee. In establishing entitlement of an affiliate of a participating entity as an eligible entity, the FDIC will also establish that entity's debt guarantee limit. Insured branches of non-U.S. banks may participate only in the transaction account guarantee. Uninsured U.S. branches and agencies of non-U.S. banks remain excluded from participation in both parts of the TLGP. An institution that became an eligible entity after October 13, 2008 may participate in the TLGP if approved by the FDIC in consultation with that institution's primary federal regulator. The amount of guaranteed debt such an entity may issue will be determined by the FDIC on a case-by-case basis (Klingler, 2008).

The FDIC Master Agreement states that institutions must enter with the FDIC to participate in the debt guarantee. No guaranteed debt could be issued after November 21, 2008, unless the participating institution agrees to be guaranteed by the terms of the Master Agreement. The Master Agreement requires the institution to enter into certain agreements; relinquish certain defences; implement certain mandatory terms for its guaranteed debt; make standard representations and warranties and conform to the Master Agreement's notice requirements. These obligations are in addition to a participating institution's obligations under the Final Rule. Institutions that issue guaranteed debt after November 21, 2008 but before the above due date for the Master Agreement may consider signing the Master Agreement at or

prior to the launch of their first guaranteed debt issuance, since by issuing the debt they are already agreeing to be bound by the Master Agreement's terms (Wutkowski, 2008).

The FDIC considers only debt with maturity greater than thirty days is covered by the debt guarantee (with one exception for short-term debt issued as guaranteed debt before the Final Rule). On the types of debt that can be guaranteed, the Final Rule provides no lists of instruments that are and are not included in "senior unsecured debt". One omitted debt type added in the Final Rule should be noted; "retail debt securities", which the FDIC has elucidated are securities marketed exclusively to retail investors, typically in small denominations. Debt that is more broadly marketed, even if it is subsequently held by retail investors through secondary market trading, is eligible for the debt guarantee. Senior unsecured debt must also meet certain legal and structural requirements, e.g.it cannot contain any entrenched options or other derivatives; it must be demonstrated by a written agreement or a trade confirmation; it must contain a specified and fixed principal amount to be paid on a date certain; and it must be non-contingent and not subordinated by its terms to another liability. Senior unsecured debt may pay a fixed or floating interest rate based on a single index, may be denominated in foreign currency, and may contain a negative pledge clause. The institution issuing such debt must use commercially reasonable efforts to have its counterparties execute a written instrument evidencing their agreement to be bound by the terms of the Master Agreement. Debt issued by a participating institution to that institution's affiliates, institution-affiliated parties or insiders is excluded from the debt guarantee, as the FDIC does not believe that guaranteeing such issuances is a means of enhancing inter-bank lending. Finally, to qualify for the debt guarantee, senior unsecured debt must contain certain contractual terms as specified in the Master Agreement (Klingler, 2008).

The FDIC's payment obligation for guaranteed debt occurs on the uncured failure of a participating institution to make a timely payment of principal or interest, as defined in the debt's governing documents (referred to as a payment default) on its debt guaranteed under the TLGP. Additionally, it must require the representative to notify the FDIC of any payment default under the guaranteed debt. Once a payment obligation is prompted, the representative or, in certain cases, individual debt-holders, have 60 days to submit a demand notice to the FDIC or they lose all rights under the FDIC guarantee. Upon a payment default, and a delivery of a timely and conforming demand notice, the FDIC will make scheduled payments of principal and interest on the guaranteed debt through maturity. Under the Master Agreement, guarantee payments will be paid directly to the representative or, in the absence of a

representative or for those opting not to be represented, directly to the registered holders, never to the issuing institution. If guaranteed debt matures beyond the guarantee cut-off date of June 30, 2012, and the issuing institution defaults prior to the cut-off date, the FDIC may, at its option, fast-track the indebtedness after June 30, 2012 and make a final payment of all principal and interest due without being liable for any prepayment penalty. The FDIC is not obligated to pay any additional amounts under any default or penalty provisions of the guaranteed debt. By accepting payment from the FDIC, debt-holders release the FDIC from any further claim under the TLG Program. Any determination by the FDIC regarding the payment process may be appealed in court within 60 days of the determination. "The maximum amount of FDIC-guaranteed debt a participating institution may issue is 125% of the par or face value of the institution's senior unsecured debt outstanding as of the close of business on September 30, 2008 scheduled to mature before June 30, 2009 (Klingler, 2008)."

Alternatively, for eligible insured depository institution with no qualifying debt outstanding at September 30, 2008, the debt guarantee limit is 2% of its consolidated liabilities at September 30, 2008. The FDIC will determine the debt guarantee limit for such an entity. A participating entity may also request an increase in its debt guarantee limit by written request to the FDIC. The FDIC holds the option, in consultation with the participating institution's primary federal banking regulator, to increase or decrease the participating institution's debt guarantee limit, once established, on a case-by-case basis, and to enact other limits or requirements. The debt guarantee limit is calculated for each participating institution. In the event of a merger of eligible entities, the surviving institution's debt guarantee limit is the sum of the debt guarantee limits of the merging entities, subject to FDIC action following consultation with the surviving institution and the appropriate federal banking agency. No debt issued by a participating institution more than its debt guarantee limit may be identified as FDIC-guaranteed. If a participating institution surpasses its debt guarantee limit and mistakenly or intentionally issues extra debt identified as guaranteed by the FDIC, the FDIC's assessments on all the participating institution's outstanding guaranteed debt are increased by 100%. The FDIC can reduce the 100% assessment increase if a participating institution shows good cause for an issuance of guaranteed debt beyond its debt guarantee limit.

Fees for the debt guarantee will be evaluated at an annualized rate multiplied by the amount of eligible debt issued and the debt's term. The applicable annual rate varies depending on the maturity of the debt. Bank holding companies and affiliates other than insured depository institutions whose combined assets in all affiliated insured depository institutions constitute less than 50% of the consolidated holding company's total assets are subject to an additional 10 bps assessment, resulting in 60, 85, and 110 bps fees. The asset comparison test to determine an eligible entity is subject to the add-on fee is determined as of September 30, 2008, or the date of eligibility if after October 13, 2008. This add-on fee is expected to chiefly affect recently created bank holding companies. Senior unsecured debt that is guaranteed under the TLGP will have a risk weighting of 20% as, according to the FDIC, the purpose of the TLGP is to encourage liquidity in the market, not to provide bank capital relief. Each institution participating in the debt guarantee must report the amount of its senior unsecured debt forming the basis for its debt guarantee limit, even if the amount of such senior unsecured debt is zero (Wutkowski, 2008).

The second part of the Temporary Liquidity Guarantee Program is the transaction account guarantee which provides an unlimited guarantee through December 31, 2009 for funds held at FDIC-insured participating institutions in non-interest-bearing transaction accounts. The transaction account guarantee is intended to cover payment-processing and other similar noninterest bearing accounts, as well as two types of interest-bearing accounts: Negotiable Order of Withdrawal (NOW) accounts (provided that the interest rate paid on such accounts is 0.50% or lower) and Interest on Lawyer Trust Accounts (IOLTAs). Sweep accounts are excluded, except for sweeps from one non-interest-bearing transaction account to a non-interest-bearing savings account, non-interest-bearing money market deposit account or any other non-interest-bearing transaction account. For an extended list of certain included and excluded accounts see (Klingler, 2008).

The reviewed regulations and government interventions are discussed more in related terms in the following sections, each revision above having covered the main aspects of policy for de-regulation and re-regulation of the financial industry. As there are many aspects and items discussed, the study looks as specific parts of the regulations and government interventions to assess not only their success but if the approach itself is warranted as a method of dealing with an issue as large as the financial crisis.

# 2.10 Conclusion

This chapter serves two main purposes. The first is to provide the necessary theoretical arguments underlying regulation. The second is to provide the necessary background material to understand the context in which the empirical work is conducted. In section 2.2, we discuss

the relationship between the regulatory framework and risk, and in section 2.3 we discuss the theoretical reasons for regulation. In section 2.4, we discuss the non-interest income which we focus in the coming chapter. Sections 2.5 to 2.9 we discuss the regulatory framework and the different legislation introduced by US congress. We are after the effect of these legislation on the banking industry. Next, in chapters 3, 4, and 5, we conduct the empirical tests that form the main idea behind this thesis.

# Chapter 3: OBS, regulation & credit risk: Does fee income make a difference?

# **3.1 Introduction**

Off-Balance-Sheet (OBS) activities have been classified and labeled under many forms of non-traditional banking transactions. OBS are a source of fee income to banks and their usage have increased exponentially in the last decades. According to previous studies, banks' OBS usage serves many purposes: as profit generating activities, speculative hedging tools or even a form of liability on a bank's overall health.

Khambata and Hirche, 2002 considers OBS activities as guarantees, commitments and market-related activities such as derivatives (futures, forwards, options and swaps contracts) and advisory functions. In 2002, when Khambata and Hirche, 2002 was published derivatives were considered OBS activities. After 2005 however, derivatives are no longer off the balance sheet but are represented on the balance sheet at fair value.

While OBS activities may facilitate risk management in banking and can be used to hedge risk (Aktan et al., 2013), OBS activities may also increase the opacity of banks' balance sheets and make the valuation of banks' assets more difficult (Casu and Girardone, 2005). OBS activities are a double-edged sword. On one hand, these can be used a hedging device, mitigating some of the risks banks are exposed to. On the other hand, OBS activities might contribute to loading up and doubling down on risks that banks face. For example, loan commitments pose a high degree of liquidity risk to banks. In a crisis, cash-strapped firms would seek to draw down on their credit lines with banks to help manage their own liquidity, but this increases the pressures on a bank's liquidity. In a full-blown crisis, this might lead to a significant spike in a bank's solvency risk.

In this chapter we examine how OBS usage interacts with the regulatory framework to define risk taking in commercial banking. While the existing studies have investigated the role played by OBS in risk management, no study has explored how OBS activities interact with the regulatory framework in banking to define the risk-taking behavior of banks.

A regulatory framework mainly operates by imposing restrictions on what a bank can do. Some of these restrictions are well-stated and clear. Other restrictions are unstated but understood and widely abided by in the banking sector. In both cases, these restrictions impose constraints on banks' behaviors and affect their ability to deal with the risks they face. The link between risk taking and OBS usage in commercial banking is expected to be driven by the regulatory framework for at least three main reasons. First, the degree of deregulation of the system affects the ability of banks to mitigate credit risk by using financial tools like OBS activities. Second, stringent regulation impedes the use of OBS activities leading to lesser ways of hedging risk. Third, depository institutions with more OBS usage have better credit risk performance in times of regulatory acceptance of these tools. In this chapter we discuss all these three issues how the usage of OBS interacted with three different policies: the Gramm-Leach-Bliley Act, the Sarbanes-Oxley Act and the Dodd-Frank Act.

As discussed in chapter 2, the Gramm-Leach-Bliley Act of 1999 relaxed the restrictions on banks' ability to offer financial services. This allowed banks a greater freedom to operate and spurred the use of financial innovations. The establishment of the Gramm-Leach-Bliley Act of 1999 may have substantially changed the way OBS activities affect risk taking in banking because it became easier for banks to take advantage of the economies of scope and scale since it increased their customer base in comparison to other sectors. Banks also have more resources dedicated to advertising, allowing them to enter new market areas, further diversifying their range. While the creation of the Section 20 subsidiaries that were primarily used pre-GLB allowed banks to become familiar with these services and sectors, with their performance increasing due to their ability to diversify. One potential problem with OBS is that it makes the valuation of banks asset more complicated and potentially decreases the information content of banks' balance sheets. To study how OBS activity is linked to accounting standards, we examine the interaction between OBS usage and the Sarbanes-Oxley Act approved in 2002 by Congress to tighten accounting standards for financial and nonfinancial public companies. This act should affect how depository institutions OBS usage will affect risk taking, according to internal control over financial reporting, and Section 906 of the Sarbanes-Oxley Act, which makes "willful failure" to portray the true condition of the company's operations and finances a crime; excluding risky OBS activities from the financial statements will endanger the institutions after auditing. While the Dodd-Frank Act introduces the Volcker rule, through which depository institutions are banned from using proprietary trading; and certain derivatives must be reported if used. This gave way to using OBS activities for hedging risk again.

To estimate the link between OBS usage and the regulatory framework in banking we used a sample of 3,840 depository institutions from 1995-2015 For each year we divided the sample between high and low OBS users, we then examined the evolution of risk taking for the two groups of banks and how it was affected by regulation. Results indicate that the

approval of the Gramm-Leach-Bliley Act of 1999 increased the link between risk taking and OBS usage. However, during the Sarbanes-Oxley Act and Dodd-Frank Act of 2010 we see a drop of OBS usage when the Acts are first enforced. Results show that the link between OBS and risk taking increased after the approval of the Gramm-Leach-Bliley Act of 1999 resulting in better mitigation of hedging risks. This suggests that deregulation and proper financial tools could better the industry. While the link between OBS and risk taking decreased after the approval of the Sarbanes-Oxley Act of 2002 and the Dodd-Frank Act of 2010 which suggest that stringent regulation and monitoring can lead to less successful attempts on hedging risk.

The findings in this chapter expand the academic literature in two ways: the first is that deregulation with the use of certain financial tools that have been worked with and understood in the market for a while, such as letter of credits and commitments, can be used as an effective hedging tool for depository institutions. Also, the greater the use of these financial tools in times of deregulation contributes to better results than lesser use of OBS activities. Additionally, stringent use of regulatory policy and monitoring leads to under-performance in hedging for risk when using OBS activities, and a fall in overall usage when these Acts are introduced. Previous literature has covered areas of Bank Holding Companies (BHC's) market and systematic risk profiles using standby letters of credit and loans sales, which were at that time considered innovative financial activities (Benveniste and Berger, 1987; Jagtiani et al., 1995; Pavel and Phillis, 1987). Khasawneh and Hassan (2009) look at US BHC's effects of derivatives on the risk profile of the bank. A similar study by the authors of the MENA region looks at how policy implications of derivative activities affect banks' risk profile, while an examination from Klomp and Haan (2011) state that regulation does not have a undeviating impact on banking risk. Their measures of regulation dos not have much effect on low-risk banks but do on high-risk banks.

There have been previous studies on OBS activities and derivatives and their effects on banking risk as mentioned in the previous section. This paper adds to the existing literature the effects on how commercial banks take on credit risk from the use of OBS activities; which include various letters of credit and unused commitments in midst of regulatory changes through a time span of 83 quarters. Credit risk is a major part of any banking institution regardless of size, leverage, capital or even customer base. This study attempts to predict the effects of how OBS activities, which are a vital segment of banking transactions, contribute to the credit risk position (which can also be hedged by using derivative contracts such as Credit Default Obligations CDO's) while the entire industry goes through a period of deregulation (GLB), accounting standard change (SOX), and re-regulation (DF).

The chapter is structured as follows; in section 3.2 a brief literature review is presented on the definition of OBS activities, banking risk and a brief of regulatory Acts. Section 3.3 discusses the methodology of the study, certain use of proxies of risk and chosen control variables. Section 3.4 outlines the data used and their definitions. Section 3.5 explains the results and a brief discussion of the outcomes while Section 3.6 concludes the paper.

## **3.2 Literature Review**

## 3.2.1 A thin line between OBS activities and Derivative activities

Banks have been functioning for centuries. During this time, they have accepted deposits from the public in order to raise most of their lendable funds. Loaning out these funds generate the bulk of their revenues and net income (Elian, 2013; Nachane and Ghosh, 2007). Banks handle this rigorous process of deposit taking and loan making in a well-organized manner, in terms of speed, safety. They efficiently transform the public's deposits into credit needed by many businesses, households and governments globally (Karim and Gee, 2007). While Banks keep the notion of accepting deposits in mind, the conjecture that certain things must belong on the balance sheet and there are those items, which escape the net, are deviations from this norm, and is something that infuses innovation within the industry. There are no principles which determine conclusively what should be on the balance sheet and when they should be stated (Paterson, 1993, p.3-5).

In accounting terms Off-Balance-Sheet usually appear "below the bottom line", just as footnotes to financial statements. While in economic terms, Off-Balance-Sheet items are contingent assets and liabilities that affect the future, rather than the current shape of a Financial Institution's balance sheet (Ghosh and Nachane, 2002). The effect of Off-Balance-Sheet transactions is that they do not result in full presentation of the underlying activity in the accounts of the reporting company. This is generally for two main points. The initial is that the items might be omitted from the accounts altogether on the basis that they signify future commitments rather than present assets and liabilities. The ensuing reason also considers a profit and loss feature; mainly because assets taken Off-Balance-Sheet activities affects the timing or disclosure of associated revenue items (Paterson, 1993, p.3-5). As such, Off-Balance-Sheet items have a direct impact on the Financial Institutions future profitability and performance since efficient management of these Off-Balance-Sheet items is central to controlling overall risk exposure in a modern Financial Institution.

Another way of looking at it is Off-Balance-Sheet transactions are those that are thought-out to allow a Financial Institution to avoid reflection of certain aspects of its activities in its accounts. The term "Off-Balance-Sheet transactions" clearly focuses on the balance sheet, but some transactions also affect other parts of the financial statement (Calmès and Théoret, 2010). For instance, from a valuation perspective, Off-Balance-Sheet activities provide a vital source of non-interest income for many Financial Institutions. An example can be contingent assets and liabilities off the balance sheet; they can theoretically yield positive or negative future cash flows, coinciding with the valuation perspective. Off-Balance-Sheet assets are outlined as an item or activity that when a contingent event occurs, moves onto the asset-side of the balance sheet, while off-balance sheet liability is an item or activity that when a contingent event occurs moves onto the liability side of the balance sheet. So, the true or actual fair value of a Financial Institution capital or net worth is not simply the difference between the market value of assets and liabilities on its balance sheet, but also reflects the variance between the current market value of its Off-Balance-Sheet or contingent assets and liabilities. This said, whenever a customer defaults it will go on the liability side of the balance sheet and the financial Institution will have to handle it (Jagtiani et al., 1995). Taking this into account, dealing with OBS activities can create risky scenarios for depository institutions.

Different studies have classified them into guarantees, commitments and market-related activities such as derivatives and advisory functions (Khambata and Hirche, 2002). Option like contingent claims that are a bale of loan commitments and standby letters of credit are a main reason of increase in leverage as dignified by conventional balance sheet quantities (Ghosh and Nachane, 2002). Derivatives contracts that are being used by banks such as futures, forwards, options and swaps contracts can be either a user for (hedging or speculation) that acts as counterparties in trades with customers for a fee. There should be an important differentiation between OBS activities and derivative activities. OBS were once considered financial innovations until they were so widely used they are treated as a traditional source of income for banks. While derivative activities are said to be increasing over time, making them a financial innovation that banks and other financial institutions can use to better the firms risk profile if used as a hedging tool (Khasawneh and Hassan, 2009).

# **3.2.2 OBS Activities and Economic Hypothesis**

#### 3.2.2.1 OBS Activities

Off-balance sheet (OBS) items are contingent assets and liabilities that may affect the future status of a financial institution's balance sheet. Although OBS activities are now an important source of fee income for almost all banks and bank holding companies (BHCs), they have the potential to produce positive as well as negative future cash flows. OBS activities include issuing various types of guarantees, and commitments these are used in this study.

Letters of Credit: banks deal with two types of Letters of Credit: Commercial Letters of Credit and Standby Letters of Credit. The Letters of Credit are essentially guarantees to underwrite performance that a depository institution sells to the buyers of guarantees, causing the depository institutions to add to their contingent future liabilities. Although both Commercial and Standby Letters of Credit have the same type of risk exposure, default risk, they are different in the severity of the risk exposure. In the case of commercial letters of credit, the bank's role is to provide a formal guarantee that payment for goods shipped or sold internationally or domestically will be forthcoming regardless of whether the buyer of the good defaults on payment. While the bank's role with standby letters of credit is to provide a formal guarantee of payment to cover contingencies that are potentially more severe and less predictable like bond performance standby letters of credit, which means a higher level of default risk exposure. At the same time Letters of Credit also are said to have a risk reducing impact through the diversification effect.

**Commitments:** A loan commitment agreement is a contractual commitment by a bank to loan to a customer a certain maximum amount at given interest rate terms. The commitment contracts also define the period over which the customer will be able to utilize his contracted loan. It is true that the banks will generate fee income for making these commitments to the borrowers, but it is also said that it will generate more credit and liquidity risk.

An extensive body of literature related to OBS activities exists, in which several hypotheses have been considered to explain the OBS activities phenomenon (Jagtiani et al, 1995; Pavel and Phillis, 1987; Koppenhaver, 1989).

# 3.2.3 OBS Activity and Risk

#### 3.2.3.1 Past Studies on OBS and Risk

Several studies have examined the vital motivations behind bank off-balance-sheet activities, and that these outcomes have been diverse. Jagtiani et al (1995) publicized these findings. This outcome derives from authors such as (Pavel and Phillis, 1987) where they suggest that banks engage in loan securitization and standby letters of credit to reduce regulatory taxes, such as capital adequacy requirements. The authors contrast this to (Benvensite and Berger, 1987) and (Koppenhaver, 1989), in that they find that the fastenings of capital constraints are not important factor in banks decisions to engage in off-balance-sheet activities. Furthermore on literature (Jagtiani et al., 1995) supports (Avery and Berger, 1991) and (Jagtiani, 1995) to find that better performing and more credit worthy banks tend to issue more off-balance-sheet commitments and swaps; this finding appears inconsistent with the capital avoidance hypotheses (Jagtiani et al. 1995).

A series of authors have supported several economic hypotheses in regard to OBS activity and/or risk, we outline some past studies on the issue. The moral hazard hypothesis is supported by Avery and Berger (1988). They suggest that standby letters of credit have a positive impact on banks' risk exposure. Benveniste and Berger (1987, 1986) maintain that, as banks approach failure, Stand-by Letter of Credit issuance decreases. In addition to the market discipline hypothesis, they also support the regulatory hypothesis by stating that there is a positive relation between Stand-by Letter of Credit and leverage. Pavel (1988) declared that there is no relation between loan sales and bank risk. Koppenhaver (1989) considered more OBS activities (loan commitments and letters of credit) and studied the determinants of OBS activities employing Logit models. The results suggest that bank size, amount of reserves, and loan losses are important factors for banks to engage in OBS activities, while capital constraint factors are insignificant for banks' OBS activities decisions.

The aforementioned studies have used the market discipline hypothesis to link the usage of OBS to risk taking in banking (Avery and Berger, 1991; Benveniste and Berger, 1987b; Berger and Udell, 1990; Hassan et al., 1994; Khasawneh and Hassan, 2009; Koppenhaver, 1989; Koppenhaver and Stover, 1991). The market discipline hypothesis disputes that, because OBS activities are uninsured, dependent future claims which are linked to other claims, banks with safer positions will take-part in more OBS activities that will reduce the banks risk. Hence, banks may be more involved in OBS activities to hedge current positions. Bank customers will value these claims more when banks are safer, therefore those banks that are already OBS issuers will have an incentive to decrease their risk exposure and issue additional OBS items. This exists if the market notices the relationship between bank risk and OBS activities and then responds to this bank risk either by charging higher prices or reducing activities of the banks (Hassan, 1993; Hassan, Karel and Peterson, 1993).

The ability to get results from regulations aimed at introducing market discipline is disputed. Financial bailouts provide inherent insurance schemes like too-big-to-fail, where regulators in central agencies feel obliged to rescue a troubled bank for fear of financial failure of the industry. While depositors may not monitor bank activities under these circumstances, there are numerous academic studies on this subject. Some results showed market discipline did not appear to be a key factor in banking, but, when including some key aspects into the empirical analysis, the existence and significance of such a supposition was evident. Accordingly, depositors 'discipline' bank activities to some extent depending on the healthy functioning of financial markets and institutions. This study finds a strong relationship between

the market discipline hypothesis and the use of high OBS usage to facilitate credit risk management and adds to the previous literature.

Other studies prior to deregulation, Berger and Udell (1990) and Avery and Berger (1990) conclude that there is a negative relationship between loan commitments and bank risk. Avery and Berger (1991) consider more risk measures and suggest that Stand-by Letters of Credit have a positive impact on small banks' risk, and a negative impact on large banks' risk. Their results support the market discipline hypothesis for large size banks.

Berger (1991) studies actual bank performance and not that of stock market prices to counter for the equity effect of disciplining banks' risk-taking. The results show that higher capital ratios for both small and large banks are related to higher future earnings, lower likelihood of bankruptcy, and better bank performance. Koppenhaver and Stover (1991) claim that the existing empirical research encounters a coinciding reckoning bias, and they work Granger's causality test. They find that Stand-by Letters of Credit have a positive impact on bank leverage, while their leverage has a negative impact on Stand-by Letters of Credit. Hassan, Karels and Peterson (1994) used a contingent valuation model to test the market discipline hypothesis for most OBS activities and suggest that debt-holders and equity holders regard OBS activities as bank risk reducers.

Banks have offered a wide range of off-balance sheet activities by originating the financial contract that resulted in the acquisition of certain assets and liabilities with provisional conditions. The expansion toward Off-balance sheet business allows companies to reduce their traditional balance sheet items by spawning further fee income to offset size reduction of interest rate margins spawned by banks granting loans. Other perks include global trade, hedging and reducing regulatory restrictions (reserve requirements and capital) that are not enacted on traditional balance sheets. Groups such as regulators, securities analysts and economic researchers have issues regarding overall banking risk such as interest risk, credit risk and liquidity risk (Elian, 2013).]. Though academics have started focusing on the design and appropriate regulation of Banks Off-balance sheet vehicles, knowledge regarding their systematic cross-country empirical investigations is slight (Barrell et al., 2012).

The growth of Off-balance sheet activities in the late 70's and 80's could be considered a natural response to clients mandate for credit guarantees and interest rate insurance (Nachane and Ghosh, 2007). Literature in the 90's point to a downward trend of traditional balance sheet
activities and an increase in Off-balance sheet activities, this has been mentioned by (Boyd and Gertler, 1995). Elian (2013) concurs to this and emphasizes the importance toward asset securitization and growth of commercial papers and how this increase will reduce bank spreads and costs (Elian, 2013). Researchers have also stated that, primarily due to the increased volatility in both interest rate and foreign exchange rate markets, banks started to provide numerous risk management services that were tailored to specific needs of their clients. This was done to strengthen the relationship between bank and client in order to capture additional non-interest income through fee-based contingent claims (Angbazo, 1997; Hassan and Sackley, 1991). While Khambata and Hirche (2002) impute the growth of Off-balance sheet activity to features that include market pressures, volatility and competition in market forces. Also deregulation, informational innovations and encroachment in technologies (Khambata and Hirche, 2002).

Recent studies show that increasing Off-balance sheet activities do not necessarily harvest direct diversification benefits for banks. This study is based on the impact of Off-balance sheet activities on banks return on application of the ARCH-M to Canadian banks. The banks risk-return trade-off shows a structural break around the year 1997. The authors find that the noninterest income generated by Off-balance sheet activities no longer sways banks return negatively (Calmès and Théoret, 2013). Haq and Heaney (2012) elaborate and test a model of bank risk containing the variables, bank capital, charter value, Off-balance sheet activities, dividend payout ratio and size as potential determinants of European bank equity risk and credit risk. The model considers non-linearity in the effect of bank capital as measured by risk adjusted total capital ratio. They sample 117 listed banks drawn from 15 European countries from 1996-2010. They have used five risk measures {total risk, systematic risk, interest rate risk, idiosyncratic risk and credit risk}. Their outcomes show, in relation to off-balance sheet activities that it positively relate to various bank risk measures, accordingly there is an upturn in the level of off-balance sheet activities, and surges bank risk (Haq and Heaney, 2012).

The impact of financial derivatives on systematic risk of publicly listed US Bank Holding Companies was discussed by Li and Marine (2014); they look at a dataset from 1997-2012. They find in terms of bank size exchange risk beta is significant for both large and small banks. Market risk shows that a large proportion of financial derivatives for trading purposes are more sensitive to market risk. Small bank holding companies are more sensitive to systematic interest rate risk, exchange risk and credit risk is aligned with the notion that lending is the core business of small bank holding companies. Large bank holding companies are more exposed to higher systematic interest rate risk, exchange rate, credit risk and market risk exposures than small bank holding companies. This was especially so during the financial crisis. Idiosyncratic risk was lower during the financial crisis and small banks were exposed to higher idiosyncratic risk than their larger competitors. The authors find that size is negatively and significantly associated with systematic exchange rate risk exposure. This may suggest that large bank holding companies match assets in foreign currencies and foreign exchange deposits to lower systematic exchange rate risk exposure. While the use of credit derivatives is positively and significantly related to systematic credit risk exposure for the total sample of large and small bank holding companies. The relationship is stronger for large banks than for smaller banks. This may indicate that large banks use credit derivatives not to hedge but to further expose themselves towards higher systematic credit risk exposure. Also, the authors find that interest exchange and credit derivatives are positively and significantly related to systematic relationship between financial derivatives and risk. During the crisis one can say that the relationship increases for hedging purposes between credit derivatives and risk (Li and Marinč, 2014)

Size of banks always seem to make headlines in news and studies alike, just like the previous discussion on Li and Marinc, (2014); Raz et al., (2015) examines how OBS activities affected the risk profile of large as well as medium and small Indonesian banks from 2010-2014. They defined risk in two categories Total Risk and Systematic Risk. Impacts of OBS activities on the Indonesian banking sector vary depending on the bank size. OBS activities reduce total risk and systematic risk of large banking firms, according to their results. While medium and small banks have an increase in both total and systematic risks.

As the use of OBS activities have had mixed results in regard to risk facilitation and management, regulation of these tools has also been inconsistent and mixed, the following section identifies studies that cover regulated parts of OBS activities.

#### 3.2.3.2 The regulated parts of off-balance sheet activities

Valuation of Off-Balance-Sheet activities is exceptionally arduous and highly intricate. These complex activities have been used in the past years since they were partial solutions for funding gaps while many say they are a crucial for bank income. Many of these Off-Balance-Sheet activities involve option features securitizing assets, selling loans and items such as issuing standby guarantees. These newer and more innovative funding options have significant benefits, but also substantial costs (Rose, 1991, p.421-436). By moving activities off the

balance sheet, banks have attempted to earn more fee income to offset dealing margins or spreads on their traditional lending business. Another aspect of off-balance sheet activities for companies is that they can commence the component of tax planning strategy, they can avoid regulatory costs or "taxes", since reserve requirements, deposit insurance premiums, and capital adequacy requirements are not imposed on Off-Balance-Sheet activities. This is a main reason why banks have incentives to move activities off their balance sheets.

There have been sentiments if off-balance sheet activities play a role and if so imperative roles in aiding banks hedge their long-term financial assets in akin to their onbalance sheet activities and if that surges the bank's profitability, at the same time keeping all these earnings off their balance sheets and consolidated financial statements apropos commercial banks. This assists commercial banks to spread their leverage against their capital adequacy requirements and maximize their return (Karim and Gee, 2007). According to Calmes and Theoret (2009) they plot on understanding the behaviour of off-balance sheet activities due to some empirical evidence that banks have faith in more heavily on off-balance sheet activities when extra funding is needed (Calmes and Theoret, 2009). What is identified so far is off-balance sheet activities have had a robust impact on banks risk-return trade off (Baele et al., 2007; De Jonghe, 2010; DeYoung and Roland, 2001; Stiroh and Rumble, 2006).

Explanations for progression in off-balance sheet activities have been discussed in past studies, (Karim and Gee, 2007; Calmes and Theoret 2009. They embrace an escalation in volatility giving a rise to the demand for risk management by financial companies and banks. Banks economies in scope, for innovating tailored financial instruments, and their interest in saving capital and avoiding reserve requirements are fore-filled. All this is probably from minuscule support by governments such as the United States to patronise the securitized mortgage market in allowing risks to be diversified where banks are curtailed to a specific extent (Ghosh and Nachane, 2002). Others note the move towards securitization in generated income is used as a strategy in European banks around the same time, that being before 2004 (Acharya and Richardson, 2009; Altunbas et al., 2009).

### 3.2.3.3 Off-balance sheet activities and pricing policies

There are concerns by past researchers such as Allen and Santomero (2001) in a study of financial intermediaries of what banks are doing. They are wary of issues such as securitization to traditional mortgages? Wary of the liability side of a bank's balance sheet, as future generations are becoming savers and not spenders with their focus being on retirement. New technology is another issue, since non-banking organizations are intervening in the fundamental role of banks in facilitating payments. This however can be better understood when broken down into afore and after strategies of how financial intermediaries handled their business, risk and pricing strategies (Allen and Santomero, 2001).

New business intermediation has affected the traditional way of banking since banks are driven economically and technologically due to a fall of significance in respect to net interest income and a growth towards a fee-based income (Allen and Gale, 1997; Allen and Santomero, 2001; Carbó Valverde and Rodríguez Fernández, 2007; DeYoung and Rice, 2004). Transfers in banking functions have seen a move towards, mutual funds, banking trusts, transaction services etc. Thanks to the de-regulation of banking activities from acts such as the Gramm-Leach-Bliley Act of 1999, banks can implement these types of intermediation. A good example of what banks did to get earnings and what they do now can be seen in Allen and Santomero (2001) study where they reference banks earnings were around 80% from spread income prior to the late 1990s; after the mid-1990s more than half their income came from fees and trading income, and they state that banks no longer focus on business and consumer income; in fact, banks are more engrossed on trading income.

The debate about risk management has also been a central debate of banks functionality. It has been a question in many research theories (Allen and Gale, 1997; Allen, 1988; Scholtens and van Wensveen, 2000). Preceding theories have had a different approach to what nontraditional intermediaries take in regard to risk. Risk activities had and have become one of the foremost undertakings of banks and other financial intermediaries, particularly with the introduction of derivatives and off-balance sheet activities and such financial innovations. Allen and Gale (1997) point out that traditional financial theory has little to say about hedging non-diversiable risks. It dons that the set of assets is given, and the theory focuses on the efficient sharing of these risks through exchange. Allen and Gale (1997), apart from the traditional approach, focus on the inter-temporal smoothing of risks that cannot be differentiated at a given point of time. They state that prospects for engaging in inter-temporal smoothing are very different in non-traditional (market based) traditional (bank based) financial systems. They demonstrate that inadequate financial markets may not allow effective inter-temporal smoothing, since bank-based systems disregard risk by investing in short term liquid assets (Allen and Gale, 1997). Other kinds of risk management are relatively less important since cross-sectional risk sharing is correspondingly reduced in importance. However, in market based financial systems inter-temporal smoothing by intermediaries is omitted by opposition from financial markets. Cross-sectional risk sharing progresses more essential. The theory envisages that, as financial systems become more market oriented, risk management using derivatives and other similar techniques will become more imperative. This said, we can say that the financial system has changed from a bank-based system to a market-based system. In lieu of financial innovations, derivative markets and other off-balance sheet activities alter the way risk is managed and the decline of inter-temporal smoothing in risk management has been eradicated in its own sense (Allen and Gale, 1997; Allen and Santomero, 2001). This leaves room to investigate how regulation plays a role in these market-based systems and if they have an influence on the increase or decrease of OBS activities.

Most research on intermediation and pricing strategies has risk bearing implications that lead to policy implications regarding regulation and financial stability. Previous policy implications from researchers have urged more leniency and deregulation from policy makers, while more recent studies and implications urge for hard regulation and compensations from the banking industry in crisis situations due to involvements in off-balance sheet activities and other financial innovations taking place.

#### **3.2.4 Hypotheses and Contribution**

This chapter explores the mitigation of credit risk by OBS activities, the effects of stringent regulations (harsher and less room for freedom for banks to take risks) on the management of credit risk through OBS activities and how increased OBS usage leads to better credit risk management. This chapter adds to the literature from the market discipline point of view and on how regulation effects risk management. We discuss the hypotheses in this section, while the equations are discussed in section 3.

# H1. The ability of banks to mitigate credit risk is when it is free to use financial tools like OBS activities.

Since various hypothesis (market discipline hypothesis) and studies suggest that OBS activities contribute to better banking risk, the study predicts that banks after the enactment of GLB should have a better risk position than banks with lower OBS usage.

H2. More stringent regulation imposes more limitations on banks' actions and impedes their use of OBS activities. Regulation leads to higher credit risk and lower use of OBS activities. Since more transparency has been required of banks and financial institutions, the belief that there should be less usage of OBS items thus leading to better risk positions. Since more regulation is imposed and hedging OBS activities would be restricted, especially in terms of using transactions such as derivative activities since the Volcker Rule limit the use of proprietary trading by commercial banks. The assumption that high OBS users will have better credit risk position is since these activities are not considered innovative financial transaction, but a core of fee-income based activities.

# H3. High OBS usage and proper regulation are significant to managing credit risk form a market discipline point of view.

The prediction is that the results will be in line with the market discipline hypothesis in which it disputes that the market will correct the usage of OBS activities depending on pricing and availability of OBS items. It should also be in line where more OBS activity will reduce risk.

This chapter contributes to literature in regard to the market discipline hypothesis; it adds to the literature on how transparency is important for a healthy banking sector and its financial stability, at the same time stringent regulation can hinder the use and mitigation of financial tools to hedge and mitigate the industry. Acts such as the Gramm-Leach-Bliley Act convey that a more relaxed system helps in mitigation when the rights tools such as OBS activities are used. While the use of stringent regulatory policies such as Sarbanes-Oxley and Dodd-Frank Act hinder the prospects of these tools having needed and appreciated effects on the banking sector.

#### **3.3 Methodology**

The study will look at commercial banks within the US banking industry. These banks do not consist of de-novo banks or Bank Holding Companies (BHC); the choice of using commercial banks gives a wide range of different size banks that operate within the US without including BHC's; using commercial banks also provides a similar baseline in operations of these banks. The sample of the study is from 1995Q1 – 2015Q3 with a total of 3840 banks; using 1995 as the starting point ensures that banks had the option of expanding to other states due to The Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 while having a before and after period prior to the enactment to the Gramm-Leach-Bliley Act of 1999; the same applies to the Sarbanes-Oxley Act 2002 and Dodd-Frank Act that was passed in 2010. We use a definition of high OBS activities that represent depository institutions with high OBS usage to assess mitigating credit risk on this aspect. We also use the three main regulatory Acts discussed earlier to see if relaxed regulation or stringent regulation effects credit risk mitigation through OBS usage. Below is a more defined analysis of how the variables are constructed and used in the empirical specification.

#### **3.3.1 Empirical Specification**

Assuming high OBS users in commercial banks have better credit risk positions than low OBS users, the following model will attempt to trial this premise while taking into account the three major regulatory Acts that took place in the time frame between 1995-2015.

## $Risk_{i,t} = \alpha + \gamma High_{i,t} + \delta_l Act_t + \theta_j Interaction_{i,t} + \beta_k X_{i,t-1} + \epsilon_{i,t}$

The equation above depicts the main empirical specification consistent of panel data that is regressed using Fixed Effects and Time Effects.  $Risk_{i,t}$  in this equation is a place-holder for the risk proxies we use to measure the credit risk profile of banks. We consider four such proxies, two of which focus on past performance (NPA and NPL), while the rest are forward-looking that represent an estimate of expected future losses. The ratio of non-performing Assets to total assets is the main risk proxy for the study. The expected results from these risk variables are they react to high OBS usage in a positive manner, in which the more OBS usage the better risk proxies are. Three other proxies such as non-performing loans to total loans, provisions of loss loans to total assets and loan loss reserves to total assets are also used to test the validity of the predictions assumed earlier. Noth and Tonzer (2015) studies which risk measure proxies best for bank risk. They suggest that non-performing assets to total assets is the best measurement to complement the Z-score as an overall risk measurement. They also suggest using the remaining risk proxies we use.

 $\gamma High_{i,t}$  Is representative of High OBS users amongst the sample of commercial banks. High OBS users are classified as banks with a value greater than the 75<sup>th</sup> percentile of OBS activities from 1995-2015 (calculated for each year); *i*, *t* is denoted by Bank =i, Time=t. While  $\alpha$  is a representation of the intercept.

A vector of the chosen regulations is represented by  $\delta_l Act_t$ :  $\delta_{l1}glb_t \delta_{l2}sox_t \delta_{l3}df_t$ 

**GLB** is a dummy variable for the Gramm-Leach-Bliley Act of 1999, defined as 1 if greater than 1994q4 onwards until end of 2015, Zero otherwise.

**SOX** is a dummy variable for the Sarbanes-Oxley Act of 2002, defined as 1 if greater than 2002q4 onwards until the end of 2015 and Zero otherwise.

**DF** is a dummy variable for the Dodd-Frank Act of 2010, defined as 1 if greater than 2010q4 onwards until the end of 2015 and Zero otherwise.

A vector of interactions is represented by  $\theta_j$  Interaction<sub>*i*,*t*</sub>:  $\theta_{j1}$  Interaction\_glb<sub>*i*,*t*</sub> $\theta_{j2}$  Interaction\_sox<sub>*i*,*t*</sub> $\theta_{j3}$  Interaction\_df<sub>*i*,*t*</sub>

**Interaction\_glb** is an interaction between High OBS users and the Gramm-Leach-Bliley Act dummy that is High OBS × GLB

**Interaction\_sox** is an interaction between High OBS users and the Sarbanes-Oxley Act dummy that is High OBS × SOX

**Interaction\_df** is an interaction between High OBS users and the Dodd-Frank Act dummy that is High OBS  $\times$  DF

 $\beta_k X_{i,t-1}$  Is a vector of control variables with a 1 lag period;  $\beta_{k1}$  Capitalization<sub>*i*,*t*-1</sub> $\beta_{k2}$  Efficiency<sub>*i*,*t*-1} $\beta_{k3}$  Lending Orientation<sub>*i*,*t*-1</sub> $\beta_{k4}$  Perfromance<sub>*i*,*t*-1</sub> $\beta_{k5}$  Size<sub>*i*,*t*-1</sub></sub>

**Capitalization** is proxied by using Tier 1 capital that is what regulators chose to assess a bank's financial strength with a 1 lag period. **(tier1cap)** 

**Efficiency** is proxied by using the efficiency ratio using a 1 lag period. (er) **Lending Orientation** is represented by using loans/deposits using a 1 lag period. (ld) **Performance** is proxied with Return on Average Equity with a 1 lag period. (Roae) **Size** is the logarithm of total assets which is a representation of bank size and is lagged by 1 period. Equations (1- 4)

$$npaa_{i,t} = \alpha + \gamma High_{i,t} + \delta_l Act_t + \theta_j Interaction_{i,t} + \beta_k X_{i,t-1} + \epsilon_{i,t}$$
(1)

 $npll_{i,t} = \alpha + \gamma High_{i,t} + \delta_l Act_t + \theta_j Interaction_{i,t} + \beta_k X_{i,t-1} + \epsilon_{i,t}$ (2)

 $pllta_{i,t} = \alpha + \gamma High_{i,t} + \delta_l Act_t + \theta_j Interaction_{i,t} + \beta_k X_{i,t-1} + \epsilon_{i,t}$ (3)

$$llra_{i,t} = \alpha + \gamma High_{i,t} + \delta_l Act_t + \theta_j Interaction_{i,t} + \beta_k X_{i,t-1} + \epsilon_{i,t}$$
(4)

Equation (1) is the main empirical specification of the study and can be broken down as follows:

 $npaa_{i,t}$  Is summarized as non-performing assets to assets which is a proxy of credit risk and the main variable of interest to assess banks credit risk position in being a safe bank or a bank at risk of credit default, as it refers to the overall quality of the bank's loan to book ratio, higher ratios represent bad quality of loan i= Bank while t= time.

 $\gamma High_{i,t}$  Depicts the high OBS usage defined as the upper 75<sup>th</sup> percentile of the average OBS usage amongst the available banks in the study which is calculated by total letters of credit and unused commitments. High OBS users should contribute to an overall better credit risk position to a bank leading to a negative significant effect on the risk proxy, i=Bank and t=time.

 $\delta_l Act_t$  Incorporates three different and unique regulation Acts at different times within the study. The first Act GLB represents a deregulation movement in 1999 in the banking sector since new instruments such as financial derivatives can be widely used by different banking institutions, the use of the non-innovative OBS activities can also be used as hedging mechanisms to maintain banking risk positions. The second regulatory Act in 2002 SOX introduced more stringent accounting standards. The introduction of SOX should lead to more transparency and give banks a better contribution to credit risk positions since banks should also choose their customers and loan generation in a more stringent manner. The final Act DF in 2010 re-regulates the industry; our interest is the Volker Rule where it limits the use of proprietary trading. If this limits the use of non-innovative OBS activities can still be used traditionally and contribute to a better credit risk position, t=time.

 $\theta_j$ Interaction<sub>i,t</sub> measures the relationship between the Act and high OBS users. There are three interactions, the first is between high OBS users and the GLB Act, the second is high OBS users and SOX and the third is high OBS users and DF, the interactions are measured by taking high OBS × Act the results if significant should have a negative relationship with the credit risk proxy and have a lower coefficient than high OBS users, this result would suggest that the interaction supports better credit positions of the banks.

 $\beta_k X_{i,t-1}$  is a vector of control variables with a lag of 1 period. Lags are included to account for simultaneity. The control variables include the following proxies:

*Capitalization* using Tier1 capital commonly used by regulators to assess a financial institutions financial strength. If significant, the proxy should provide a positive relationship to credit risk leading to a better bank performance in managing credit risk.

*Efficiency* is proxied using efficiency ratio, which measures the expenses to revenue aspect of a bank that leads to its fiscal footing, the lower the ratio the better a bank's position. A positive significant affiliation with credit risk will lead to a stronger and better allocated credit risk position of the bank.

*Lending orientation* is proxied by a loan to deposit ratio which calculates the institutions ability to cover withdrawals made by its customers, the lower the ratio the better, a positive significant result should attribute a well-founded deposit base where banks can give loans and that should contribute to a stronger credit risk position for banks.

*Performance* uses return on average equity (roae) as a proxy which depicts how much profit each dollar of common stockholder's equity generates, it is also an indicator on how effective management is at using equity to fund and finance banking operations and investments, a higher ratio is better when discussing roae. A negative significant relationship would be an idle outcome for credit risk position in relation to roae for banks.

*Size* is defined as the logarithm of total assets which represents a banks size in the study; bank size can also represent greater efficiency, profitability and diversification when the bank is larger. If size has a significant disposition to credit risk a negative significant relationship should represent efficient and more profitable and diversified banks that should also be considered larger than the average bank in the sample.

 $\alpha$  Is the intercept and  $\epsilon_{i,t}$  is the error term i=Bank, t=time.

Equations (2, 3 and 4) share the same independent and control variable, what differs is the credit risk proxy.

Equation (2) uses non-performing loans to total loans, this is a measure of the quality of a bank's outstanding loans. A smaller ratio indicates smaller losses for the bank, while a larger ratio can mean more significant losses for the bank as it writes off bad loans.

Equation (3) incorporates provision for loan losses this measures banks assumption that a certain percentage of loans will default or become slow-paying. Banks enter a percentage as an expense when calculating their pre-tax incomes. This guarantees a bank's solvency and

Capitalization if and when the defaults occur. The loan loss provision allocated each year and increases with the riskiness of the loans a given bank makes. A bank making a small number of risky loans will have a low loan loss provision compared to a bank taking higher risks.

Equation (4) is proxied using loan loss reserves which indicate a bank's sense of how stable its lending base is. A panel regression using fixed and time effects is used to predict the effects of High OBS usage in midst of different regulatory enactments on a bank credit risk profile, the advantage of using lagged periods is to remedy autocorrelation within the models.

#### **3.3.2 Empirical Motivation and Discussion**

A proposed model should be checked against a collection of possible issues and problems that its estimation might suffer from. These issues may be; endogeneity, serial correlation, simultaneity and omitted variables. Some of these problems are correlated with each other. For example, simultaneity and omitted variables might lead to endogeneity issues where the explanatory variable is correlated with the errors, and errors cease to be independent. Correlation of residuals in the estimation of the model will arise if not taken into consideration as well.

#### Why use fixed effects

FE explore the relationship between predictor and outcome variables within an entity. Each entity has its own individual characteristics that may or may not influence the predictor variables. When using FE we assume that something within the individual may impact or bias the predictor or outcome variables and we need to control for this. This is the rationale behind the assumption of the correlation between entity's error term and predictor variables. FE remove the effect of those time-invariant characteristics so we can assess the net effect of the predictors on the outcome variable. Another important assumption of the FE model is that those time-invariant characteristics are unique to the individual and should not be correlated with time-varing individual characteristics. If the error terms are correlated, then FE is no suitable since inferences may not be correct and you need to model that relationship (probably using random-effects), this is the main rationale for the Hausman test.

The fixed-effects model controls for all time-invariant differences between the individuals, so the estimated coefficients of the fixed-effects models cannot be biased because of omitted timeinvariant characteristics. One side effect of the features of fixed-effects models is that they cannot be used to investigate time-invariant causes of the dependent variables. Technically, time-invariant characteristics of the individuals are perfectly collinear with the entity. Substantively, fixed-effects models are designed to study the causes of changes within an entity. A time-invariant characteristic cannot cause such a change, because it is constant for each person.

Because group-specific fixed effects wipe out all group-specific unobserved heterogeneity, FE models only require the assumption of no unit-specific unobserved heterogeneity. Thus, compared with standard regression models, FE models allow a causal effect to be identified under weaker assumptions. Obviously, this makes FE models attractive for social researchers undertaking causal analysis.

#### Why use the Hausman test

To decide between fixed or random effects a Hausman test is run where the null hypothesis is that the preferred model is random effects vs. the alternative the fixed. It basically tests whether the unique errors (ui) are correlated with the regressors, the null hypothesis is they are not. We run a fixed effects model and save the estimates, then run a random model and save the estimates, then perform the test. The rejection of the null, as shown in the following Hausman test, confirms the validity of the fixed effects approach:

Coefficients							
	(b) (B)		(b-B) (dia	$g(V_b-V_B))$			
	fixed	random	Difference	S.E.			
heavy	-0.6812814	-0.646535	0347463	.0021543			
GLB	0.0339319	0.0234114	.0105205	.0008168			
Interaction_GLB	-0.1657838	-0.1651266	0006572	.0005739			
SOX	0.2876705	0.2800464	.0076241	.0007392			
DF	0.7829156	0.7799203	.0029953	.0009693			
Interaction_SOX	0.2034795	0.1962807	.0071988	.0007901			
Interaction_DF	0.4473909	0.4334942	.0138968	.0008905			
size	0.1070938	0.1605195	0534258	.0048055			
Tier1 Capital	5.47E-07	4.72E-07	7.46e-08	5.70e-08			
Loan/Deposits	0.0019359	0.0021783	0002423	.0000588			
Efficiency Ratio	0.0064105	0.0064488	0000383	.00003			
Return on Average Equity	-0.0115572	-0.0115065	0000507	.000023			

Table 2 Hausman Test

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(11) = (b-B)'[(V\_b-V\_B)^(-1)](b-B) = 502.96 Prob>chi2 = 0.0000 For simultaneity, we use lags which help reduce simultaneity on each control variable this mitigates for one aspect of endogeneity. For omitted variables we use fixed effects which help clean everything that is constant and is robust and time effects is used will help partial out each individual year. Fixed-effects estimation takes into account unobserved time-invariant heterogeneity. On one hand, it needs less assumptions to get consistent estimations. Fixed-effects estimation will change both, point and interval estimates. But without further assumptions fixed-effects estimation will not take care of the problems related to intra-cluster correlation for the variance matrix.

It is very common for panel data to have clustering. If we test hypothesis with standard errors, we are almost certain to fall into problems with the results. Clustered standard errors adjust for the clustering and allow us to make the right inference. Moreover, clustered standard errors are a way to deal with clustering without explicitly modelling the error correlations.

#### **3.4 Data**

#### 3.4.1 Database & Variables

The data collected for the study is from the SNL database, which use Report of Condition and Income (Call reports). A total of 83 quarters encompass 3865 non-de-novo commercial banks in the US banking sector which include the periods from 1995Q1 – 2015Q3. The total number of observations for the main model used is 308,148. All values have been deflated to use 1995Q1 dollar value as the base year. The Consumer Price Index (CPI-Index) was used to deflate the values of the data set; this was obtained from the Federal Reserve bank of St. Louis. Quarterly data provides us with a more detailed view of how the risk plays out during the year. Moreover, it gives us access to more data which helps us deal with issues that might arise with estimation the equations.

The main variables of interest are non-performing assets to total assets (npaa) which holds a representation of banks credit facility and represents credit risk (Noth and Tonzer, 2015); other proxies of risk that hold the same measure behind them are non-performing loans to total loans, provisions of loan losses to total assets and loan loss reserves to total assets. The main independent variable is the high usage of OBS activities. OBS activity in this study is defined as the sum of unused commitments, standby letters of credit, performance letter of credit and commercial letters of credit (definitions of all variables are available in table 1 in the appendix). OBS activity is the financing of assets and debts that is not on the balance sheet also commonly known as incognito leverage. Traditionally, studies have commented that forms of OBS activities were used for fee income and avoidance of regulatory capital requirements and taxation. The study claims that with more relaxed regulation OBS activities aid in hedging credit risk.

Choosing explanatory variables to fit the model dealing with credit risk, OBS activities and regulations. The choice using Tier 1 Capital for the Capitalization proxy over the widely used equity/assets was due to tier1cap is said to be the choice of regulators to display a financial institutions financial strength according to previous commentators of Basel 1 & 2. Apart from Capitalization, the choice of the efficiency proxy as the efficiency ratio is ideal, since it explains a bank's relation of expenses to a percentage of revenues, the lower the percentage the better it is, it also relates to operating leverage.

A banks lending orientation depicts its liquidity, the proxy chosen is loan to deposits in where a high ratio means a bank might not have enough liquidity to cover unforeseen fund requirement, liquidity, leverage and financial strength have been associated in many previous studies linking OBS and credit risk (Hirtle, 2009; Jagtiani et al., 1995; Karim and Gee, 2007; Khasawneh and Hassan, 2010, 2009). Other proxies widely used from previous studies for profitability would be Return on Average Assets, however Return on Average Equity has also been used, and the choice of ROAE over ROAA comes to the flexibility of asset independence allowing taking individual performance of banks without taking assets into consideration. ROAE generally tends to tell us how well an organization is taking care of its equity effectively. Size of banks has also been implemented as a control variable; many studies have reported a link between large banks taking on more risk and OBS activity than smaller banks. Size is calculated by taking the logarithm of total assets.

The variable High represents high OBS users which are defined as banks that have a usage of greater than the 75<sup>th</sup> percentile of the sample sets mean. This declares that banks with greater OBS usage should have better risk profiles than light OBS users; this is set to take 1 if it is greater than the 75<sup>th</sup> percentile zero otherwise. Regulatory Acts are depicted by the following variables, the first and most important Act is the Gramm-Leach-Bliley Act of 1999, GLB is a dummy 1 for years greater than 1999Q4 Zero otherwise. The Sarbanes-Oxley Act of 2002 and the Dodd-Frank Act of 2010 are depicted in the same manner 1 for years greater than 2002Q4 for SOX zero otherwise and 1 for years greater than 2010Q4 zero otherwise for DF. Each regulatory Act has an interaction variable defined as the multiplication of high OBS usage to the dummy variable that represents the particular Act.

3.4.1.1 Summary Statistics Table 3 Summary Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
Non-performing assets/Assets	315083	1.074	1.603	0.040	9.230
Non-performing loans/Total Loans	313453	1.309	1.914	0.020	10.540
Provision loan losses/Total Assets	313816	0.001	0.005	-0.006	0.195
Loan Loss Reserves/Total Assets	312874	0.890	0.440	0.110	2.730
Off Balance Sheet Items	320795	99.524	160.411	0.650	1396.590
Size	316359	6.522	0.926	4.040	9.023
Loans/deposits	313851	70.941	19.109	20.180	116.930
Efficiency Ratio	312548	65.076	15.796	31.220	122.200
Return on Average Equity	314512	10.216	8.122	-23.350	33.490
Tier1cap	312874	14012.840	15159.050	989	87703

Table 3 shows summary statistics about the variables, some variables such as OBS activity, ld and tier1cap seem to have deviated standard deviations which are much larger than the mean, this could be a result of times of crisis, regulatory change or missing values. Taking a closer look, non-performing assets represents the overall health of a bank's loan to book ratio, the total number of bank exceeding 3,860 have a minimum value of zero and a max of 43.71, the mean is at 1.11, for a period of 20 years including the financial crisis the value is low for the sample set, this represents a strong loan to book ratio for the duration of the data set.

Non-performing loans to total loans has a similar overlook, being in the low range for the duration of the data set indicates the majority off the banks have a stable loan system between bank and client. Provision of loan losses to total assets, banks seem to be confident that their loans would have been paid back by clients, this assumption is from the low mean calculated for the period under investigation. While loan loss reserves take a similar approach to provision for loan losses as banks had and was under the impression of giving out stable loans. Total OBS exposure seems to be on the lower term of the spectrum for the mean of the sample set, this indicates that for the duration of the sample set most banks were under the 75<sup>th</sup> percentile. Loan to deposit indicates a low ratio for the mean assuming good coverage of withdrawals from its customers and a stable lending orientation. The efficiency ratio relates a steady result where the mean is still at a relatively low range, giving a good fiscal footing for the sample set. ROAE is not relatively high which could indicate better allocation of funds and management from the banks side to its investors. Capitalization of the sample banks seem to be on the lower end of the maximum results, this could mean that banks in the sample many not be very well cushioned to absorb hard losses. This could also be banks meeting minimal capital requirements and using OBS activities.

High 0						
Variable	Obs	Mean	Std. Dev.	Min	Max	
Off Balance Sheet Items	240619	36.94501	34.28131	0.650	180.7055	
Loan/Deposit	235219	70.22033	19.91171	20.180	299.78	
Efficiency Ratio	234157	65.84815	18.34246	-149.87	348.25	
<b>Return on Average Equity</b>	235676	9.823686	12.20769	-532.4	640.02	
Tier1cap	234405	14065.34	51921.1	-8804	5233047	
Size	236183	6.187608	0.785553	-1.17243	12.39351	

TT: 1 0

#### Table 4 Summary statistics on OBS activity

Variable	Obs	Mean	Std. Dev.	Min	Max
Off Balance Sheet Items	80176	731.7488	7638.647	48.03323	429782.7
Loan/Deposit	78632	73.50543	20.88256	78.328	299.51
Efficiency Ratio	78391	63.89761	17.43644	-148.13	345.84
Return on Average Equity	78836	10.65108	12.69299	-861.15	424.39
Tier1can	78469	22108.16	77198.46	-1484	4827242
Size	80176	7.51637	0.69471	3.124772	12.76917

High 1

Taking a closer look at OBS activity table 4 shows that OBS usage is generally distributed within the mean of the corresponding variable, except tier1cap which also shows higher standard deviation from the mean of the sample. Also, we see that low OBS users' means are at around the bottom 20% of their sample set of 240619 observations while other control variables such as loan to deposit and efficiency ratio are around the same percentage of the sample set. Light OBS users consist around 75% of the entire sample set. High OBS users have the mean of OBS usage at the lower end of the maximum usage at around 1% while the remaining control variables means are closer to 20% to the maximum usage range, high OBS users make up 25% of the sample set.

6.96

75.01

1

Total

	Overall	Between	Within	
high	Freq. Percent	Freq. Percent	Percent	
0	240619 75.01	3538 91.54	81.94	
1	80176 24.99	1878 48.59	51.44	
Total	320795 100.00	5416 140.13	71.36	
		high		
high	0	1	Total	
0	97.68	2.32	100	

93.04

24.99

Taking a closer look, table 5 shows OBS usage that on average 25% banks conduct in high OBS usage while approximately 93% of those banks remained high OBS users to the next

100

100

period and around 25% of high OBS bank users were consistently high OBS users from beginning to the end of the sample set.



OBS Usage: Difference Figure 1 between High & light OBS usage during regulatory initiations

Looking at figure 1 we plot the OBS usage between high and light OBS usage from Q1 1995 - Q1 2015 and mark the dates regulatory initiations were introduced. OBS generally has an upward trend in usage with slight drops at certain periods but regain growth shortly after; this is more evident in high OBS usage than light. Looking at around the year 1999 there is a slight drop in high and light OBS usage; this could be a reaction to the beginning of the enactment of GLB, giving banks other options in OBS activities. Another change in usage is around 2002-2003 High OBS usage drops prior to light around the time of SOX Act, this could also be a reaction to the enactment of the new regulation There are more fluctuations with light OBS usage while both users drop after 2008 a steady increase is apparent in 2010 leading to the assumption that banks could have returned to the use of more non-innovative OBS activities after the DF Act enactment.

Figure 2 High OBS Usage and Total Assets



Figure 2 depicts the growth of Total Assets in comparison to High OBS usage in respect to the data. Within the time span of the study we see that Total Assets keeps a steady growth incline from 1995q1 to 2015q1, while High OBS usage does tend to be slightly volatile in the time frame. In 2002 for example with the introduction of SOX we can see a slight decrease in High OBS usage while not much change in total assets. The same can be seen in the periods between 2008 and 2010, however there is an increase in High OBS usage after 2010. We can assume as depository institutions total assets grow so does their usage of OBS activities. Following we present the correlation between the different variables we consider.

	Non- performing	Non- performing loans/Total	Provision loan losses/Total	Loan Loss Reserves/ Total	Off Balance Sheet			Efficiency	Return on Average	
Variable	assets/Assets	Loans	Assets	Assets	Items	Size	Loans/deposit	Ratio	Equity	Tier1cap
Non- performing assets/Assets Non- performing	1.000									
loans/Total Loans Provision loan	0.898	1.000								
losses/Total Assets Loan Loss	0.041	0.036	1.000							
Reserves/Total Assets Off Balance	0.168	0.146	0.182	1.000						
Sheet Items	0.087	0.064	-0.069	0.037	1.000					
Size	0.159	0.132	-0.175	0.000	0.657	1.000				
Loans/deposits	0.059	0.012	0.136	0.337	0.106	0.082	1.000			
Ratio Return on	0.144	0.123	0.012	0.068	-0.008	-0.039	-0.064	1.000		
Equity	-0.157	-0.147	-0.186	-0.125	0.014	0.020	0.111	-0.623	1.000	
Tier1cap	0.125	0.111	0.248	0.073	0.303	0.313	0.152	-0.112	-0.018	1.000

Table 6 Correlation Table

#### **3.5. Results**

This section explores the results hypothesised in earlier parts of the chapter, we look at our four main equations shown in table 4 below. Each equation proxies to a different attempt to proxy credit risk, while incorporating the main questions to the chapter on how OBS activities mitigate credit risk in terms of deregulation, stringent regulation and high OBS usage.

	(1)	(2)	(3)	(4)
VARIABLES	Non-Performing	Non-Performing Loans/	Provision of loan	Loan Loss
	Assets/ Total Assets	Total Loans	losses/Total Assets	Reserves/Total Assets
High	-0.69686***	-0.83576***	0.00066***	-0.03628**
C	(0.06606)	(0.08815)	(0.00012)	(0.01495)
glb	-0.14114***	-0.11491**	0.00005	-0.06631***
C	(0.02843)	(0.05212)	(0.00018)	(0.01382)
High OBS×glb	-0.15955***	-0.07410*	0.00164	0.02569
	(0.03296)	(0.04373)	(0.00181)	(0.01863)
SOX	1.40132***	0.16888***	0.00077***	0.03848***
	(0.04912)	(0.04038)	(0.00019)	(0.00980)
df	0.19188***	1.58259***	0.00075***	0.04999***
	(0.02904)	(0.06666)	(0.00028)	(0.01727)
High OBS×sox	0.21643***	0.28597***	-0.00262	-0.01285
	(0.04201)	(0.04631)	(0.00188)	(0.01939)
High OBS×df	0.45564***	0.48744***	-0.00004	0.01667
	(0.06064)	(0.08772)	(0.00043)	(0.01650)
Size	0.03796	-0.13701	-0.00210***	-0.00748
	(0.07000)	(0.11660)	(0.00081)	(0.02659)
Tier1 Capital	0.00000	0.00000	0.00000**	0.00000
	(0.00000)	(0.00001)	(0.00000)	(0.00000)
Loan/Deposits	0.00357***	-0.00237	0.00010	0.00749***
	(0.00097)	(0.00346)	(0.00007)	(0.00125)
Efficiency Ratio	0.00487***	0.00340***	-0.00004*	0.00102***
	(0.00087)	(0.00130)	(0.00002)	(0.00036)
ROAE	-0.00757***	-0.00868***	-0.00008**	-0.00577***
	(0.00093)	(0.00133)	(0.00004)	(0.00050)
Constant	0.18224	1.99483**	0.00990***	0.45038**
	(0.43607)	(0.87875)	(0.00239)	(0.20875)
Fixed Effects	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes
Observations	304,345	303,145	305,053	305,054
R-squared	0.20444	0.13817	0.01005	0.07960
Number of snlkey	3,840	3,819	3,840	3,840

#### Table 7 Results for proposed Equations

Equation (1) consists of a panel data having 3,840 commercial banks from the 1<sup>st</sup> quarter in 1995 up to the 3<sup>rd</sup> quarter of 2015. The dependent variable is risk which is proxied as nonperforming assets to total assets. High is a dummy variable distinguishing banks that have invested heavily in Off-Balance-sheet activities by taking the 75<sup>th</sup> and larger percentile of the banks mean, in the pool of data and is lagged by 1 period. GLB is a dummy variable 1 for banks using OBS in years larger than 1999q4 which is the effective date of the Gramm-Leach-Bliley Act of 1999 zero otherwise. Interaction\_glb is an interaction between our dummy variable which is High\*GLB. Sox is a dummy 1 for the Sarbanes Oxley Act of 4<sup>th</sup> quarter 2002 zero otherwise. Df is a dummy variable 1 for the Dodd-Frank Act 4<sup>th</sup> quarter 2010 zero otherwise. Interaction\_sox is an interaction between our dummy variable shat are lagged by 1 period and take into account Capitalization, efficiency, lending the differentiated by using non-performing loans to total loans. Equation (3) is differentiated by using the provision of loans losses to total assets of our risk proxy & equation(4) is using loan loss reserves to total assets.

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 Equation (1) independent variable high has a highly negative significant effect on our credit risk proxy leading to the assumption that high OBS usage contributes to lower credit risk from 1995-2015 for all banks. When introducing GLB in 1999 and deregulating the industry that too has a highly negative significant effect deducing a similar assumption that deregulation does contribute to lower credit risk positions in all banks (high and light OBS users) from quarter 4 1999.

The interaction between GLB and high OBS users is also negatively highly significant, stating that high OBS users lowered credit risk for banks at that time period. While deregulation seemed to lower credit risk for banks the results for SOX and DF showed to be contrary, more stringent accounting standards and re-regulation might have increased credit risk as their results show positively high significance to credit risk, another factor could have been that transparency requirements made the use of OBS activities less appetizing for the industry. Not only that, but potential usage of high OBS activity at those regulatory changes could also contribute to increasing credit risk as a positive high significance is attributed to the interaction between both regulations and high OBS activity.

These results have similar outcomes to many past studies such as (Avery and Berger, 1991(big banks only); Benveniste and Berger, 1987b; Berger and Udell, 1990; Koppenhaver, 1989) found that standby letters of credit and loan commitments had significant negative relations between risk and commercial banks. These studies did not include any effects of regulatory Acts. While studies by (Avery and Berger, 1991, 1988; Khambata and Hirche, 2002); found that Standby letters of credit and loan commitments had significant positive effects of risk, Khambata and Hirche 2002 further found that loan commitments had the most effect of banks credit risk. While the control variables such as size and tier1 capital show no significance to the effect of credit risk, these results go against most literature in which bank size and capital regulation have significant effects on a bank risk management (Koppenhaver, 1989; Pavel and Phillis, 1987).

Loan deposits and efficiency ratio show a highly positive significant relationship, which indicates a good well-founded deposit base and a good fiscal footing, both leading to a stronger credit risk managerial position for banks. ROAE is negatively significant indicating to some degree strong and efficient financing of investors' money and management of credit risk. All in all, Equation (1) shows a strong effect of high OBS usage and deregulation with credit risk.

Besides, a strong lending orientation, performance and efficiency of commercial banks can contribute to better credit risk positions.

Equation (2) proxies' credit risk with the use of non-performing loans to total loans, the general outcome is very similar to the main model which incorporates non-performing assets to total assets as a credit risk proxy. For the duration of the study high OBS usage contributes to better credit risk allocation and giving banks well maintained credit risk positions. The introduction of GLB also has a significant effect leading to better credit risk management from commercial banks from quarter 4 1999. The interaction between deregulation and high OBS activity confers that in deregulation periods high OBS usage contributes to maintaining good credit risk facilitation.

While in times of stringent accounting periods and re-regulation of the industry by Acts such as SOX and DF adverse results suggest an increase in credit risk exposure, this goes with previous literature from (Avery and Berger, 1988; Koppenhaver, 1989). Like Model (1) both size and tier1 capital has no relationship with credit risk, nor does loan to deposit ratio. Efficiency ratio has a positive effect on credit risk while a negative significant relationship of our performance indicator contributes to better overall credit risk management. Equation (2) has fewer observations to Equation (1) since 21 banks are missing this leads to a lower overall r-squared in the model however yielding results are still considered significant.

Equation (3) has different results than the previous two models, using provision for loan losses as a proxy, high OBS usage as a highly positive significant effect on credit risk, these results are similar to (Avery and Berger, 1988; Avery and Berger, 1991 (small banks only)), GLB has no significance nor does an interaction between OBS usage and deregulation. Both SOX and DF have high positive significance to credit risk, this states that high OBS contributes to increasing credit risk while both regulations interactions have no significance.

Another difference is that size like previous studies has a negative significance, stating that banks size does have an effect, the larger the bank the better its credit risk position and its ability to withstand shocks. Tier1 capital also is significant with a positive relationship contributing to better capital of banks. ROAE remains negatively significant leading to an assumption that good performance leads to a healthier bank, in this case it can also aid to better credit risk allocation. Lending orientation has no significance while a negative significance at 10% for efficiency leads to poor fiscal footing leading to bad credit risk facilitation. Overall

the model has a very low r-squared value at 1% leading to a weak contribution of the entire model in respect to credit risk positions of commercial banks.

Equation (4) uses loans loss reserves to total assets as our credit risk proxy, a negative significant relationship between high OBS usage and credit risk implies that during the duration of the study high OBSS usage helped facilitate a better credit risk position for commercial banks. Similar results that were obtained using non-performing assets and non-performing loans, the introduction of GLB Act in quarter 4 1999 also had a negative significance resulting in better credit risk allocation however the interaction between GLB and high OBS usage has no effect. Similar to the previous three models a positive relationship between SOX and DF imposes deteriorating credit risk positions and no significance between interactions with high OBS usage and SOX Act and DF Act. Size and Tier1 share similar results as Equations (1) and (2) in which there is no relationship between the control variables and our dependent variable. Lending orientation is highly positively significant contributing to better credit risk facilitation and so does our efficiency proxy. Performance represented by ROAE relays a highly negative significant effect that also represents better management of investor wealth and management of credit risk from commercial banks management. Overall the r-squared is lower than Equations (1) and (2) but is acceptable at around 8% goodness of fit.

All Equations use fixed and time effects, fixed effects estimator is used to refer to an estimator for the coefficients in the regression model. Assuming fixed time effects independent effects imposed on each entity that could be correlated with the regressors. Taking the main Equation (1) into consideration the assumption of stating lax regulation and high OBS usage betters credit risk positions of commercial banks while more stringent regulation and accounting standards drops commercial banks' ability to manage credit risk, size and Capitalization have no significance while controls such as profitability efficiency and lending orientation are highly significant. The results are aligned with research from authors such as (Avery and Berger, 1991; Benveniste and Berger, 1987a).

The overall outlook of the results shows that high OBS usage contributed to a healthy credit risk management drive for commercial banks in times of de-regulation, while stringent accounting standards and re-regulation of the industry hinges banks' ability to manage credit risk properly and can also cause hedging tools such as OBS activity to deteriorate credit risk positions of banks. Also bank size has no effect on overall health of a bank's credit risk

position, nor does tier1 capital. Proper lending orientation, performance and efficiency of commercial banks can all lead to assisting in better credit risk management by banks.

In terms of economic hypothesis the results go with the market discipline hypothesis since well managed banks that have safer positions in terms of performance, efficiency and lending orientation with relaxed regulatory systems invested heavier in OBS activity, at the same time when the market exposed threats or shocks such as times of crisis or stringent and re-regulation periods banks seemed to withdraw from high OBS usage, these results are similar to (Avery and Berger, 1991; Benveniste and Berger, 1987b; Berger and Udell, 1990; Hassan et al., 1993, 1994; Khasawneh and Hassan, 2009; Koppenhaver, 1989; Nachane and Ghosh, 2007). The results also convey that fee-income based activities expand and decline according to market needs. Regulation, however, can hinder their usage, which affects the health of commercial banks, and the financial industry as a whole.

Concerning the model fit, we do not expect the regressions we run to have a high R-squared since we do not have micro-data on loan compositions that allows us to measures the inherent risk of the portfolio of loans. We see that the model fit is low but acceptable for the regressions we run.

#### **3.6 Conclusion**

The study looked at the credit risk positions of non-de-novo commercial banks in the US from 1999Q1 to 2015Q3 and how they have been affected by OBS usage; which has been defined as total unused commitment plus various letters of credit. Taking the most significant regulatory Acts from after 1995 which are the Gramm-Leach-Bliley Act of 1999 that deregulated the banking sector in the US, the study assumed better credit risk allocation due to the ability of diversifying credit risk by using OBS activity in hedging through various aspects of the banks activities. Taking into account other important regulatory Acts in the time period such The Sarbanes-Oxley Act of 2002 that imposed harsher accounting standards and more transparent standards, and The Dodd-Frank Act of 2010, which emerged after the financial crisis around 2008 that was attributed to a credit bubble in the subprime mortgage lending sector. The results showed that de-regulation and high OBS usage had a negative significant effect on credit risk. Considering that OBS activities as defined in this study are not considered as financial innovations but are now a traditional part of banks fee income the results show that when regulation is relaxed, banks despite their size and capital constraints part-take in high OBS usage tend to have better credit risk management than banks with less emphasis on OBS activity.

The study did not find an association between bank size and Capitalization and the credit risk of the banks as previous studies have suggested. We find that, regardless of bank size, OBS usage was associated with strong banking performance, lending orientation and efficiency. Commercial banks can rely on investing in OBS activity to better allocate and manage credit risk. This, however, cannot be done under harsh and stringent regulatory standards; a deregulated industry will encourage banks to invest in proper OBS activities. Premise such as the market discipline hypothesis backs the results of the study in which investors and investees can monitor pricing and amounts of OBS activities in proper conditions. Further work on the subject can include other risk measures with the inclusion of various innovative OBS activities and how they differ under stringent regulatory Acts. Banks have moved from interest bearing profits to a more stable fee-based income and, having more tools to work with, will grow the industry if proper management and monitoring from government agencies work with better understanding of the industry.

## Chapter 4: Did bank groups have an advantage exiting TARP?

### **4.1 Introduction**

This chapter focuses on depository institutions that are owned by a parent company. We check these banks ability to repay the Treasury's assistance to financially distressed banks after the financial crisis of 2007-2008. The initial program was based on The Troubled Asset Relief Program (TARP) led by the U.S. Treasury's Office of Financial Stability. The program purchased equity in depository institutions and recapitalized the financial sector. It is one of the largest measures implemented by the US government in 2008 to address the financial crisis.

The establishment of TARP allowed the Treasury to purchase or insure up to \$700 Billion of troubled assets or to purchase equity in the banks themselves. We focus mainly on the Capital Purchase Program (CPP), a preferred stock and equity warrant purchase program. Under CPP, the Treasury acquired preferred equity summing to more than \$205 billion in 707 banks from October 2008 to December 2009. This injection of capital was intended to restore the financial health of these institutions. TARP funded banks are scheduled to "repay" or "redeem" the preferred stock at an undetermined time, the program requires them to pay an established dividend rate of 5% for the first five years and 9% thereafter and interest rate to the Treasury if the securities are outstanding.

Other incentives to exit TARP included a restriction on the bank's ability to pay dividends to its common shareholders and a restriction on repurchasing shares until the bank repays the TARP preferred stock. From the original 707 regulated financial institutions, our data set covers over 220 regulated financial institutions including commercial banks and Bank Holding Companies (BHCs).

We challenge the notion that financial institutions in groups or that are owned by a parent company are more likely to repay the Treasury. The premises attain from the Source of Strength Doctrine and a revised version of this doctrine was part of the American Reinvestment and Recovery Act (ARRA) of 2009. By legislation parent companies have a duty to help their subsidiaries that are in financial distress.

This legal obligation may facilitate or hinder the likelihood of early capital repayment. In particular, belonging to a group may facilitate early repayment in normal times when a small number of banks that belong to the group are facing capital shortfalls. However, in times of crisis, when several banks belonging to the group may be facing difficult times, being part of a group may have the opposite effects and hinder capital repayment. Results show that it was less likely for banks in groups to repay the Treasury and the initiation of the ARRA had no significance for financial institutions Treasury repayment, even though by legislation parent companies have a fiducial duty to help their subsidiaries that are in financial distress.

The ARRA did not catalyse motivation even after removing the three years period of payback. The ARRA did introduce further limitations to banks participating which included restriction on bonuses and incentive compensation, prohibition on severance payments, recoupment/clawback of bonus and incentive compensation, no incentives for excessive risk-taking, compensation deduction limited to \$500,000, luxury expenditure policy, compensation committee requirements, shareholders' say on pay and compliance certification. The ARRA's executive compensation provisions are often ambiguous and vague. Much needed clarifications have been asked of the Treasury, but not much has been clarified on these issues.

This chapter contributes to the literature on government interventions after the crisis to help stabilize the economy, we take a closer look at the "Source of Strength Doctrine", a "no child shall be left behind" approach the government initiated in the late 1980s in which large Bank Holding Companies and Financial Holding Companies will support their subsidiaries in time of financial distress. This chapter also checks if the impact of financial institutions differs if they were part of a bank group or not, and if being part of a bank group made them repay TARP more. The chapter first looks at financial institutions: we suspect that banks that took part in TARP and more precisely CPP should have issued more equity after the crisis than banks that did not. Further, we consider subsidiaries of BHC's and FHC's and check if they issued more equity than non-participating subsidiaries. Additionally, we test to see if banks in groups repay TARP back more efficiently than standalone financial institutions. While past research is split on how executive compensation affects exiting TARP, we test to see if the year repayment is fulfilled influences financial institutions and if being part of a group impacts that or not. Our final test looks at the effects of ARRA on repaying back TARP and if being part of a group has an advantage in repayment or not.

Other accounting measurements such as bank size, bank performance also had no significance on the likelihood of a financial institutions to pay back while non-performing assets to total assets depicted the lower the ratio the more likely a depository would pay back. Our results are in line and related to increased moral hazard. This study aligns with the moral hazard theory, that could be described in two variations which are the increased moral hazard theory, there moral hazard theory. Under the increased moral hazard theory, there

may be increases in risk taking because of a perceived increased probability of future bailouts. The increases in risk taking may take the form of amplified supplies of bank loans and guarantees to riskier applicants, diminished supplies to safer applicants, or shifts from safer to riskier applicants without changing the overall quantities of loans and guarantees. On the other hand, under the decreased moral hazard theory, the surge in capital from the TARP injections may reduce moral hazard, resulting in shifts into safer portfolios, also with a profound effect on the overall loan and guarantee supplies (Berger and Roman, 2015).

Several papers investigate the moral hazard problem associated with government support to see if it creates the perception that banks will be bailed out in the future. Wilson and Wu (2012), stated no publicly traded bank that entered after the ARRA legislation chose to exit TARP in 2009. While they did confer that CEO pay, accounting performance metrics, and capital measures do predict TARP exit, they cannot explain why banks often replaced cheap government capital with more expensive private capital.

Even though, TARP recapitalized troubled banks, the repaying efficiency of the banks in groups were weaker because the government intervention showed no sign of enforcing legislation such as the Source of Strength Doctrine or the addition of the American Reinvestment and Recovery Act of 2009. The research is closely related to Wilson and Wu (2012) on banks exiting TARP. The research is different to Wilson and Wu (2012) in that we focus on the ability of bank groups to repay the Treasury, emphasising on the aspect that legislation supports subsidiaries to be financial and managerially backed by their parent companies. They focus on exiting TARP; based on strength of banks in terms of capital and size and executive compensation cuts.

Previous literature covers certain aspect of TARP :Bayazitova and Shivdasani (2012) investigate the basic characteristic of banks that received capital infusions under TARP. They find that TARP participating banks are larger, have weaker capital ratios, are more exposed to funding risk, and have significantly stronger loan portfolios than non-recipients. They concluded that strong banks opted out of CPP, and equity infusions were provided to banks that posed systemic risk and faced high financial distress costs but had strong asset quality. Executive compensation restrictions led banks to reject CPP infusions and exit the program. CPP infusions did not have meaningful certification effects, but the subsequent stress tests conducted for the major banks had significant certification effects. CPP equity infusions increased investor expectations regarding future regulatory interventions in the banking sector.

(Duchin and Sosyura, 2014, 2012) and Li (2013) argue that besides bank characteristics, banks' political and regulatory connections also play a significant role in the allocation of TARP funds. They also find CPP participating banks are larger, have lower capital ratios, and have better asset quality. Ng et al. (2011) argues that the banks that received TARP funds were healthier than non-recipients, according to accounting variables. Nevertheless, that study finds that TARP recipients' share prices suffered from taking the funds. No bank that accepted TARP capital after the signing into law of the ARRA chose to exit in 2009. These post-ARRA banks were not significantly different from other TARP recipients with respect to most measures of accounting performance and tangible common equity ratios.

Prior TARP research also includes investigations of the effects on bank lending (Black and Hazelwood, 2013; Duchin and Sosyura, 2014; Li, 2013; Puddu and Waelchli, 2015), bank risk-taking (Black and Hazelwood, 2013; Li, 2013; Duchin and Sosyura, 2014), bank competition (Berger and Roman, 2015; Kotter and Noth, 2015), traded banks' stock market valuations (Harris et al., 2013; Ng et al., 2011; Veronesi and Zingales, 2010), traded relationship borrowers' stock market valuations (Norden et al., 2012), and loan contract terms to recipient banks' large customers (Berger et al., 2015).

The remainder of this chapter is organized as follows. Section 4.2 provides additional background on TARP, Source of Strength Doctrine, the American Reinvestment and Recovery Act of 2009 and related literature. Section 4.3 describes the data and how the sample was constructed. We explain our methodology in Section 4.4 and discuss our results in Section 4.5. we offer the conclusion in Section 4.6.

#### **4.2 Literature review**

#### 4.2.1 Background

The past financial crisis has taken a toll on many, while most seem sceptical of the banking system and governments that have bailed out these too big or too important to fail banks (Zingales, 2008). Government intervention however has proven to help in a number of ways, for instance Ivashina and Scharfstein (2009), claim that new loans to large borrowers fell near 47% in the third quarter of 2008 in comparison to the previous year. It is said that if a firm is laden by a risky or large debt, an equity infusion can act as a cushion to debt. This results in the risky debt value to go up while equity is raised (Myers, 1977). This of course if not attractive for equity holders to raise new capital, it is known in the financial and in literature as debt overhang, government intervention helps prevent future loss in valuable investment opportunities for banks all over the United States.

The US government could have justified their intervention to stop a potential liquidity crisis which could have been followed by a bank run. Even though this financial crisis did not seem to have warranted a traditional bank run, it did however warrant a run from short term lenders who repudiated to roll-over their short-term lending. Gorton and Metrick (2011), and Diamond and Dybvig (1983) suggest that bank runs can be inefficient, and stopping them can create value. During the 2008 financial crisis Gorton and Metrick (2011) illustrate how a bank run could have happened in the repo market despite the security being backed by collateral.

As discussed in section 2.3, in a crisis contagion concerns are paramount which might give governments plenty of reasons to intervene. However as honourable as it may seem for the government to intervene and rescue the economy of (banks) with a capital infusion, this does have some negative outcomes. The government could impose restrictions on banks' decision-making (for example, executive compensations or lending requirements) that reduce a bank's profit. Another possibility is that a government can introduce political criteria into the lending decisions, reducing bank's profitability (Sapienza, 2004).

Preferred equity issuance has had little attention in the financial literary field. Kallberg et al. (2013), state that from 1999 to 2005 US firms issued as much preferred stock as common equity IPOs and seasoned equity offerings. On October 14<sup>th</sup>, 2008, the US treasury announced that the largest 9 banks in the US would be forced to receive infused capital through the Troubled Asset Relief Program (TARP), this capital would come as preferred stock; this would seem to have affected pre-existing preferred stockholders. Veronesi and Zingales (2010),

contest that there was a greater total influence upon existing preferred stock than upon common stock in the forced banks. Also, in their analysis of preferred stock, Veronesi and Zingales (2010) assess that many shares of preferred stock do not trade frequently enough to make a dependable analysis of the change in value of each outstanding preferred stock.

Fundamental theory states that a security issuance should be a concern to those with claims on a firm's cash flows, where a claimant may be concerned about claims of similar seniority. Kim and Stock (2012), investigate the impact of TARP preferred issuance upon bonds, preferred stock, and common stock. They focus upon two different types of outstanding preferred stock, these are (a) trust preferred stock, senior in claim to TARP preferred stock, (b) non-trust preferred stock, which has equal claim to TARP preferred stock.

Several researchers have questioned whether equity infusions are a cost-efficient solution and if alternative strategies would have yielded better outcomes (Diamond and Rajan, 2011; Hoshi and Kashyap, 2010; Veronesi and Zingales, 2010). The Japanese experience of Hoshi and Kashyap (2010) state that the success of a financial rescue program depends critically on the willingness of weak banks to take part in it. They note that a bank may refuse government assistance if the capital injection generates an adverse signal which could lead to a future loss.

Bayazitova and Shivdasani (2012) agree, they find clear evidence of self-selection by banks, they find it was stronger banks and not weaker banks who did not participate in Capital Purchase Program (CPP). The strong banks had strong capital ratios, stable funding profiles, high asset quality and operated in better performing regions than banks who took part of CPP. Hoshi and Kashyap (2010) state that shareholders in the event of recovery reduced capital infusion which has seniority over common shareholder. Due to debt overhang, much of the recovery in firm value accrues to debt-holders leaving stockholders with little incentive to partake in the rescue. While Bayazitova and Shivdasani (2012), assure that the adverse signalling and debt overhang do not appear to have prevented weak US banks from partaking in CPP infusions.

Bayazitova and Shivdasani (2012), state that capital injections under CPP befell in a way constant with lowering financial distress costs. Banks that were approved for CPP injections were larger and posed greater systemic risk. They also had significantly stronger asset quality than banks that were not approved for CPP, suggesting that capital was not provided to banks with high levels of troubled assets. They also discuss that some banks declined CPP funding, these banks had significantly higher quality assets and are in better performing regions than those that accepted capital injections. They suggest that better performing banks viewed the capital injection to be relatively expensive. Bayazitova and Shivdasani (2012), also document that funding was directed towards large banks with greater derivative exposure, a pattern consistent with an objective of lowering systemic risk. Also with lowering distress costs, banks with less stable funding mixes were more likely to receive CPP and seemed to be part of the same objective. However, banks with distressed loan portfolios did not receive any type of funding from treasury.

Berger and Roman (2015), use data on commercial banks within the US: the years studied are from (2005-2012), they show that TARP provided competitive advantages to TARP recipients and this led to an increase of both the market share and market power relative to banks that did not receive TARP funding. Their results also suggest that the increase of market share and power may be driven by the safety channel primarily; which perceive TARP banks as safer banks. However, this could be slightly misguided by the cost advantage channel; which perceive TARP funds as expensive. The competitive advantage could be due to TARP banks paying early, which would lead the banks to having reduced the importance of the cost advantage channel while increasing the importance of the safety channel. Berger and Roman results also suggest possible distortion in competition due to the government intervention, which may have mismanaged resources.

Examining papers that cover the determinants and effects of banks initial decisions to apply and receive TARP funding (Bayazitova and Shivdasani, 2012; Berger and Roman, 2015; Duchin and Sosyura, 2014, 2012) state that banks with more political networks were more likely to receive TARP funds. Bayazitova and Shivdasani (2012), state that banks that showed systemic risk and faced high financial distress but had a stronger asset quality base could obtain TARP funding.

Other authors found that financial characteristics related to the probability of receiving TARP differ for the healthiest against the weakest banks (Cornett et al., 2013). The weakest TARP banks had income production and experienced liquidity issues while the healthiest banks; their loans performed well, but liquidity issues hindered the abilities to continue lending. Another interesting study was that banks with high levels of CEO pay were more likely to exit early due to TARP restrictions on executive pay (Wilson and Wu, 2012).

Papers discussing valuation effects on TARP find deteriorating operating efficiency for TARP banks (Harris et al., 2013). Veronesi and Zingales (2010) find that towards the end of 2009 the top 10 banks increased their value of a net benefit in over \$85 billion. Norden et al. (2012), relay that TARP had a spill-over effect from the banking sector to the corporate, leading to a positive impact on borrowing relationships firms' stock returns. Black and Hazelwood (2013), analyse risk taking by banks size using 81 banks from 2007-2010 using the Survey of Terms of Bank Lending. They discuss finding that the risk of loans originated increased for large TARP banks but decreased for small TARP banks.

Other papers discussing TARP and risk suggest, TARP may reduce or increase systemic risk during the past financial crisis and found that TARP reduced the recipient banks' contribution to systemic risk on average, but effects are due to a reduction mainly in the risk of the institutions that were safer ex ante (Berger et al., 2016b).

Kotter and Noth (2015), find that higher loan rates and lower depositor risk premiums for unsupported banks with higher bailout expectations, lead to competitive distortions because of TARP for sound, unsupported banks. Berger et al. (2015), study the effects of the TARP loan contract terms for large loans and found that generally TARP led to more favourable terms of credit to businesses; this was done using DealScan. Berger and Roman (2016), found that TARP statistically and economically increased significantly job creation as well as net hiring establishments and decreased local business and personal bankruptcies. This suggests that, maybe, by saving Wall Street TARP that Main Street was saved. In another study, TARP banks showed an average of 12% more small business loan originations as compared to non-TARP banks (Puddu and Waelchli, 2015). Finally Chang et al. (2014) find that banks that received TARP funds maintained lower cash-to-cash ratios; this leads to lower excess reserve ratios. This is consistent with the view that the TARP capital injection possibly resulted in more lending for the TARP beneficiaries.

#### 4.2.1.1 American Recovery and Reinvestment Act (ARRA)

Section 2.6.1 discussed TARP and the CPP programs in details. We focus on the ARRA here. The ARRA is a stimulus package enacted by Congress and signed into law by President Barack Obama in February 2009. Established in retort to the last financial crisis, the ARRA's main objective was to save existing jobs and create new ones as soon as possible. Other objectives were to provide temporary relief programs for those most affected by the recession and invest in infrastructure, education, health, and renewable energy. However, under this also there were some additions to the TARP relief programs; the most significant executive compensation restriction in the 2009 Recovery Act limits the amount and timing of incentive compensation and retention bonuses that may be paid by TARP recipients to their executives before satisfying all obligations arising from financial assistance provided under TARP.

Up to 25 executives may be limited by this restriction depending upon the amount of TARP financial assistance. ARRA also prohibits severance benefits that may be paid to named executive officers and the five next most highly compensated employees of a TARP recipient, and limits amounts that may be deducted for executive compensation. Shareholders at these institutions must also be provided a "say on pay." Subject to certain payments under employment agreements entered on or before February 11, 2009, these restrictions are retroactive and cover existing and future financial institutions receiving TARP financial assistance.

Under EESA, Treasury had required banks receiving TARP financing assistance under CPP to retain the cash for three years or raise amounts from third parties to replace it. The ARRA provides an opportunity for TARP recipients to immediately repay any TARP financing assistance without first needing to raise any funds, under the consultation of the secretary of the Treasury with the appropriate federal banking agency. This provision seemed to be included at the request of some TARP recipients seeking to make early repayment. The nature of the consultation process is not defined under ARRA, and banking regulators might seek to require a withdrawing TARP recipient to raise additional funds from third parties if the regulators determine that there are not otherwise sufficient capital reserves. Upon repayment, the secretary is required to liquidate any warrants it received from the TARP recipient at current market prices.

The approximate cost of the economic stimulus package was estimated to be \$787 billion, later reviewed to \$831 billion between 2009 and 2019. The ARRA's rationale was based on the Keynesian economic theory that, during recessions, the government should offset the

decrease in private spending with an increase in public spending to save jobs and stop further economic deterioration (Conley and Dupor, 2013).

Part of the ARRA was a revised version of the Source of Strength doctrine, this doctrine protects subsidiaries in times of crisis in which their parent groups should help them financially and managerially, the following sections explains in more detail.

#### 4.2.1.2 Source of Doctrine Act

The primary facet of the source-of-strength doctrine is found in Section 3(c)(2) of the Bank Holding Company Act of 1956 (BHC Act), which entails the Board to take into consideration "the financial and managerial resources and prospects of the company or companies" involved in a proposed transaction requiring approval of the Board (P. L. Lee, 2012a). In the early years of the BHC Act, the Board frequently addressed tenders to organize bank holding companies that involved significant incurrence of debt by the applicants. In considering these applications, the Board applied special attention to the effect that the incurrence of the debt would have on the financial resources and prospects of the candidate. In what appears to be the earliest proximate articulation of the source-of-strength doctrine, the Board in a 1966 order, denying an application involving significant debt incurrence, stated that Section 3(c)(2) of the BHC Act required it to consider an applicant's ability to "serve, when and as required, as a source of financial assistance to its subsidiary banks (P. L. Lee, 2012a)."

In 1984, the doctrine simply provides that "a bank holding company shall serve as a source of financial and managerial strength to its subsidiary banks." As further illuminated by the Board in a policy statement in 1987, the doctrine foresees that "a bank holding company should stand ready to use available resources to provide adequate capital funds to its subsidiary banks during periods of financial stress or adversity." Individual bank holding companies have challenged the claim of the doctrine as a matter of legality, parting with the soundness of the doctrine, or the validity of the outer bounds of the doctrine, for a time in uncertainty. Nonetheless the board has consistently asserted the authority to require a bank holding company to serve as a source of strength to its subsidiary banks and has in historical years regularly incorporated a source of-strength requirement into written agreements and cease and desist orders with bank holding companies (Bierman and Fraser, 1993a).

Due to the financial crisis in 2007 and 2008 a renewed focus on the source-of-strength doctrine was underway. Within the mist of the crisis the board to actions, such as the granting of waivers from the restrictions of Section 23A of the Federal Reserve Act to permit banks to supply liquidity to their affiliated mutual funds and other affiliated entities, seem to have inverted the doctrine — with the result that a bank subsidiary appeared to be serving as a source of strength to its holding company and other subsidiaries of the holding company. In the aftermath of the crisis, the Dodd-Frank Act sought to re-assure the source-of-strength doctrine and expand its application to other depository holding companies such as savings and loan holding companies and to certain structures involving systemically important nonbank financial companies designated under the Dodd-Frank Act.

There are many requirements in the Dodd-Frank Act that relate to the source-ofstrength doctrine. Section 616(d) is the most important of these. It creates a statutory codification of a source-of-financial-strength requirement, applicable not only to bank holding companies but also to all other companies that directly or indirectly control an insured depository institution. Sections 616(a) and (b) relate indirectly to the source-of-strength doctrine by codifying and clarifying the authority of the Board to impose capital requirements by rule and regulation on bank holding companies and savings and loan holding companies (P. Lee, 2012b).

Other provisions of Section 165(d) requiring a systemically important bank holding company to submit a plan (or "living will") for its rapid and orderly resolution in the event of material financial distress or failure will implicate considerations under the source-of-strength doctrine. The appropriate Federal banking agency for a bank holding company or savings and loan holding company shall require the bank holding company or savings and loan holding company to serve as a source-of-financial strength for any subsidiary of the bank holding company or savings and loan holding company that is a depository institution.

Part of the Board's policy is that in serving as a source of strength to its subsidiary banks, a bank holding company should stand ready to use available resources to provide adequate capital funds to its subsidiary banks during periods of financial stress or adversity and should maintain the financial flexibility and capital-raising capacity to obtain additional resources for assisting its subsidiary banks in a manner consistent with the provisions of this policy statement. Elsewhere in the policy statement, the Board indicates that a holding
company should not withhold financial support from a subsidiary bank in a weakened or failing condition.

Bank holding company's failure to meet its obligation to serve as a source of strength to its subsidiary bank(s), including an unwillingness to provide appropriate assistance to a troubled or failing bank, will generally be considered an unsafe and unsound banking practice or a violation of Regulation Y, or both, particularly if appropriate resources are on hand or are available to the bank holding company on a reasonable basis (P. Lee, 2012b). An important reference to "ability" in subsection (e) of Section 38A raises the possibility that the federal banking agencies in their implementing rules under Section 38A will incorporate an analysis of the capital position of a company subject to subsection (b) of Section 38A. Such an approach would draw support from the language of subsection (c) of Section 38A, authorizing the federal banking agencies to require reports from such a company for (1) assessing the ability of the company to comply with subsection (b) of Section 38A and (2) enforcing compliance with subsection (b). For bank holding companies, the assessment would be facilitated of course by the fact that bank holding companies have long been subject to consolidated capital requirements (Meyerowitz, 2012).

The reference to "ability" also suggests that the federal banking agencies might assess other aspects of the financial condition of a company, including its liquidity and perhaps translating the source of-financial-strength requirement indirectly into a liquidity requirement for a company controlling an insured depository institution. What the financial crisis provided was several high-profile examples of financial institutions, such as Bear Stearns, Lehman Brothers and Washington Mutual, in which they were deemed to be "well capitalized" by applicable regulatory standards up to the very moment that they failed. The commonality in their failures was liquidity problems related to market concerns about the integrity of their balance sheets.

Also, the federal banking agencies might require an analysis of any contractual or other legal constraints on the ability of a company to make capital contributions to its insured depository subsidiary. The probable complications that contractual restrictions at the holding company level may present for the operation of the source-of-strength doctrine have been evident since the time of the first attempt by the Board to enforce a source-of-strength requirement in the Hawkeye case and have been reprised more recently in a judicial decision involving an analogy of the source of strength (Meyerowitz, 2012).

Similarly, corporate law considerations based on the fiduciary duty of directors may affect the operation of the source-of-financial-strength requirement as the decision in MCorp suggested. The articulation of Section 38A provides no indication that Congress intended the source-of-financial-strength requirement to override state corporate law requirements or private contractual provisions.

Previous studies have given evidence that multi-bank holding companies are significantly safer and more profitable that standalone banks (Ashcraft, 2008; Bierman and Fraser, 1993a). Ashcraft, 2008 also points out that bank holding companies' affiliation reduces the probability of future financial distress, but distressed affiliated banks are also more likely to receive capital injections, recover more quickly and are less likely to fail over the next year. While measured benefits of affiliation are much larger than those that existed before recent reforms of bank holding company regulation, suggesting that much of the observed benefit can be attributed to regulation and not the market. The findings of this paper go against Ashcraft, in which banks part of a group tend not to pay back CPP funds.

The source of strength doctrine aids us to form all of our hypothesis. Since this doctrine asks bank groups to help their subsidiaries that are in trouble. We hypothesize in H3 that Regulated financial institutions in bank groups repay their dues more efficiently than standalone regulated financial institutions. Moreover, in H4, we hypothesize that the year that the banks repayment is fulfilled having an effect if the regulated financial institutions is part of a bank group or not.

#### 4.2.2 Hypothesis

The financial crisis that emerged in the late 2007 – 2008 made global news, the stimulus packages approved by the US government also made global news. Many questions were asked about TARP and more specifically CPP. We look at four issues that can contribute to this issue. We first look at equity issues and hypothesize that CPP participants should have more equity issues, which leads to my second hypothesis which states that subsidiaries should have issued more equity issues after the crash, to help their holding companies. This leads to my third hypothesis in which the holding companies will payback TARP faster than standalone banks since banks in groups are obligated to help each other out. We finally hypothesize that the year in which banks repay determines if a bank is part of a bank group or not. These issues have not been discussed in earlier studies and by exploring these issues we hope to contribute to the

existing literature on financial stability, government interventions and how the industry responds versus the expected outcome.

The expectations are formed to see if the policies enacted play the role they were supposed to. The injection of funds was supposed to strengthen the financial sector and help depository institutions and their subsidiaries, these hypothesis were derived from these expectations.

# H1. Regulated financial institutions taking part in CPP should have issued more equity issues after the crisis.

We first look at banks that are part of the government intervention CPP and other regulated financial institutions if they have issued more equity than regulated financial institutions. This assumption will derive if non-CPP banks used equity issuing to gather finance for their institutions or if issuing equity was mainly for financial institutions that wanted to join in the Treasury's initiative.

# H2. Subsidiaries of either BHCs or FHCs issued more equity issues post financial crisis.

In parallel to the first hypothesis regulated financial institutions who are subsidiaries of other institutions should also have issued more equity, either in the form of preferred equity or common equity.

# H3. Regulated financial institutions in bank groups repay their dues more efficiently than standalone regulated financial institutions.

Knowing if regulated financial institutions repay their debts in a more efficient manner can speak of certain aspects of the financial sector, one of the most important would be the implementation of the Source of Strength Doctrine. Another would be the correct selection of institutions to take part in the TARP initiative.

# H4. The year that the banks repayment is fulfilled having an effect if the regulated financial institutions is part of a bank group or not.

In 2009 the American Reinvestment and Recovery Act (ARRA) was introduced, the enactment set new regulation on compensation for banks, it also introduced legislation in which regulated financial institutions could payback Treasury when they saw fit and not after three years of

receiving government investments. This would change the pace of repayments and being part of a bank group should also be affected by the ARRA.

The expectations are formed to see if the policies enacted play the role they were supposed to. The injection of funds was supposed to strengthen the financial sector and help depository institutions and their subsidiaries. These hypotheses were derived from these expectations.

#### 4.2.3 Contribution

This chapter contributes to several aspects, the first is to the moral hazard hypothesis in which there may be a decrease in moral hazard as a surge in capital from TARP injections could lead to safer portfolios. This chapter also contributes to government intervention and financial stability in which the main purpose of TARP and CPP was to bailout banks. The chapter also focuses on a long-forgotten concept of "no child shall be left behind" an approach initiated from the source of strength doctrine where depository institution who have subsidiaries are obliged to help their smaller counterparts from failing. Finally, the chapter contributes to how financial regulation affected compensation of executives had a role on depository institutions repayment to TARP.

#### **4.3 Data**

#### **4.3.1 Introduction**

In section 3 we discuss our contribution, the hypothesis that drives the study, data collection processes and introduce our variables. Past research has used data bases such as, the Federal Reserve, Compustat, DealScan and SNL Financial. We have chosen SNL for having a comprehensive database of our required information. SNL derive their accounting information from call reports and calculate some ratios themselves. In the following subsections, we discuss the data more closely.

#### 4.3.2 Data set part 1

Data collected are from the SNL financial data base centre. The data used are from two parts, the first part used regulated depositories (under regulated depositories (financial institutions) all accounting information is derived from call reports.); a total of 9696 commercial banks and Bank holding companies (BHCs) from the years 2004 – 2016, which gives a total of 126048 observations. These commercial banks and BHCs contain accounting variables that will be used for analysis and variables such as TARP status which describes each regulated depository in respect to TARP; these would-be descriptions such as "Acquired or Defunct", "Applied", "Approved", "Converted", "No" (which means this depository did not take part in TARP), "Participating", "Redeemed" and "Resold". From 9690 financial institutions, a total of 557 took part in TARP which is around 5.74% of the financial institutions from SNL database.

Table 8 TARP status in 2016

This table reports on the status of financial institutions in 2016 that have taken part in TARP.

tarp_status_	Freq.	Percent	Cum.
Acquired or Defunct	91	1.24	1.24
Applied	286	3.89	5.12
Approved	780	10.60	15.72
Converted	13	0.18	15.90
Participating	351	4.77	20.67
Redeemed	4,914	66.78	87.46
Resold	923	12.54	100.00
Total	7,358	100.00	

The above table represents the first-part dataset with banks that have participated within TARP and more specifically the Capital Purchase Program (CPP). The number of observations drops from 125983 to 7358. We can see that 66.78% of the 557 banks that took part in the CPP have successfully paid back Treasury while the remaining 33.22% have been split up between the remaining descriptions, the largest would be "Resold" in which treasury has sold the preferred stock of these banks in an auction with a mark down on par value from 5-30%, these banks make up 12.54% of the 33.22%, which is around 38% while 10.60% are banks that have been "Approved" and 4.77% are "Participating" which makes the majority of the 33% of none-redeemed financial institutions, banks that have not re-paid back Treasury.

#### Table 9 Summary statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Size	4664	14.080	1.904	8.957	21.668
ROAA	4562	.477	2.326	-90.16	8.36
ROAE	4505	6.179	14.182	-261.6	125.99
tier1_ratio	4590	.096	.0475	0246	.948
NPA/assets	4613	2.084	2.662	0.037	31.71
NPA/loans	4613	3.136	4.063	0.011	63.2
Liquidity Ratio	4593	18.829	17.404	.91	383.48
LLR/Assets	4613	1.124	.636	0.110	7.1

Table 9 represents a summary statistic of the main control variables used in the study.

The table 9 above depicts the accounting variables used from the first-part dataset. Size is calculated by taking the natural logarithm of total assets. Big banks are generally more profitable because of their economics of scope, so the size variable represents that banks are being competitive and profitable; the sample size drops to 4664 observations in comparison to the total number of financial institutions that took part in CPP that was at 7358 observations.

Figure 3 Bank size Bank size of the sample is depicted in figure 3.



Figure 4 Bank size TARP & Non-TARP Banks Bank size between TARP and Non-TARP Participants



Size seems to have a normal distribution (figure 3); most financial institutions are within the mean while there seems to be more big banks than small ones. This could be due to the fact of there being more BHCs than commercial banks. While figure 4 shows the difference between participants of TARP and those financial institutions that have not taken part in TARP, we see a slight difference that TARP participants have a larger mean size than non-TARP participants. Having used two measurements of performance ROAA and ROAE both these performance measure different aspects of a bank's position. Return on average assets (ROAA) is an indicator used to assess the profitability of a firm's assets, this is calculated by SNL database. While, Return on Average Equity (ROAE) measures a company's profitability, in which the average shareholder's equity is divided by net income. Both these measurements elaborate on a firm's status on probability, the higher the ratio the better the firm is performing. ROAE is also calculated by SNL database, the mean of both these ratios indicates that the firms

are profitable being positive, however; non-TARP participants have higher profitability indicators than TARP participants.



As we can see both performance measures are in figures 5 and 6 indicate to a positive performance from pre to post crisis. Performance of ROAE seems to be higher in terms of the mean, but the available observations are less. Furthermore, ROAE seem to have lower ratios for banks that are not performing well.

Figure 7 Return on Average Assets s TARP and Non-TARP Participants



Figure 8 Return on Average Equity TARP and Non-TARP Participants



In the above figures, it is evident that both performance measures (figure 7 and 8) start to plummet from 2007 and at 2009 they reach their lowest means, this shows that when CPP was initiated, banks' performance were at their worst from 2005. The final investment of CPP was in December 2009 according to the treasury.gov website and this shows a beginning of better performance for both ratios. Figure 9 shows Return on Average Equity between TARP and Non-TARP participants have similar ratios by the beginning of 2015. Both performance measures for TARP based financial institutions show a steep incline in performance after 2009, leading to believe a better allocation of investments and good return. Non-TARP financial institutions also performed well after 2009; however, their performance growth does not seem to be as significant from TARP based banks.

Tier1\_ratio has 4590 observations; this variable is calculated by the author in which Tier 1 capital was divided by total assets. Tier 1 capital, describes the capital adequacy of a bank, which includes equity capital and disclosed reserves. Equity capital is inclusive of instruments that cannot be redeemed at the option of the holder. Tier 1 capital depicts a bank's capital or the money the bank has stored to keep it functioning through all transactions it performs, such as trading, investing and lending.





Tier 1 ratio for TARP participants depicts a lower mean to non-TARP participants, most of the banks seem to have sufficient capital to asset ratio however it is on the lower side compared to non-TARP participants. The use of Tier 1 capital as a percentage of total assets is to buffer the size gap between banks as the largest 10 banks in the USA received TARP funding. Below in graph 10 we see a comparison between TARP and Non-TARP participating banks prior to post crisis. TARP participants as a mean have always been less capitalized than their non-participating peers, the major difference is TARP participants were at their lowest in 2008 and began improving their Capitalization after 2008 while non-TARP participants lost capital in respect to assets around 2009.



Figure 10 Tier 1 Capital as a Percentage of Total Assets for TARP & Non-TARP Participants

When looking a financial banks quality of loan book both nonperforming assets to assets (npas/assets) and nonperforming assets (npas/loans) to loans give a good insight. Both ratios have the same interpretation: a higher ratio reflects rising bad quality of loans; both are considered on the low side of the spectrum in terms of overall mean. In figures 11 and 12 we can see that both ratios are similar in measurements of a bank's quality of loans prior to the 2008 crisis, in late 2007 we see TARP participants to have increased bad loans with a slightly higher non-performing asset to total assets ratio. After 2008 up to 2010 TARP participants excel in having a bad non-performing asset to assets ratio compared to non- TARP participants both types of financial institutions begin to improve after 2010, while TARP participants adjust to the industry average by 2015.



Figure 11 Non-Performing Assets to Total Assets TARP & Non-TARP Participants

Figure 12 Non-Performing Assets to Total Loans TARP & Non-TARP Participants



Non-Performing assets to Total Loans in figure 12 reveals that TARP participants had a better loan allocation than non-TARP participants prior to the crisis; from 2007 however, we see a decrease of proper loan allocation from TARP participants all the way until 2015, when they seem to have better allocated loans. All accounting measure thus far have shown that TARP participants have been inferior in bank management to non-TARP participants and that aid was needed.

Liquidity ratios measure a company's ability to pay debt obligations and its margin of safety, higher liquidity ratio indicates that a company is more liquid and has better coverage of outstanding debts. Liquidity Ratio is calculated by SNL database as follows: (Cash & Balances Due + Securities + Fed Funds Sold & Repos + Trading Account Assets - Pledged Securities)/ Total Liabilities. Liquidity ratio is the proxy used to measure the liquidity strength of a depository institution, this variable is calculated by SNL global. The use of liquidity ratio shows the readiness of a depository institution ability to be liquid, a higher ratio establishes a

strong liquidity measure while negative ratios will indicate a weaker financial entity. A company must have more current assets than current liabilities to be considered liquid. We can see on the bottom figure 13 the mean of the financial institutions are between TARP participants and non-participants have a similar trend, both are at their lows in 2008, TARP participants clearly are less liquid and the need for TARP aid is apparent to help improve liquidity and the ability to pay debt obligations.





Loan loss reserves give an estimate on loans losses and non-payments for financial institutions which can be an indication of credit risk as well. Loan Loss Reserves to Assets has 4613 observations in the first-tier dataset, the lower the ratio the better the situation of the financial institution. In the below figure 14, it is evident that amid the crisis Loan loss reserves to total assets increased dramatically for TARP participants, causing credit risk to the selected financial institutions in our sample, however after 2010 these financial institutions managed to bring the ratio back down in 2015 to similar figures prior to the crisis.

Figure 14 Loan Loss Reserves to Total Assets TARP & Non-TARP Participants



#### 4.3.3 Data set part 2

Part 2 data set consists of offerings data from SNL, the offerings have the description of type of offering and the data the offering was announced and no longer outstanding which will be important dates in the customization of variables for the research explained later. The two parts get merged to give a combined matched dataset of 2762 observations. From the original 557 financial institutions under TARP and CPP 449 financial institutions have available data in the new merged set. Looking further into the data set we conclude that from the 449 financial institutions a total of 1996 observations are available from 2004-2016.

#### Table 10 TARP Status after merge

Tarp status	Freq.	Percent	Cum.
Acquired or Defunct	5	1.59	1.59
Converted	2	0.64	2.23
Participating	22	7.01	9.24
Redeemed	262	83.44	92.68
Resold	23	7.32	100.00
Total	314	100.00	

Table 10 represents the status of banks after the data set is merged with equity offering.

The table above depicts the figures for each individual depository, the 314 are the total number in the sample, the number of financial institutions drop for each depository for the accounting variables after the merge as well, this can be seen in the table below.

#### Table 11 Summary statistics after merge

Table 11 depicts summary statistics of the control variables after the equity offering data set is merged.

Variable	Observation	Mean	Std. Dev.	Min	Max
Size	267	14.195	1.556	11.104	19.286
ROAA	267	235	1.490	-8.1	4.68
ROAE	267	-2.473	17.607	-155.6	47.98
Tier1ratio	230	.096	.019	.057	.180
NPA/Loans	230	3.947	3.095	0.019	18.23
NPA/Assets	267	2.733	2.141	0.052	12.46
Liquidity Ratio	230	13.284	8.992	.99	61.21
LLR/Assets	230	1.344	.617	.01	5.42

Comparing the variables between the final data set and the part 1 data set we can see several differences in the performance of the financial institutions. The most evident is the performance measures. In table 8 we see a deterioration of negative performance measures for the entire industry.

#### Table 12 Summary statistics adjusted after merge

Variable	Observations	Mean	Std. Dev.	Min	Max
Size	4664	14.080	1.904	8.957	21.668
ROAA	4562	.477	2.326	-90.16	8.36
ROAE	4505	6.179	14.182	-261.6	125.99
tier1ratio	4590	.0964	.047	024	.948
NPA/assets	4613	2.084	2.662	0.037	31.71
NPA/loans	4613	3.136	4.063	0.011	63.2
Liquidity Ratio	4593	18.829	17.404	.91	383.48
LLR/Assets	4613	1.124	.636	0.110	7.1

#### We add a correlation table:

Table 13 Correlation Table

Variable	Size	ROAA	ROAE	tier1ratio	NPA/assets	NPA/loans	Liquidity Ratio	LLR/Assets
Size	1							
ROAA	0.0417	1						
ROAE	0.0541	0.7728	1					
tier1ratio	0.3211	0.0008	0.0017	1				
NPA/assets	0.0667	-0.3549	-0.4326	-0.0056	1			
NPA/loans	0.0544	-0.3338	-0.4091	0.0059	0.9473	1		
Liquidity Ratio	-0.2453	0.0439	-0.0466	0.0391	-0.1363	-0.0324	1	
LLR/Assets	0.0812	-0.1223	-0.2317	0.0077	0.4442	0.3823	-0.2164	1

Looking at Size, we see that not much has changed: the mean is the same, however there is a slight difference in terms of min and max values to the size of the financial institutions between the two tables above. In figure 15, we see a slightly surprising fact that banks that are not in a bank group have a larger mean compared to banks in a group.

Figure 15 Bank Size in a Bank Group or Non-Bank Group



The major difference is within the profitability of the financial institutions. ROAA and ROAE have a mean in the negative which means that these financial institutions are mainly failing. In the bottom figure 16, we see that ROAA performance for banks in a group is worse than for standalone banks. The negative performance should also give an indication for banks which will have a harder time repaying the Treasury.



Figure 16 Return on Average Asset in a Bank Group or Non-Bank Group

Figure 17 Return on Average Asset Repaid and Non-Repaid Participants



Figure 17 shows that banks who have not repaid have worse performance ratios than banks that did repay. That should be the case as struggling banks would have a harder time to repay the Treasury if they were not profitable, however most banks that have not repaid would also be part of a group, and they should have financial support from their mother companies.

Figure 18 Return on Average Equity Bank Group and Non-Bank Group Participants



In figure 18 we see a similar outcome for ROAE in which banks in a group perform less efficiently than standalone banks. Figure 19 below also portrays similar results as ROAA in which banks ROAE performance for non-repaid banks are lower than those that paid back TARP.

Figure 19 Return on Average Equity Repaid and Non-Repaid Participants



While performance was low for reflected categories of being part of a bank group or not and if banks repaid TARP or not, non-performing assets to total assets also had discerning figures for all categories. Figure 20 depicts how non-performing assets as a percentage of assets were lower for banks in a group. Figure 21 portrays a similar depiction on how the ratio of nonperforming assets to total assets were in a dire situation for banks who did not repay TARP, also suggesting that these non-repayers were part of a bank group.



Figure 20 Non-Performing Assets to Total Assets Bank-Group & Non-Bank Group Participants

Figure 21 Non-Performing Assets to Total Assets Repaid & Non-Repaid Participants







Being part of a bank group tier 1 capital as a ratio of total assets shows higher figures, stating that banks in a group should have had the ability to repay the Treasury more efficiently than non-bank group participants, this is shown in the above figure 22.



Figure 23 Tier 1 Capital as a Ratio of Total Assets Repaid & Non-Repaid Participants

Figure 23 above shows even though non-repaid banks are having a slightly larger Tier 1 capital to total assets ratio, banks in groups were less likely to repay the Treasury and were also less efficient at that. Like previous accounting measures we see a similar trend.

Figure 24 Liquidity Ratio Bank-Group & Non-Bank Group Participants



Similar to our tier 1 capital ratio, liquidity ratio and the ability of banks to repay debt, we see that data refers to banks in groups having better results than non-bank group banks above in figure 24. However, when analysing the data for banks that have repaid the Treasury, we see that banks that repaid had lower liquidity ratios, below in figure 25.

Figure 25 Liquidity Ratio Repaid & Non-Repaid Participants



Figure 26 Loan Loss Reserves to Total Asset Bank-Group & Non-Bank Group Participants



In terms on non-payments and loan losses as depicted in figure 26, being part of bankgroup indicates better credit risk mediation and the ability to cover loan losses and nonpayments. Even though there is only a slight increase of performance between the two groups, being part of a bank-group still warrants more confidence that these banks are better performers with good managerial skills in allocating funds and investments. However, in figure 27 below we see a repetition with previous variables in which banks in groups seem to have better accounting indicators but do not repay back TARP as efficiently as standalone banks.



Figure 27 Loan Loss Reserves to Total Assets Repaid & Non-Repaid Participants

Certain variables were created, such variables include TARP Issue (tarp issue) which is a dummy variable equal to 1 when the word TARP is part of the description as part of an issued security by the depository institution, or zero otherwise. The variable Year Repaid (year repaid) is the by-product of using the date of when TARP funds were set as no longer outstanding by the Treasury. Other variables created will be discussed in the methodology section as they are specific to certain models. While other research has been able to cover greater number of observations from using SNL, the issue of combining data sets has altered and reduced the maximum amount of observations including total number of depository institutions.

590 publicly traded banks that have annual and quarterly consolidated financial statements along with data on executive compensation from SNL Financial were what Bayazitova and Shivdasani (2012), started with. They conduct a detailed search of publicly filed financial statements, press releases, news wires, and company websites for any disclosure by banks about their CPP applications. Of the 590 banks in the sample, they found 121 banks that disclose that they are not applying for funds under CPP. They refer to them as non-participating banks and the others as participating banks. Of the 469 participating banks, 268 banks received CPP infusions based on data from the U.S. Treasury. However, they find 51 banks that disclose that they received approval for CPP infusions but opted not to receive the funds. Therefore, their sample contains 319 banks that received approval for CPP but do not appear on the U.S. Treasury list of banks approved for CPP infusions. They treat these 49 banks along with the remaining 101 banks for which CPP status is unknown as banks that did not receive approval from the U.S. Treasury.

Berger et al., (2015) examine the effects of TARP on recipient banks' borrowers, they use the DealScan dataset on corporate loans, which has detailed information on deal characteristics for corporate and middle market commercial loans, they match the DealScan loan data with the Call Report for commercial banks, TARP transactions data and TARP recipients list from the Treasury's website, and borrower data from COMPUSTAT. The TARP report has 756 transactions included for 709 unique institutions (572 bank holding companies (BHCs), 87 commercial banks, 51 S&Ls and thrifts), since some institutions have multiple transactions – some received more than one TARP capital purchase and some made one or more repayments they exclude S&Ls and thrifts because datasets are not comparable with banks and these institutions compete in different ways to commercial banks and provide few corporate and middle market commercial loans. Then they merge the Call Report data with the TARP recipients list, totalling to 5,986 observations.

Under the title Did Saving Wall Street Really Save Main Street? The Real Effects of TARP on Local Economic Conditions by Berger and Roman (2016), they collect data from multiple resources, they use the period from October 2008 to December 2010 and the TARP recipient list from the Treasury website, they match these with Call Report IDs. This included 572 BHCs and 87 commercial banks. They also use other resources such as List of Corrective Actions, U.S. Census Bureau's Population Distribution House of Representatives website, Missouri Census Data Centre, Centre for Responsible Politics website, National Bureau of Economic Research, Tax Policy Centre, and Fraser Institute. They use a similar data set for their "Did TARP Banks Get Competitive Advantages?" (Berger and Roman, 2015).

Wilson and Wu (2012), obtain 2008 U.S. Securities and Exchanges 10-K accounting data from Compustat. They use end year of 2008, they have a total of 282 banks in their sample while only 250 have complete accounting control variable in their final sample. The authors also used CEO pay from SNL financial leading to a complete data set after the merge of 244 observations. Duchin and Sosyura (2014), collect mortgage application data from the Home Mortgage Disclosure Act Loan Application Registry which covers about 90% of mortgage lending in the U.S. they also gather data on corporate loan facilities from DealScan. There Data consists of 521 publicly traded firms from 2006 – 2010. Other sources include Call Reports and the Treasury Office of Financial Stability.

In a study by (Puddu and Waelchli, 2015); they merge data sets from Call Reports and foreign banking organizations to have in 2005, the final dataset containing 794 banks, and of

those 213 received financial support through the TARP program. Overall, banks provide loans in 2634 counties, while the TARP banks provide loans in 2026 counties. In 2010, the data set contains 635 banks that provided loans in 2650 counties. Of these banks 255 received the TARP financial support and they provide loans in 2113 counties. The data set includes around 10 percent of institutions that hand in Call Reports, and around 50 percent of all TARP banks. The data set is a panel of banks tracked from 2005-2010.

Li (2013), uses Bank data extracted from Call Reports published on the Chicago Fed's website, there were 7944 individual banks that filed 2008Q3 Call Reports. All foreigncontrolled banks were excluded from the sample, as they were not eligible for TARP investments, which leaves a sample of 7599 banks. Also excluded were banks acquired before 2009 second quarter, the final total were 7062 individual banks, out of these there was a total 518 banks and BHCs in the sample that received TARP capital. Black and Hazelwood (2013), study the effect of TARP on bank risk-taking, they construct their primary data from the Survey of Terms of Business Lending, from the period of October 2008 until January 2009. They have a total of 441 TARP recipients, after merging with data from the National Information Centre the sample is reduced to 295 and finally after all additions from Treasury a total of 81 banks are available in the data set.

Harris et al., (2013) Use data from the Financial Stability for the American Economy website, a sample frequency from October 2008, until December 2009 and data from Compustat, to have a total of 227 TARP recipients. According to previous research total number of TARP recipients are usually below the true number of recipients. This paper has similar figures to discussed papers.

#### 4.4. Methodology

#### **4.4.1 Introduction**

This chapter focuses on the post financial crisis of 2007-2008. It looks at the U.S. governmental intervention to help aid, support and guide the much-distressed financial sector after the downfall of many players in the market. Various stimulus packages were available to different institutions. This study focuses on the Troubled Asset Relief Program also known as TARP and more specifically the Capital Purchase Program (CPP) discussed in more detail in a previous part of this study. The focus is to see if regulated financial institutions paid back Treasury and not defaulted on their payments in a more consistent manner than standalone regulated financial institutions. To achieve this, various hypotheses were set and tested out before a conclusion on the subject. This section will focus on the methodological approaches of the study and will discuss the results in the section after this.

#### 4.4.2 Empirical Specifications

#### 4.4.2.1 Issuing equity post crisis

 $eq_{issue_{i,t}} = \alpha + \beta_1 CPP \ Banks_i \times post_t + i. \ year + \epsilon_{i,t}$ (5)

Equation (5) consists of a panel data from the years 2005 - 2013 looking at both regulated financial institutions that were part of TARP & CPP and regulated financial institutions that were not part of Treasury's intervention. We explore the assumption that equity issues increased after 2008 when the Treasury announced its intervention package to help the banking sector, the variables are explained as follows. The dependent variable  $eq_i issue_{i,t}$  is a dummy variable 1 if a depository issued equity 0, otherwise, each institution is defined as i by SNL institution key from the SNL data base. While  $\alpha$  is a representation of the intercept.  $\beta_1 CPP Banks_i \times post_t$  is the interaction between *CPP Banks* and *post* represent years after the financial crisis defined by *post* while *CPP Banks* are regulated financial institutions that have taken part in CPP a total of 333 commercial banks and BHCs. *i. year* are time effects on years from 2005 -2012, while  $\epsilon_{i,t}$  is the error term.

#### $eq_issue_{i,t} = \alpha + \beta_1 TARP \, Sub_i \times post_t + i. \, year + \epsilon_{i,t}$ (6)

The sixth equation (6) like the first consists of a panel data from the years 2005 - 2012 looking at both regulated financial institutions that were part of TARP & CPP and regulated financial institutions that were not part of Treasury's intervention. Like equation five, we explore the assumption that there were more equity issues for TARP bank subsidiaries or banks that are part of a group. This sheds light on the fact if TARP participants would have generally issued more equity due to the requirements of TARP for banks to issue preferred stock in exchange for liquidity. The dependent variable  $eq_issue_{i,t}$  is a dummy variable 1 if a depository issued equity 0, otherwise, each institution is defined as i by SNL institution key from the SNL data base and t for time. While  $\alpha$  is a representation of the intercept.  $\beta_1 TARP Sub_i \times post_i$  the interaction between TARP Sub and post represents years after the financial crisis defined by *post* while *TARP Sub* is regulated financial institutions that have taken part in CPP and are subsidiaries to companies that own 50% or more of the regulated financial institutions equal to 1 and 0 otherwise. There is a total of 70 subsidiaries. *i. year* are time effects on years from 2005 -2013, while  $\epsilon_{i,t}$  is the error term.

#### 4.4.2.3 Subsidiaries issuing equity post crisis with controls

## $eq_{issue_{i,t}} = \alpha + \beta_{1}TARP Sub_{i} \times post_{t} + \beta_{2}tier 1 capital_{-i,t} + \beta_{3}size_{i,t} + \beta_{4}roae_{i,t} + i.TARP Sub_{i} \times post_{t} + i.year + \epsilon_{i,t}$ (7)

Equation (7) like the previous last two equations consists of a panel data from the years 2005 - 2013 looking at both regulated financial institutions that were part of TARP & CPP and regulated financial institutions that were not part of Treasury's intervention. Like equation two, this adds control variables to represent the datasets Capitalization, bank size and performance, we also account for institution effects. The dependent variable  $eq_issue_{i,t}$  is a dummy variable 1 if a depository issued equity 0 otherwise, each institution is defined as i by SNL institution key from the SNL data base and t for time. While  $\alpha$  is a representation of the intercept.  $\beta_1 TARP Sub_i \times post_t$  the interaction between TARP Sub and post represent years after the financial crisis defined by post while TARP Sub are regulated financial institutions that have taken part in CPP and are subsidiaries to companies that own 50% or more of the regulated financial institutions equal to 1 and 0 otherwise. There is a total of 70 subsidiaries. Adding the controls on Capitalization and performance are two important aspects of when Treasury accepted applicants and size would give additional input on types of regulated financial

institutions, these controls were depicted as follows  $\beta_2 tier 1 capital_{i,t} + \beta_3 size_{i,t} + i. TARP Sub_i \times post_t$  controls the effect over subsidiaries whilst interacting with years after the crisis. *i. year* are time effects on years from 2005 -2013, while  $\epsilon_{i,t}$  is the error term. This model takes a difference and difference approach which requires the intervention or treatment, in this case the issuing of preferred stock by the financial institutions to Treasury. This is then modelled by comparing the difference between the main groups, in the case of subsidiaries receiving TARP funds and those that do not. This approach warrants that any disregarded time-invariant variables, which are interrelated with the selection method and the outcome of interest, will not be bias to the estimated effect.

### 4.4.2.4 Repaying more efficiently $repaid_{i,t} = \alpha + \beta_1 bank \, group_i + \epsilon_{i,t}$ (8)

Equation (8) uses a logistic regression to derive if financial institutions in groups repay Treasury more efficiently than their standalone brethren from the years 2005-2012. The use of a logistic regression is due to the fact our dependent variable is binary. The exploration on whether banks in groups repaid TARP more efficiently or not. The dependent variable **repaid**<sub>*i*,*t*</sub> is constructed by using a variable in the data set called **tarpstatus**, this variable discussed in the data section has a characteristic of "redeemed" status, in which the depository has successfully repaid Treasury. The variable is allocated a 1 if it has repaid and 0 otherwise. While  $\alpha$  is the intercept, **bank group**<sub>*i*</sub> is defined as 1 if it is allocated TARP funding and if it is of a parentgroup; which is defined as if it has a Parent Institution key, a variable given from the SNL database is allocated to more than one depository and 0 otherwise, there are 47 financial institutions part of a bank group and 173 that are not, this gives us a total of 220 financial institutions. While  $\epsilon_{i,t}$  is the error term.

### 4.4.2.5 Does the year matter? year outstanding<sub>i,t</sub> = $\alpha$ + bank group<sub>i,t</sub> + $\epsilon_{i,t}$ (9)

The dependent variable *yearoutstanding* is used in the equation to depict if the year the depository paid back Treasury had an affect or not. The variable was constructed by subtracting the year the depository repaid with the year TARP was issued, in which most were in 2008; however, some were issued after or they are still "participating" and that was controlled by subtracting 2016 the last year in the data set with the year it was issued. This gave a set of values from 0-8 in the amount of years it took to pay back TARP. We use this equation to validate if joining TARP at a specific date contributed to repayment or not. While  $\alpha$  is the

intercept, **bank group**<sub>i</sub> is defined as 1 if it is allocated TARP funding and if it is of a parent\_group; which is defined as if a Parent Institution key, a variable given from the SNL database is allocated to more than one depository and 0 otherwise, while  $\epsilon_{i,t}$  is the error term.

### 4.4.2.6 Repaying and the ARRA $repaid_{i,t} = \alpha + \beta_1 bank group_i + \beta_2 arra_{i,t} + \epsilon_{i,t}$ (10)

Like the above equation (10), this iteration uses a logistic regression to derive if financial institutions in groups repay Treasury more efficiently than their standalone brethren. We add new variable *arra* to depict the introduction of the American Recovery and Reinvestment Act of 2009, this warranted much debate on whether this Act lead to institutions to repay TARP and exit as soon as they could due to many restrictions especially on executive compensation. The dependent variable *repaid*<sub>*i*,*t*</sub> is constructed by using a variable in the data set called *tarpstatus*, this variable discussed in the data section has a characteristic of "redeemed" status, in which the depository has successfully repaid Treasury. The variable is allocated a 1 if it has repaid and 0 otherwise. While *a* is the intercept, *bank group*<sub>*i*</sub> is defined as 1 if it is allocated TARP funding and if it is of a parent group; which is defined as if a Parent Institution key, a variable given from the SNL database is allocated to more than one depository and 0 otherwise. *arra*<sub>*i*,*t*</sub> represents the American Reinvestment Recovery Act of 2009 it is defined as 1 if year is greater than 2009 and 0 if year is less than 2009. This dummy variable signifies if financial institutions paid back TARP to escape cuts in executive compensation, while  $\epsilon_{i,t}$  is the error term.

### 4.4.2.7 Repaying full model repaid<sub>i,t</sub> = $\alpha + \beta_1 bank \ group_i + \beta_2 arra_{i,t} \times post_t + \beta_3 npas/assets_{i,t} + \beta_4 size_{i,t} + \beta_5 roae_{-i,t} + i. year + \epsilon_{i,t}$ (11)

Continuing from the previous equation this regression adds an interaction between the ARRA and post which is defined as years greater than 2009  $\beta_2 arra_{i,t} \times post_t$ ,  $\beta_1 bank group_i$  is defined as 1 if it is allocated TARP funding and if it is of a parent group; which is defined as if a Parent Institution key, a variable given from the SNL database is allocated to more than one depository and 0 otherwise. Also control variables are added such as size and roae which measure the size of a depository institution and the performance respectfully.  $\beta_3 npas/assets_{i,t}$  is a variable to measure a financial institutions ability to cover loans, the ratio is taken from the SNL database in which they have taken non-performing assets by total assets. *i. year* are time effects on years from 2005 -2013, while  $\epsilon_{i,t}$  is the error term.

Equation seven gives a full representation if being part of a bank group warrants efficiently repaying the Treasury, if the American Recovery and Reinvestment Act of 2009 established a benchmark of more able banks to repay the Treasury and if certain control variables such as performance, bank size and the ability to cover loans were determinants of a bank's ability for repayment.

#### **4.4.3 Empirical Motivation**

We recall the discussion in subsection 3.3.2 on issues that motivate our choice of fixed effects. Very similar reasons to the one discussed in that subsection motivate our empirical methodology, we mention some of them here. There might be some other factor that affect capital issuance post the crisis that are correlated with participation in the CPP program. This omitted variable might affect the errors and the estimate of our coefficients. Part of the estimate would be picking up the effect of the omitted variable. We feel that this is less of an issue since we include time effects, which might sweep up some of the effects of these possible omitted variables. Moreover, we ran the regression with fixed effects as a robustness test and did not see a significant difference in the results. This increased our confidence in our results.

The difference between a logit and a probit are usually very slight to non-existent. The logit is generally easier to interpret. That is because the logit has a logit link function and not an inverse normal link function as the probit. This facilitates the interpretation of the coefficients we get from the model. Both models are similar since we use marginal effects to form my outcome.

Following is the Hausman test, which shows the validity of our approach, by rejecting the null hypothesis.

Table 14 Hausman Test

Variables	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
American Recovery Reinvestment Act	-0.582	-0.565	-0.0163	
Banks in Groups	3.438	19.723	-16.285	2.802
Bank Size	0.114	0.123	-0.008	
Return on Average Equity	-0.006	-0.006	0.000	
Non-Performing Assets/Total Assets	-0.341	-0.345	0.004	

b = consistent under Ho and Ha; obtained from xtlogit

B = inconsistent under Ha, efficient under Ho; obtained from xtlogit

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V\_b-V\_B)^(-1)](b-B)

= 30.68

Prob>chi2 = 0.0000 (V b-V B is not positive definite)

#### 4.5. Results

This section focuses on the hypothesised queries of the post financial crisis of 2007-2008, it looks at the U.S. governmental intervention to help aid, support and guide the muchdistressed financial sector after the downfall of many players in the market. Various stimulus packages were available to different institutions, this section focuses on the results on CPP discussed in more detail in a previous part of this study. The focus is to see if regulated financial institutions paid back Treasury and not defaulted on their payments in a more consistent manner than standalone regulated financial institutions. To achieve this, various hypotheses were set and tested out before a conclusion on the subject.

#### 4.5.1 Equity Issues & CPP Banks

Table 15 Margins Equation 5

	Margins Equation (5)
VARIABLES	Equity Issue
CPP Banks	0.0319***
	(0.00151)
Post CPP Banks	0.0160***
	(0.00159)
Time Effects	YES
Observations	116,352

Margins Equation (5) is a logistic regression consisting of 116,352 observations from the years 2005-2013. The dependent variable is a dummy variable 1 if a depository issued equity 0 otherwise. Snlkey represents financial institutions that have taken TAR P funding. While post is a dummy or years after the crisis. The interaction between snlkey and post represents TARP financial institutions interactions with post crisis. This model also uses yearly time effects.

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Margins equation (5) is a logistic regression; we present the results using marginal effects to show the change in probability when the predictor or independent variable increases by one unit. For continuous variables, this represents the instantaneous change given that the "unit" may be small. For binary variables, the change is from 0 to 1, so one "unit" as it is usually thought. The model investigates if financial institutions that participated in TARP issued more equity within the years after the financial crisis (2008- on wards). Time effects were used on years from 2005 - 2013, we can see that the years after the financial crisis starting from 2008 are significant with issuing equity, this leads us to believe that the positive

coefficient change for 2009 of .0116 is a 1.16% chance of increase for banks to issue equity, compared to a .07% increase in 2006. The results warrant the assumption as TARP participants were more likely to issue equity within those years.

Taking **CPP Banks** we can deduce that TARP participants were 3.19% more likely to issue equity of the sample year. While years after the crisis represented by **post** the results warrant no significance to the sample data. On the other hand, with the interaction between TARP financial institutions and years after the financial crisis represented by **Post CPP Banks** it is evident from the results that these participants did in fact issue more equity since the initiative of Treasury's methodology was buying preferred equity from regulated financial institutions in need of funding. This gave TARP participants around 1.16% a higher rate of issuing equity compared to non-TARP participants. This is in-line with previous research in which TARP injections had effects on banks risk-taking (Black and Hazelwood, 2013) and bank efficiency (Harris et al., 2013). The rationale behind this model is to assert that financial institutions that were injected with TARP funding did in-fact issue more equity especially from 2008 onwards. This promotes the idea that other financial institutions did not issue more equity if it was preferred stock or common stock to raise capital, and if they did it was not to the extent of TARP participants.

Margins Equation (6)				
VARIABLES	Equity Issue			
TARP Sub	0.0196***			
TARPSub Post	(0.00318)			
TAKI Sub Tost	(0.00357)			
Time Effects	YES			
Observations	57,388			

#### 4.5.2 Equity Issues & TARP Subs

Table 16 Margins equation 6

Margins equation (6) is a logistic regression consisting of 57,388 observations from the years 2005-2013. The dependent variable is a dummy variable 1 if a depository issued equity 0 otherwise. TARP\_sub is a dummy 1 if a depository is a subsidiary and has received TARP funding 0 otherwise. While post is a dummy or years after the crisis. The interaction between tarp\_sub and post representTARP financial institutions interactions with post crisis. This model also uses yearly time effects.

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Margins equation (6) looks at a similar approach of equation (5) with the difference in being TARP participants and subsidiaries (the definition of subsidiary is that a depository is owned by a parent company; the definition from SNL database would be 50% or more controlling shares). The years covered are from 2005 - 2013, 57,388 observations were accounted for in this model over the 8-year time span. The results are like previous model in which TARP participants issue more equity; however we do see that after the crisis subsidiaries for the sample data tended to issue less equity than prior the crisis by around (1.3%).

According to the research under took to complete this study no research has given input on subsidiaries of Bank Holding Companies or Financial Holding Companies on government injections of funds into the market. We can see that TARP subsidiaries have issued more equity like all other non-subsidiary TARP participants and that the interaction between TARP subsidiaries and years after the financial crisis, that there is greater issuing of equity than non-TARP subsidiaries even though it is less than 1% but there is more issuing as the sample issued less equity after the crisis than before. Taking into consideration time effects, the results also warrant to our assumptions that the issuing of equity has a significant and positive correlation with years starting with 2008 at the time of TARP initiation. Like the rationale of equation (5) confirming that TARP subsidiary participants issue more equity will lead to further assumptions that financial institutions part of a group "should" be more efficient in repaying TARP for reasons initiated by the Source of Strength Doctrine; these reasons consist of obligatory requirements from the parent company to help financially and managerially in times of needs. Also, this would warrant to stabilizing the economy which is the main inventiveness of TARP.

#### 4.5.3 Equity Issues, TARP Subs & Controls

Table 17 Margins Equation 7

	Margins Equation (7)	
VARIABLES	Equity Issue	
TARP Sub	0.00489***	
	(0.000806)	
post	-0.00303***	
-	(0.000959)	
TARPSub_Post	0.00271***	
_	(0.000823)	
tier1ratio	0.000493**	
	(0.000266)	
size	0.000360***	
	(0.000125)	
roae	-3.47e-05***	
_	(6.47e-06)	
Time Effects	YES	
Observations	48,317	

Margins equation (7) is logit regression with a similar approach to a difference and Difference regression which consists of 48,317 observations from the years 2005-2013. The dependent variable is a dummy variable 1 if a depository issued equity 0 otherwise. TARP\_sub is a dummy 1 if a depository is a subsidiary and has received TARP funding 0 otherwise. While post is a dummy or years after the crisis. The interaction between tarp\_sub and post represent TARP financial institutions interactions with post crisis. Tier\_1\_capital represents our capital proxy while size variable represents a proxy for the banks size if relative to its assets, roae is our performance proxy. This model also uses yearly time effects.

### Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

In margins equation (7) there is a reduction in number of observations to 48,317, the man variables do not change as the interaction between subsidiaries of TARP participants is significant corresponding to equation (6). The methodology of this model is similar to a difference and difference approach which is a version of fixed-effects estimation, becoming a widely accepted non-experimental tool for estimating causal relationships. The research design requires, initially, the identification of a specific intervention or treatment in our case would be the interaction between TARP subsidiaries and non-subsidiaries after the crisis in 2007-2008. Subsequently, the treatment effect is modelled by comparing the change (difference) between the outcome before and after the intervention for the group affected by the intervention to the corresponding difference for the unaffected group.

This approach of binary differencing ensures that any unobserved time-invariant variables, which are correlated with the selection process and the outcome of interest, will not bias the estimated effect. Our control variables that depict the financial institutions capital (tier1 ratio) Size (natural logarithm of total assets) and performance (Return on Average Equity) show significance to the model. Tier 1 ratio is a calculated figure of Tier 1 capital to Total Assets. As the significance is at 10% confidence with a coefficient of zero we cannot give the relevance of this variable, however, size indicates that the larger the bank, the possibility of

issuing equity is around .03% in respect to the size of the bank and how much equity it can issue which is related to the amount injected from TARP.

Our performance indicator is conveying results that, if a bank issues equity, the performance is at a negative value. This goes contrary with research from (Bayazitova and Shivdasani, 2012; Ng et al., 2011) in which less capitalized banks opted in to receive TARP injections. On the other hand, it is similar to research from (Berger and Roman, 2016, 2015; Black and Hazelwood, 2013) in which TARP participants were healthier and better performing; our results show that these variables are significant to the issuance of equity.

#### 4.5.4 Repaying & Bank Groups

Margin equation (8) focuses on a logistic regression of 493 observations, "repaid" being our dependent variable which represents TARP participants who have successfully paid back Treasury and bought back their preferred shares to our independent variable "bankgroup" which depicts if a depository is part of a group or not. We see that there is significance between "repaid" and "bankgroup" but this significance is negatively correlated; indicating that it is less likely for financial institutions to pay back Treasury if they are part of a bank group, the coefficient results suggests that it is 49% less likely for banks in groups to repay TARP. These results are inconsistent with the legislation in the Source of Strength Doctrine and the revised alteration of the Doctrine enforced by the American Reinvestment and Recovery Act of 2009 (Ashcraft, 2008; Bierman and Fraser, 1993b; P. Lee, 2012; Meyerowitz, 2012).

#### 4.5.5 Years Outstanding & Bank Groups

Contrary to previous research in which it has been noted that banks with better accounting performance, stronger capital ratios and fewer troubled loans and other assets exited TARP early (Wilson and Wu, 2012), we find that "yearsoutstanding" defined as years taken to exit TARP has no significance in correlation with "bankgroups", not going against the notion that banks with better performance, capital ratios and fewer troubled loans correlated with exiting TARP, being part of a group does not give a depository institution that type of edge, this is depicted in equation (9). Wilson and Wu (2012), also report that banks tried to avoid executive pay restrictions, so they opted out of TARP. While their research also mentioned that the first 8 banks that were forced into TARP exited early even though they had troubled loans and assets they had strong capital and performance ratios. Berger and Roman (2015), report banks that exited early also had competitive advantages to banks that remained. They also mention that banks that exited early were better performing, larger and more capitalized banks.

#### 4.5.6 Repaid, Bank Group & ARRA

Margin equation (10) like equation (8) is a logistic regression with 493 observations from the year 2005-2013, we add a dummy variable to represent the American Reinvestment and Recovery Act of 2009 which had important implications discussed earlier in the study such as cuts in executive compensation and revisions to the Source of Strength Doctrine. Results still show a significant but negatively correlated result to banks in groups repaying Treasury efficiently, like equation (8) the results show that it is 49% less likely to repay TARP if a bank is part of a group. Also results show significance at a 95% level of a negative effect of financial institutions repaying Treasury after entering ARRA, which leads to the assumption that after the ARRA if a bank has not already repaid TARP is 7% less likely to repay. Denoting that financial institutions entering TARP funding after the ARRA in 2009 would lead delayed or no payments back to the Treasury. Wilson and Wu (2012) note that banks after the initiation of the ARRA were smaller and did not perform or had similar Capitalization of banks prior to the induction of the ARRA. While we see that being part of a bank group has a higher possibility of not repaying or not paying as efficiently as stand-alone banks, it is evident that joining TARP after the initiation of ARRA also would have led to being less efficient or not being able to pay back TARP.

#### 4.5.7 Repaid, Bank Group, ARRA & Controls

Table 18 Margins Equation 11

	Margins Equation (11)
VARIABLES	Repaid
arra	-0.0449
	(0.0926)
Bankgroup	-0.378***
•	(0.0988)
arra bankgroup	0.0537
_ • •	(0.118)
size	-0.00477
	(0.0202)
roae	-0.000874
	(0.00128)
Npas/assets	-0.0251*
· _	(0.0140)
Time Effects	YES
Observations	267

Margin equation (11) is a logistic regression consisting of 267 observations from the years 2005-2014. The dependent variable is a dummy variable 1 if a depository repaid TARP 0 otherwise. ARRA is for the inception of the American Reinvestment and Recovery ACT of 2009, arra\_post is a dummy for years greater than 2009. Bank\_group is a dummy 1 if a depository is part of a group and 0 otherwise. 1 equal to years greater than 2009 0 otherwise. The interaction between arra\_post and bank\_group represents banks in groups that still have not paid back TARP after 2009.

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Previous models have shown that TARP participants (subsidiaries or non-subsidiaries) are more likely to issue equity after the 2007-2008 crisis, also if you are part of a bank group it is less likely you will repay the Treasury. Accounting measures like capital, performance and banks size warrant no significance to issuing equity, while the American Reinvestment and Recovery Act of 2009 has also no significant effect. Equation (11) adds control variables to the previous equation (10), we see a change in which years after the initiation of ARRA (arrapost) there is no significance; stating that if you received injections from TARP after ARRA it does not contribute to likelihood of repaying back the Treasury.

This result does not coincide with our previous equation (10) nor does it coincide with Wilson and Wu (2012), in which they mention financial institutions joining after the initiation of ARRA were less likely to exit ARP quickly. It is consistent with previous results in being part of a bank group still makes you unlikely to repay the Treasury. Results remain negatively significant in respect to our dependent variable "repaid" to the independent variable "bankgroup", however, the likelihood of not repaying drops from 49% to 38%. The interaction between ARRA and bank group shows no significance to likelihood of repaying the Treasury, this also denotes the idea of financial institutions joining after the ARRA initiation and being

part of a bank group hinders your ability in paying back the Treasury. Bank size and performance also do not warrant any indication of the likelihood of repaying back the Treasury. Non-performing assets to total assets shows a significance of 90%, having a negative correlation of 2.5% indicates financial institutions with more troubled loans and other assets are less likely to repay the Treasury. The number of observations drops to 267 from 490 due to missing values in accounting measurements.

As this model uses a logistic regression other forms of analysis were used to report coefficients such as previous models in using marginal effects. The use of logistic regression is appropriate when the dependent variable is binary or dichotomous. These forms of techniques are used when the dependent variable is binary and one or more of the independent variables are nominal, ordinal, interval or ratio-level (Wasserman and Pattison, 1996). We also use OLS regressions to find if our control variables such as Size, Non-performing assets to total assets, Return on Average Equity and Tier 1 Capital have correlation to bank groups or years outstanding available in the appendix. These tests reveal there is no implication on a stand-alone basis, which warrant as robustness checks, that being a larger or smaller depository institution, better performing or more capitalized which warrant no effects if you are part of a bank group or not.

The results shown go against all our hypotheses and rationales of legislation. TARP was initiated to revitalize the financial sector, using incentives for financial institutions to buy back their preferred stock at par value with a 5% increase before the end of 5 years, or 9% after that, and is considered good value for money. Banks in groups should have had a higher probability of repaying the Treasury due doctrines like the Source of Strength Doctrine. Better performing banks, larger banks and more capitalized banks should have also contributed to the aids of banks in groups to repay the Treasury like research from (Bayazitova and Shivdasani, 2012; Duchin and Sosyura, 2014; Wilson and Wu, 2012), however, results illustrate a different depiction to our rationale and legislation.

Regarding model fit, it is notable that the logit model we are using does not produce the Pseudo R-squared. We use the margins command which adjusts the coefficients of the output from the logit model, significance levels do not change at all. This restricts our ability to comment on the model fit.

#### **4.6 Conclusion**

The main objectives of TARP were to improve the stability of the financial system and increase the availability of credit. TARP was one of the largest government interventions in the U.S. during the recent financial crisis. The main component of TARP, the Capital Purchase Program (CPP), was a bank preferred stock and equity warrant purchase program led by the U.S. Treasury's Office of Financial Stability. The main objectives of TARP were to enhance the overall stability of the financial system, increase the availability of credit, and improve real economic conditions. This study aligns with the moral hazard theory, which could be described in two variations. Under the increased moral hazard theory, there may be increases in risk taking because of a perceived increased probability of future bailouts. The increases in risk taking may take the form of amplified supplies of bank loans and guarantees to riskier applicants, diminished supplies to safer applicants, or shifts from safer to riskier applicants without changing the overall quantities of loans and guarantees. On the other hand, under the decreased moral hazard theory, the surge in capital from the TARP injections may reduce moral hazard, resulting in shifts into safer portfolios, also with an profound effect on the overall loan and guarantee supplies (Berger and Roman, 2015).

Wilson and Wu's (2012) paper shows that higher CEO pay significantly increases the chances that a bank will leave TARP early. They find that larger banks, banks with a higher return on assets in 2008, banks which raised common or preferred stock in 2009, banks with stronger capital ratios, and banks with fewer problem assets were more likely to exit TARP before the end of 2009, little difference between banks that entered TARP after executive pay restrictions were added to the investments in February 2009. What they do find is that those latter participants were significantly smaller and had significantly less capital and more problem assets. The American Recovery and Reinvestment Act of 2009 enacted in February 2009 not only imposed ex post restrictions on TARP recipients' pay practices, but also it made it easier for banks to leave TARP early. They stated no publicly traded bank that entered after the ARRA legislation chose to exit TARP in 2009. While they did confer that CEO pay, accounting performance metrics, and capital measures do predict TARP exit, they cannot explain why banks often replaced cheap government capital with more expensive private capital. Hence, the decision by most banks to exit the TARP programs cannot be easily reconciled with standard investment analysis. There are many studies that address which banks enter or are selected for TARP. This is does not lend much support to the claims that adverse selection became more prevalent after the ARRA legislation added more restrictions on TARP
recipients. Instead, post-ARRA banks were less concerned with executive pay restrictions and any stigma associated with TARP (Wilson and Wu, 2012).

The study is very closely related to Wilson and Wu (2012), in terms of who exited TARP, our focus is on bank groups. Bank groups should have had a better probability of exiting TARP, many factors supporting this notion as banks owned by larger companies have support of their parent company in times of financial distress. This notion has a legal standpoint from the Source of Strength Doctrine. The decreased moral hazard theory gives assumptions that an increase in capital will reduce moral hazard, resulting in shifts into safer portfolios and have effect on the overall loan and guarantee supplies. The results illustrated a different scenario, being part of a bank group did not give a better probability to repay TARP in fact it was less likely to repay TARP, financial institutions did not show significance in post ARRA initiation, while accounting metrics such as performance and bank size had no significance on the financial institutions attribution to pay back TARP. Non-performing assets to total assets were significant at 5%, inferring that regulated financial institutions with less non-performing assets to total assets are more likely to repay TARP.

We attribute the findings to related increased moral hazards. Specifically, although TARP recapitalized troubled banks, the repaying efficiency of the banks in groups were weaker because the government intervention showed no sign of enforcing legislation such as the Source of Strength Doctrine or the addition of the American Reinvestment and Recovery Act of 2009. Results also reveal that when new government legislation was introduced in 2009 financial institutions were not motivated enough to pay back the Treasury. The study makes a notable contribution to the growing literature on TARP, as well as the literature on bank groups around financial crises and regulatory reforms. In addition, results have important implications for policymakers. The results suggest that future bailout schemes should have efficiency requirements as bailouts contributes to moral hazard if tighter regulation is not enforced in complete repayment (Treasury selling at auctions for discounts and other ways of not collecting full amounts).

# **Chapter 5: How were the TDGP funds used?**

### 5.1 Introduction

The Temporary Liquidity Guarantee Program (TLGP) was intended to be a time-limited program. The FDIC's initial guarantee under the TDGP expired on the earlier of the maturity date of the debt or June 30, 2012, for newly issued senior unsecured debt issued through June 30, 2009, by entities that opted into the Temporary Debt Guarantee Program (TDGP). To reduce market disruption at the end of the TDGP and to facilitate the orderly exit of the program, in 2009, the FDIC extended the issuance period for senior unsecured debt through October 31, 2009, and similarly extended the FDIC's guarantee on such obligations to the earlier of the stated maturity date of the debt or December 31, 2012. Later in 2009, the FDIC would have permitted approved entities to issue FDIC-guaranteed debt through April 30, 2010, for which the FDIC's guarantee would have expired on the earlier of the stated maturity date of the FDIC collected \$10.4 billion in fees and surcharges under the TDGP. As of December 31, 2012, the FDIC had paid \$153 million in losses resulting from six participating entities defaulting on debt issued under the TDGP. Most of these losses (\$113 million) arose from banks with outstanding TDGP notes that failed in 2011 and were placed into receivership (Federal Register, 2015).

We discuss the notion of liquidity prior and after the FDIC initiation. We distinguish between two different liquidity objectives of the FDIC's TDGP initiation, and their relevant effects on the industry. To understand the workings of financial system liquidity, as well as the role of the objectives of the FDIC, we bring together relevant literature from different areas and review liquidity linkages among these three types of liquidity; central bank liquidity, market liquidity and funding liquidity. In October 2008, acting in response to disruptions to the US credit the Federal Deposit Insurance Act (FDI Act), the Board of Directors of the Federal Deposit Insurance Corporation (FDIC) and the Board of Governors of the Federal Reserve System (FRB) recommended that the Secretary of the Treasury, with the President, decided to exit the financial distress encompassed in the nation's financial system. After the Treasury Secretary's determination of systemic risk, the FDIC was authorized to act or to aid as necessary to avoid or to mitigate the effects of the perceived risks to the financial system. The FDIC issued Federal regulations that established the TLGP. The TLGP was composed of two distinct components: The Temporary Debt Guarantee Program (TDGP) and the Transaction Account Guarantee Program (TAGP). The TDGP provided a temporary FDIC guarantee for all newly issued senior unsecured debt issued by participating entities up to prescribed limits; the TAGP

provided a temporary FDIC guarantee for all funds held at FDIC-insured depository institutions in noninterest-bearing transaction accounts above the existing deposit insurance limit.

The chapter focuses on several aspects, (i) does loan supply increase after the TDGP initiation for TDGP depository institutions? (ii) Does liquidity strength increase for TDGP participating depository institutions after the initiation? (iii) Did TARP participants who also participated in TDGP use TDGP funds to repay Treasury? (iv) Do larger banks have higher loan supply and stronger liquidity positions? We took information available if depository institutions 'opted-in' or 'opted-out' of the program from the SNL database. With this we had our two groups to compare if our proxies changed within two periods. The first period consisted of the time prior to the completion of fund injection, from 2004 to the end of the TDGP funding session in 2012. The second-time period is from 2013 until 2016 where depository institutions would have dispersed their funding and liquidated the market. In terms of proxies used we took similar approaches to papers from Aspal and Dhawan, (2016) in which they used the CAMELS rating system to select their proxies for the each category. From the CAMELS system the "L" for liquidity we choose loan supply to be represented by loans growth rate, furthermore, we take into consideration two proxies for strength of liquidity. The first is liquidity ratio, a variable used by the SNL data base to calculate the liquidity strength of a depository institution. The second choice is Gap ratio, the use of gap ratio is mainly for sensitivity testing of a depository institution since it relies on interest rate sensitivity. Gap ratio has been used to measure a depository institutions liquidity position. We used a dummy variable to represent large banks and another dummy variable to represent depository institutions that took part in the TDGP and TARP programs.

The results for strength of liquidity are similar to Berger et al., (2016), in which the creation of liquidity by banks is essential for the macroeconomy, these issues are of importance for academics, bank regulators, and policymakers. Regulatory interventions are generally associated with statistically and economically significant reductions in both risk taking and liquidity creation in the short run. We also find that capital support is associated with statistically significant decreases in both loan supply and increase in liquidity strength, loan supply and liquidity strength analysis suggest that most of the changes in liquidity creation occur in the short term and remain in place in the long run. In terms of policy implications, the results suggest that regulatory interventions and capital support have intended and unintended consequences. Furthermore, like Vazquez & Federico, (2015) we agree that marginal stability gains associated with stronger liquidity and capital cushions do not appear to be large for the

average bank but seem substantial for the weaker institutions. At the same time, there is evidence of systematic differences across bank types. The smaller banks were more susceptible to failure on loan supply as they showed less capability in providing loans compared to larger depository institutions. This difference is crucial from the financial stability perspective and implies that regulatory and supervisory emphasis should be placed on ensuring that the loan capability buffers of the systemically important banks are commensurate with their ability to provide.

Furthermore, we looked at allegations from several media outlets alleging that participants from the Troubled Asset Relief Program (TARP) who also participated in the TDGP used their funds from the TDGP not to strengthen their liquidity standings nor to increase loan supply but to repay Treasury for funds received that had harsher restrictions such as compensation cuts (Braithwaite, 2009; Gongloff, 2012; Prins, 2009). Results warranted that these allegations could have a solid ground since both loan supply and liquidity showed decreased values compared to depository institutions that did not take part in either program. Previous literature covers certain aspect of TARP such as; Bayazitova and Shivdasani (2012) investigate the basic characteristic of banks that received capital infusions under TARP. They find that TARP participating banks are larger, have weaker capital ratios, are more exposed to funding risk, and have significantly stronger loan portfolios than non-recipients. (Duchin and Sosyura, 2014, 2012) and Li (2013) argue that besides bank characteristics, banks' political and regulatory connections also play a significant role in the allocation of TARP funds. They also find Capital Purchase Program (CPP) participating banks are larger, have lower capital ratios, and have better asset quality. Berger and Roman (2015), use data on commercial banks within the US the years studied are from (2005-2012), they show that TARP provided competitive advantages to TARP recipients which led to an increase of both the market share and market power relative to banks that did not receive TARP funding.

In terms of similar studies, we find during the subprime crisis, the Federal Reserve introduced several emergency liquidity programs as supplements to the discount window (DW): The Primary Dealer Credit Facility (PDCF), the Term Securities Lending Facility (TSLF) and the Term Auction Facility (TAF). Using data on loans to large commercial banks and primary dealers, the authors found that the programs were used by relatively few institutions and provided limited reprieve to banks that relied on short-term debt markets. Although usage increased, most commercial banks avoided the DW and TAF. The programs were more often used by failed European banks than by strong US banks, likely because these

loans are expensive relative to private market funds. Also, usage of PDCF and TSLF programs, while higher, was more often used by primary dealers in weaker financial position (Helwege et al., 2017). These were alternatives to using intervention funds to rejuvenate and revitalize depository institutions that needed funding for various reasons.

Other studies that deliberate on financial intermediation include Berger and Bouwman, (2009) in which they state that the modern theory of financial intermediation portrays liquidity creation as an essential role of banks, comprehensive measures of bank liquidity creation does not exist. The authors construct four measures and apply them to data on virtually all U.S. banks from 1993 to 2003. Berger and Bouwman find that the relationship is positive for large banks and negative for small banks in terms of bank liquidity creation is positively correlated with bank value by testing recent theories of the relationship between capital and liquidity creation.

Also, the theory of financial intermediation highlights various channels through which capital and liquidity are interrelated states (Distinguin et al., 2013). Using a simultaneous equations framework, the authors investigate the relationship between bank regulatory capital and bank liquidity measured from on-balance sheet positions for European and US publicly traded commercial banks. Previous research studying the determinants of bank capital buffer indicates negligence of the role of liquidity. They find that banks decrease their regulatory capital ratios when they face higher illiquidity as defined in the Basel III accords or when they create more liquidity as measured by Berger and Bouwman (2009). Vazquez and Federico, (2015) use a bank-level dataset to study the connection between structural liquidity and leverage in bank balance sheets in the run-up to the global financial crisis, and the likelihood of subsequent failure. Berger et al., (2016) study the effects of regulatory interventions and bailouts on banks' liquidity creation. And Khan et al., (2017) examine the relationship between funding liquidity and bank risk taking. Using quarterly data for U.S. bank holding companies from 1986 to 2014, evidence is found that banks having lower funding liquidity risk as proxied by higher deposit ratios, take more risk. Not much studies focused on TDGP. The ones that do mention TDGP focuses on if banks took money from TDGP and Paid TARP. This chapter on the other hand studies TDGP and focuses on its effects.

The remainder of this chapter is divided as follows; section 6.2 discusses literature and definitions of liquidity. Section 6.3 looks at the contribution, hypothesis, variable definitions, descriptive statistics and data. Section 6.4 covers our identification strategy and equations

based on our hypothesis, while section 6.5 explains the results in brief, ending with section 6.6, which discusses our results and our conclusion.

#### **5.2 Literature Review:**

#### **5.2.1 Introduction:**

The FDIC's Temporary Liquidity Guarantee Program (TLGP) consists of two main sub-groups; Transaction Account Guarantee Program (TAGP) and the Temporary Debt Guarantee Program (TDGP), which is the interest of this paper. The centre topic of the TDGP revolves around liquidity, in this section we shall cover various approaches to liquidity in the past and look at the importance of liquidity measurements, risks and policy implications that affect the financial industry. Since we have not come across many papers that cover TDGP, this paper will discuss a void in literature regarding this intervention that has received almost no news or headlines from the public. Those papers that have discussed TLGP have agreed in general that information is not publicly available.

Bank liquidity has become an important focus of financial regulatory reforms since the dangers of liquidity crises became all too apparent in the recent Global Financial Crisis. In response to ongoing regulatory pressure and the introduction of the Dodd-Frank Wall Street Reform and Consumer Protection Act in July 2010, large US banks have increased the amount of liquid securities and cash to be better prepared in future crisis. However, it is uncertain whether the new emphasis on funding liquidity requirements suggested in the new Basel III guidelines globally and in the Dodd-Frank Act within the U.S. will make banks less risky and the whole financial system more stable going forward (Khan et al., 2017). Therefore, we look at the definition of liquidity and past research on the subject. While regulatory interventions and capital support take place in many countries, data on such actions are typically impossible to obtain and previous studies are therefore usually confined to analysing the effects of laws and regulations on bank soundness (Barth et al., 2004; Demirgüç-Kunt et al., 2008).

#### **5.2.2 Liquidity definition:**

We define liquidity for the purpose of this paper the same way Strahan (2008), defines it. Banks' role in providing funding liquidity (the ability to raise cash on demand; strength of an institutions ability in raising cash.) and market liquidity (the ability to trade assets at low cost – low cost of funding), and how these roles have evolved; which are the two main goals of the FDIC's TDGP program. Traditional banks made illiquid loans funded with liquid deposits, therefore producing funding liquidity on the liability side of the balance sheet. Deposits are less important in today's banks, but funding liquidity from lines of credit and loan commitments has become more important. Many institutions besides banks provide market liquidity in similar ways, but banks dominate in producing funding liquidity because of their comparative advantage in managing funding liquidity risk. This advantage stems from the structure of bank balance sheets as well as their access to government-guaranteed deposits and central-bank liquidity (Strahan, 2008).

Financial liquidity is a subtle notion, yet of high dependency for the sound functioning of the financial system. Considering the financial market rigidities from the last global financial crisis emphasises this. These problems appeared as liquidity in financial industry declined significantly, following credit curbs in the interbank segment. Since banks refused to lend to each other because of funding liquidity problems relating to uncertainty over their exposure to structured products. The amount of exposure was a significant because market liquidity of these structured assets had declined significantly, in that way reinforcing difficulties in valuing such products. As a result, central banks intervened and injected liquidity types and has recorded broad linkages between them. However, it mainly treated the different concepts of liquidity in a rather fragmented way, because it aimed at explaining issues not necessarily related to financial liquidity and liquidity linkages. As a result, it has yet to provide an analysis of the various liquidity types into a context focused only on liquidity (Nikolaou, 2009). We will look at liquidity per our definition; market and funding liquidity.

#### 5.2.2.1 Market liquidity

Changes in banking over the past two decades reflect moving from a model of 'originate and hold' to one of 'originate and sell.' The first model involved creation of funding liquidity through asset transformation from loans to deposits. This traditional model has been reshaped by the growth of loan sales and securitization. In the modern approach, the bank creates market liquidity rather than funding liquidity; that is, the bank (or other intermediary) transforms a hard-to-sell asset like a loan into one that is easier to sell, like a bond. This allows the originating bank to sell the asset to passive investors and re-cycle their capital to originate new loans, which can in turn be transformed and sold (Strahan, 2008).

The notion of market liquidity has been around at least since Keynes. However, many years later was there an agreed upon definition. Many recent studies define market liquidity as the ability to trade an asset at short notice, at low cost and with little impact on its price. It therefore becomes obvious that market liquidity should be judged on several grounds (Nikolaou, 2009). As Keynes noted; it incorporates key elements of volume, time and transaction costs. Liquidity then may be defined by three dimensions that incorporate these elements: depth, breadth (or tightness) and resiliency. These dimensions ensure that any

amount of assets can be sold anytime within market hours, rapidly, with minimum loss of value and at a competitive price (Nikolaou, 2009).

Academic interest has been broad regarding the properties of market liquidity and its importance on the functioning of markets. There is a positive covariance between individual stock liquidity and overall market liquidity. Additionally, Chordia et al., (2005) have documented that liquidity is correlated across markets, specifically across stocks and across stocks and bonds. In fact, Brunnermeier and Pedersen, (2005) provide a theoretical framework which vindicates cohesion of liquidity across assets and markets in general through the microstructure analysis of the behaviour of traders. Literature also records a negative (positive) relation between liquidity and asset prices (Acharya and Pedersen, 2005). Additionally Nikolaou, (2009) mentions two types of market liquidity. The liquidity in the interbank market, where liquidity is being traded among banks and the liquidity in the asset market, where assets are being traded among financial agents. These two types are the main sources for a bank to acquire funding liquidity from the markets.

Concentrating on the interbank market, funding liquidity risk is directly linked to interbank market liquidity risk. As Diamond and Rajan, (2001) explain, banks are linked by a common market for liquidity. Individual bank failures can potentially shrink the common pool of liquidity which links all banks together and therefore the liquidity shortage proliferates to other banks through excessive early restructuring, causing a taint of failures until a complete meltdown of the system. Such a destructive mechanism can work through the extensive linkages among banks. The latter relate to the highly inter-connected bank payment systems, to balance sheet linkages or, more generally, cross-holdings of liabilities across banks. Furthermore, they can take the form of informational spill over to the interbank market, leading to generalised bank runs. This scenario of illiquidity can lead to market illiquidity.

#### 5.2.2.2 Funding liquidity

Banks have traditionally provided funding liquidity to customers by issuing transactions deposits that act as a close substitute for currency based from deposits. Transactions deposits allow account holders to take cash on demand from the bank. Balance depositors hold in their accounts what can be invested by the bank in loans to businesses and households. Since banks tend to invest in illiquid loans, this business model has been called 'asset transformation' - banks transform illiquid and hence high-yield assets (loans) into liquid and thus low-yield assets (deposits) (Strahan, 2008). The yield spread creates positive carry for the bank. Loans are illiquid because banks lend to small and medium-sized businesses without

access to broad securities market. To do such lending, banks collect private information on credit risk and future growth opportunities and monitor borrowers over the life of the loan (Strahan, 2008).

Compared to loans, deposits are low in risk and high in liquidity. Bank deposits possess the three attributes theorists ascribe to money, a store of value, they are denominated in the economy's unit of account, and they can be used as a medium of exchange. For deposits to act as an effective store of value, banks must minimize the risk to depositors that their claims will not be honoured at face value; hence low risk and high liquidity go hand in hand. Banks also produce funding liquidity by issuing lines of credit, much as a demand deposit allows customers to take cash at any time. The difference between a demand deposit versus a line of credit (a credit card) is that the line is not pre-funded. As an alternative, the customer borrows from the bank when they take cash, typically at a pre-arranged rate of interest. Consequently, the moral hazard from deposit insurance encourages banks to invest in risky assets like loans and may play some role in explaining bank structure (Strahan, 2008).

Combining exposure to funding liquidity on both the asset and liability sides of the balance sheet provides the measure of liquidity stability for banks. Kashyap et al., (2002) argue that demands for funding liquidity by borrowers and depositors tends to be less than perfectly correlated, so combining the two products offers some diversification benefits. Also, Saidenberg and Strahan, (1999) study the LTCM crisis during 1998 and find that bank lending increased to satisfy a systematic increase in loan demand from firms that normally receive liquidity in the commercial paper market, but that this increase in liquidity demand from borrowers was offset by funding inflows by depositors. Gatev and Strahan, (2006) study these flows across many market conditions and find that both bank loans and their holdings of cash and securities increase when market liquidity dries up generally.

Evidence suggests that by offering liquidity from lines of credit, bank expose themselves to the systematic risk that they may face loan take downs across many borrowers at the same time. Taking on this risk requires access to funds at exactly the time that most firms find borrowing expensive. Banks enjoy an increase in funding supply at exactly such times because they are viewed as a haven for funds. Since banks tend to combine these two products, flows into the bank deposit accounts tended to balance outflows of funds from unused lines of credit Strahan et al.,( 2006). The Basel Committee of Banking supervision defines funding liquidity as the ability of banks to meet their liabilities, unwind or settle their positions as they come due (BIS, 2008). Correspondingly, the IMF provides a definition of funding liquidity as the ability of solvent institutions to make agreed upon payments in a timely fashion. Yet, references to funding liquidity have also been made from the point of view of brokers (Brunnermeier and Pedersen, 2009) or investors (Strahan, 2008), where funding liquidity relates to their ability to raise funding at short notice. This can be clearly seen in practice, where funding liquidity, being a flow concept, can be understood in terms of a budget constraint. Specifically, an entity is liquid if inflows are bigger or at least equal to outflows. This can hold for, banks, investors and traders. This paper mainly focuses on the funding liquidity of banks, given their importance in distributing liquidity in the financial system (Drehmann and Nikolaou, 2013).

#### 5.2.2.3 Central Bank liquidity

The role of the central bank is unique due to its size and its immunity to bankruptcy Flannery, (1996), but also because it is the only agent interested in maintaining aggregate welfare, having in its disposal the apparatuses to enable market stabilisation. These apparatuses are liquidity provision apparatuses, which includes emergency liquidity provision acting as a Lender of Last Resort, complementary to which, they can also mobilise their supervisory and regulatory role. Generally, there is no doubt that the central bank has the ability and the right to provide emergency liquidity assistance. The problem faced in central bank interventions is on information asymmetries that hinder the distinction between illiquid and insolvent banks. The inability to distinguish between illiquid and insolvent borrowers can also create problems for the central banks liquidity to funding and to market liquidity, which in turn hurt the central bank itself. The link to funding liquidity is direct, by rescuing insolvent institutions the central bank is obliquely penalising solvent but illiquid banks mainly because it increases their costs of funding. This could render them unable to borrow or to repay the loan, thereby enhancing their funding liquidity risk. A misallocation of central bank liquidity can promote excessive risk taking by banks and create moral hazard (Nikolaou, 2009).

Central bank liquidity is the ability of the central bank to supply the liquidity needed to the financial system. It is typically measured as the liquidity supplied to the economy by the central bank, it relates to central bank operations liquidity, which refers to the amount of liquidity provided through the central bank auctions to the money market according to the monetary policy stance. The central bank uses its monetary policy instruments to affect the liquidity in the money markets so that the interbank rate is closely aligned to the operational target rate set by the prevailing monetary policy stance (Nikolaou, 2009). The Central Bank, the 'lender of last resort', central banks should lend to illiquid but solvent banks at a penalty rate. Some have argued that such targeted liquidity support may worsen moral hazard problems associated with bailouts. Instead, open market operations that expand the total supply of liquidity are preferable. Such broad expansions of liquidity can be recycled in the interbank lending market without (or with less) moral hazard (Goodfriend and King, 1988).

#### 5.2.3 CAMELS with a silent "M"

CAMELS acronym stands for Capital adequacy, Asset quality, Management, Earnings and Liquidity. Regulators created an additional measure, Sensitivity, to evaluate market risk associated with changing interest rates and other factors. The variables in this paper are based on the CAMELS rating system, a device created by federal banking regulators to assess the overall performance of commercial banks. However, we eliminate the management aspect of the rating system, our initial use of CAMELS is to use industry standards for proxy use. This drop of the M variable is partially mitigated by the fixed effects and the time effects we include in the regressions. Moreover, M is considered an operating efficiency measure, and we think size proxies for that. The general definitions for the acronyms are as follows.

Capital adequacy is a critical indicator of the financial soundness of a bank. To endure, a depository institution must protect the stakeholder confidence and prevent bankruptcy. Capital is assumed to be a cushion that offers protection to stakeholder' and it enhances the stability and efficiency of bank. Capital adequacy represents the overall financial position of a bank. It reflects whether the bank has sufficient capital to bear unexpected losses in the future and bank leverage. The capital adequacy of a bank is assessed through following many ratios: Capital to Risk-weighted Assets Ratio; advocated to ensure that banks can bear a reasonable amount of losses occurring during the operations and to ascertain bank's loss bearing capacity. Higher the ratio reflects that banks are stronger, and the investors are more protected. Capital to Risk-weighted Assets Ratio is calculated by dividing Tier-I and Tier-II capital with Risk Weighted Assets. Tier 1 capital includes shareholders' equity; perpetual noncumulative preference shares, disclosed reserves and innovative capital instruments. Tier 2 capitals include undisclosed reserves, revaluation reserves of fixed assets and long-term holdings of equity securities, general provisions/general loan loss reserves; hybrid debt capital instruments and subordinated debt (Aspal & Dhawan, 2016). These are some of the industries proxies for capital adequacy.

Assets Quality assesses the degree of financial strength of a bank. The principal purpose to measure the assets quality is to determine the composition of non-performing assets as a percentage of the total assets. The quality of credit portfolio expresses the profitability of banks. The major concern of all commercial banks is to keep the amount of non-performing loans to a low level. This is so because high non-performing loan affects the profitability of the bank (Aspal & Dhawan, 2016).

Earning Quality high earnings quality should reflect the firm's current operating performance and is a good indicator of future operating performance. The quality of earnings is an extremely significant parameter, which expresses the quality of profitability and capability of a bank to sustain quality and earning consistently. It primarily reflects the profitability of bank and enhances consistency of future earnings (Aspal & Dhawan, 2016).

Liquidity for financial Institutions states that although more liquid assets enhance the ability to raise cash on short-notice, it also reduces management's ability to commit credibly to an investment strategy that protects investors. Liquidity expresses the financial performance of banks. Liquidity means the ability of the bank to honour its obligations toward depositors. Bank can preserve adequate liquidity position either by increasing current liabilities or by converting its assets in to cash quickly. It also denotes the fund available with a bank to meet its credit demand and cash flow requirements. (Aspal & Dhawan, 2016).

Sensitivity is expressed as the risk that occurs due to alteration in market conditions, such changes could adversely impact earnings and/or capital. Market risk includes exposures associated with changes in interest rates, foreign exchange rates, commodity prices, equity prices, and such. However, the primary risk in most banks is interest rate risk. The sensitivity of the market risk is assessed by banks through changes in interest rate, foreign exchange rates and equity prices. The changes in these variables effects earning ability of the bank. So, sensitivity to market risk expresses how adversely the bank is affected due to such changes. GAP Analysis is a tool used to judge a bank's earnings exposure to interest rate movements. A bank's gap over a given period is the difference between the value of its assets that mature or reprice during that period and the value of its liabilities that mature or reprice during that period. If this difference is large, then interest rate changes will have large effects on net interest income. A balanced position would result if the amount of repricing assets were exactly offset by the repricing liabilities. A ratio less than 1.0 indicates a bank that is liability sensitive (liabilities reprice quicker than assets), while a ratio greater than 1.0 indicates that the bank's

assets reprice faster than liabilities (asset sensitive). GAP is the difference between risk sensitive assets and risk sensitive liabilities. Whereas, risk sensitive assets are the sum of net advances, net investments and money at call. Risk sensitive liabilities are the sum of deposits and borrowings of the bank. (Aspal & Dhawan, 2016).

#### 5.2.4 Recent Bank Liquidity and Risk Studies

Capital and liquidity are distinct but related notions. Each plays an essential role in understanding a bank's capability and solvency. Liquidity is a measure of the ability and ease with which assets can be converted to cash. Liquid assets are those that can be converted to cash quickly if needed to meet financial obligations. To remain workable, a financial institution must have enough liquid assets to meet its near-term obligations, such as withdrawals by depositors. Capital acts as a financial cushion to absorb unexpected losses and is the difference between all a firm's assets and its liabilities. To remain solvent, the value of a firm's assets must exceed its liabilities. Over time, banks have failed or required government assistance because they had inadequate capital, a lack of liquidity, or a combination of the two.

Strahan, (2008) considers banks' role in providing funding liquidity and market liquidity, and how these roles have evolved. Many institutions besides banks provide market liquidity in similar ways, but banks dominate in producing funding liquidity because of their comparative advantage in managing funding liquidity risk. This advantage stems from the structure of bank balance sheets as well as their access to government-guaranteed deposits and central-bank liquidity. Brunnermeier and Pedersen, (2009) provide a model that links an assets' market liquidity and traders' funding liquidity. They state that traders provide market liquidity, and their ability to do so depends on their availability of funding. Equally, traders' funding depends on the assets' market liquidity. Under certain conditions, margins are destabilizing, and market liquidity and funding liquidity are mutually reinforcing, leading to liquidity spirals. Their model explains the empirically documented features that market liquidity (i) can suddenly dry up, (ii) has commonality across securities, (iii) is related to volatility, (iv) is subject to "flight to quality," and (v) co-moves with the market.

Distinguishing between three different liquidity types Nikolaou, (2009), lists central bank liquidity, funding and market liquidity and their relevant risks. To understand the workings of financial system liquidity, as well as the role of the central bank, relevant literature from different areas and review liquidity linkages among these three types in normal and turbulent times. Liquidity risk lies in information asymmetries and the existence of incomplete

markets. The role of central bank liquidity can be important in managing a liquidity crisis, yet it is not an answer. It can act as an immediate but temporary buyer to liquidity shocks, thereby allowing time for supervision and regulation to confront the causes of liquidity risk.

Authors such as Berger and Bouwman, (2009) state that the modern theory of financial intermediation portrays liquidity creation as an essential role of banks, comprehensive measures of bank liquidity creation do not exist. The authors construct four measures and apply them to data on virtually all U.S. banks from 1993 to 2003. They find that bank liquidity creation increased every year and exceeded \$2.8 trillion in 2003. Large banks, multibank holding company members, retail banks, and recently merged banks created the most liquidity. Bank liquidity creation is positively correlated with bank value. By testing recent theories of the relationship between capital and liquidity creation, Berger and Bouwman find that the relationship is positive for large banks and negative for small banks.

A measure for funding liquidity risk based on publicly available data remains so far elusive. Drehmann and Nikolaou, (2012) attempt to address this gap by showing that aggressive bidding at central bank auctions reveals funding liquidity risk. They can extract an insurance premium from banks' bids, which is proposed as a measure of funding liquidity risk. Using a unique data set consisting of all bids in all auctions for the main refinancing operation conducted at the ECB between June 2005 and October 2008, results show that funding liquidity risk is typically stable and low, with occasional spikes especially around key events during the recent crisis. They document downward spirals between funding liquidity risk and market liquidity. As measurement without clear definitions is impossible, they provide definitions of funding liquidity risk.

The theory of financial intermediation highlights various channels through which capital and liquidity are interrelated states (Distinguin et al., 2013). Using a simultaneous equations framework, the authors investigate the relationship between bank regulatory capital and bank liquidity measured from on-balance sheet positions for European and US publicly traded commercial banks. Previous research studying the determinants of bank capital buffer indicates negligence of the role of liquidity. They find that banks decrease their regulatory capital ratios when they face higher illiquidity as defined in the Basel III accords or when they create more liquidity as measured by Berger and Bouwman (2009). Considering other measures of illiquidity that focus more closely on core deposits in the United States, results show that small banks strengthen their solvency standards when they are exposed to higher illiquidity.

Empirical investigation shows the need to implement minimum liquidity ratios in line to capital ratios, as stressed by the Basel Committee; however, they also shed light on the need to further clarify how to define and measure illiquidity and on how to regulate large banking institutions, which behave differently from smaller ones (Distinguin et al., 2013). We have looked at the definitions of liquidity and will attempt to differentiate between large depository institutions with small ones.

Vazquez and Federico, (2015) use a bank-level dataset to study the connection between structural liquidity and leverage in bank balance sheets in the run-up to the global financial crisis, and the likelihood of subsequent failure. They explore for potential differences in the relative importance of liquidity and capital buffers on the likelihood of failure across bank types, distinguishing between large globally-active banks, and domestic retail-oriented institutions. They try to answer the following questions: (1) are there any connections between structural liquidity and leverage in bank balance sheets during the pre-crisis period and the probability of subsequent failure? And (2) is there evidence of systematic differences across bank types? In answering these questions, they also explore the relationship between bank risk-taking and macroeconomic and financial factors in the run up to the crisis and the likelihood of subsequent bank failure (Vazquez and Federico, 2015)

Topics on regulatory intervention can be attributed to authors such as Berger et al., (2016)in which their study on the effects of regulatory interventions and bailouts on banks' liquidity creation. The authors rely on instrumental variables to deal with possible endogeneity concerns. Their key findings, which are based on a unique supervisory German dataset, are that regulatory interventions vigorously trigger decreases in liquidity creation; capital support does not affect liquidity creation. Results include the effects of these actions on different components of liquidity creation, lending, and risk taking. Their findings provide new and important insights into the debates about the design of regulatory interventions and bailouts.

Continuing with liquidity and bank risk, Khan et al., (2017) examine the relationship between funding liquidity and bank risk taking. Using quarterly data for U.S. bank holding companies from 1986 to 2014, evidence is found that banks having lower funding liquidity risk as proxied by higher deposit ratios, take more risk. A reduction in banks' funding liquidity risk increases bank risk as evidenced by higher risk-weighted assets, greater liquidity creation and lower Z-scores. However, results show that bank size and capital buffers usually limit banks from taking more risk when they have lower funding liquidity risk. Besides, during the Global Financial Crisis, banks with lower funding liquidity risk took less risk. The findings of this study have implications for bank regulators advocating greater liquidity and capital requirements for banks under Basel III.

Helwege et al., (2017) used data on loans to large commercial banks and primary dealers from Discount Window (DW) programs such as; the Primary Dealer Credit Facility (PDCF), the Term Securities Lending Facility (TSLF) and the Term Auction Facility (TAF). They find that the programs were used by relatively few institutions and thus provided limited relief to banks that relied on short-term debt markets. Although usage increased after Lehman's bankruptcy, most commercial banks avoided the DW and TAF. They also find that the programs were more often used by failed European banks than by healthy US banks, likely because these loans are expensive relative to private market funds. Results also showed that usage of PDCF and TSLF programs, while higher, was more often used by primary dealers in weaker financial position.

#### 5.2.4.1 Troubled Asset Relief Program (TARP):

As discussed in section 2.6.1, the Troubled Asset Relief Program (TARP) is a program set out to purchase toxic assets and equity from financial institutions to strengthen the economy. President George W. Bush on October 3, 2008 signed off to the relief program. This was the response in 2008 to address the subprime mortgage crisis. The Emergency Economic Stabilization Act (ESSA) of 2008 created the TARP program, originally TARP was authorized expenditures of \$700 billion. The Dodd–Frank Wall Street Reform and Consumer Protection Act, signed into law in 2010, reduced the amount to \$475 billion. By October 11, 2012, the Congressional Budget Office stated that total disbursements would be \$431 billion, and estimated the total cost, including grants for mortgage programs that have not yet been made, would be \$24 billion (Puddu and Waelchli, 2015).

The Emergency Economic Stabilization Act of 2008 (EESA) requires financial institutions selling assets to TARP to issue equity warrants (a security that entitles its holder to purchase shares in the company issuing the security for a specific price), or senior debt securities (for non-publicly listed companies) to the Treasury. While in terms of the warrants, Treasury will only receive warrants for non-voting shares, or will agree not to vote. This measure is designed to protect the government by giving Treasury the possibility of profiting through its new ownership stakes in these institutions. The idea is that if the financial institutions benefit from government assistance and recover their former strength, the government will also be able to profit from their recovery.

Taking a look at papers that cover the determinants and effects of banks initial decisions to apply and receive TARP funding (Bayazitova and Shivdasani, 2012; Berger and Roman, 2015; Duchin and Sosyura, 2014, 2012) state that banks with more political networks were more likely to receive TARP funds. Bayazitova and Shivdasani (2012), state that banks that showed systemic risk and faced high financial distress, but had a stronger asset quality base, could obtain TARP funding.

Other authors found that financial characteristics related to the probability of receiving TARP differ for the healthiest against the weakest banks (Cornett et al., 2013). The weakest TARP banks had income production and experienced liquidity issues while the healthiest banks; their loans performed well, but liquidity issues hindered their abilities to continue lending. Another interesting study was that banks with high levels of CEO pay were more likely to exit early due to TARP restrictions on executive pay (Wilson and Wu, 2012). Papers discussing valuation effects on TARP find deteriorating operating efficiency for TARP banks (Harris et al., 2013). Veronesi and Zingales (2010) find that towards the end of 2009 the top 10 banks increased their value of a net benefit in over \$85 billion. Norden et al. (2012), relay that TARP had a spill over effect from the banking sector to the corporate, leading to a positive impact on borrowing relationships firm's stock returns. Black and Hazelwood (2013), analyse risk taking by banks size using 81 banks from 2007-2010 using the Survey of Terms of Bank Lending. They discuss finding that the risk of loans originated increased for large TARP banks but decreased for small TARP banks. Other papers discussing TARP and risk suggest, TARP may reduce or increase systemic risk during the past financial crisis and found that TARP reduced the recipient banks contribution to systemic risk on average, but effects are due to a reduction mainly in the risk of the institutions that were safer ex ante (Berger et al., 2016b).

Kotter and Noth (2015), find that higher loan rates and lower depositor risk premiums for unsupported banks with higher bailout expectations, lead to competitive distortions because of TARP for sound unsupported banks. Berger et al. (2015), study the effects of the TARP loan contract terms for large loans and found that generally TARP led to more favourable terms of credit to businesses this was done using DealScan. Berger and Roman (2016), found that TARP statistically and economically increased job creation significantly as well as net hiring establishments and decreased local business and personal bankruptcies, this suggests that maybe by saving Wall Street TARP that Main Street was saved. In another study TARP banks showed an average of 12% more small business loan originations as compared to non-TARP banks (Puddu and Waelchli, 2015). Finally Chang et al. (2014) find that banks that received TARP funds maintained lower cash-to-cash ratios; this leads to lower excess reserve ratios. This is consistent with the view that the TARP capital injection possibly resulted in more lending for the TARP beneficiaries.

### 5.2.5 Hypothesis

We attempt to investigate the Temporary Debt Guarantee Program, in which the TDGP attempts to first decrease the cost of bank funding by increasing loan supply through liquidity, so that bank lending to consumers and businesses will normalize and to strengthen confidence and then encourage liquidity in the banking system by guaranteeing newly issued senior unsecured debt of banks, thrifts, and certain holding companies. We attempt to contribute to the justification of using tax payers' dollars for a bigger bailout that was presented to the public. We also look if previous government interventions (TARP), and if participants used TDGP to repay Treasury, there has been some allegations regarding banks integrity in where they spend tax payers' money. Larger depository institutions have always been accused of having a competitive advantage to smaller banks in terms of receiving funds from the FDIC, we also test to see if these allegations hold ground from the data gathered

# A. H1: Expected use of TDGP funds should show an increase in depository institutions loan supply

As to the postulation of the FDIC that "opted-in" depository institutions will see an increase of loan supply we hypothesis that there is a positive and significant relationship between loan supply and "opted-in" depository institutions. We construct a dummy variable of "opted-in" and "opted-out" while we regress this dummy to a proxy of loan supply using growth of loans of the depository institutions gathered from the SNL global database.

# **B.** H1: After the initiation of TDGP participation should have an increase in liquidity compared to non-participants.

The FDIC premise that with the inception of the TDGP liquidity in the economy will increase; we assume that liquidity does increase after the inception of the TDGP from years 2012-2016, we also assume that "opted-in" depository institutions have a larger increase of liquidity which will also increase the strengths of the depository institutions. We test two

different accounting proxies widely used in the industry to account for a depository institutions liquidity standing.

### C. H1: TDGP funds bailing out TARP participants.

Allegations on TARP participants have been made that if they took funds from TARP and from the FDIC then the funds given by the FDIC were used to repay Treasury. This is because the FDIC are not obliged to disclose the names of their participants. If so, TARP participants who have repaid would have positive and significant correlations to loan supply and liquidity measures.

# D. H1: Larger depository institutions have higher loan supply and more liquidity than smaller depository institutions.

Larger depository institutions are always accused of having the favour of receiving distinct treatment when it comes to government funding. We indulge the accusations by testing our proxies of loan supply and liquidity standing between large depository institutions, which are those in the largest 90<sup>th</sup> percentile. The test will substantiate accusations if larger depository institutions benefited from the use the FDIC funding.

#### **5.2.6** Contribution

This chapter contributes to the decreased moral hazard theory, discussed in section 4.1., in which the increase of liquidity strength could lead to a more stable banking sector. The topic of government interventions after the crisis has been discussed and is discussed at length. The issue of the success of the interventions has also been debated and still is debated. While some government interventions have been under the spotlight like the TARP initiation others such as the Temporary Liquidity Guarantee Program have escaped it. Our contribution explores one of two initiatives from the TLGP; we attempt to investigate the Temporary Debt Guarantee Program, in which the TDGP attempts to (i) decrease the cost of bank funding by increasing loan supply through liquidity, so that bank lending to consumers and businesses will normalize and strengthen confidence and (ii) encourage liquidity in the banking system by guaranteeing newly issued senior unsecured debt of banks, thrifts, and certain holding companies. Using accounting data from the SNL global database we contribute findings to the justification of using tax payers' dollars for a bigger bailout that was presented to the public. We also look if previous government interventions (TARP), and if (iii) participants used TDGP to repay

Treasury, there has been some allegations regarding banks integrity about where they spend tax payers' money. (iv) Larger depository institutions have always been accused of having a competitive advantage over smaller banks in terms of receiving funds from the FDIC, we also test to see if these allegations hold ground from the data.

#### **5.3 Data**

#### **5.3.1 Introduction**

In section 5.3 we discuss my contribution, the hypothesis that drives the study, data collection processes and introduce our variables; the basis of using our variables from previous research were discussed in the previous section and how various studies used these variables. The chapter consists of data derived from the SNL global data base. With a yearly frequency from 2004-2016 we look at depository institutions made up of commercial banks and bank holding companies. The number of unique depository institutions is 9,306 with 120,978 observations for the frequency from using our unique identifier SNL Key. The use of variables from the SNL data base are derived from call reports, accounting data is used to construct proxies and remainder of our control variables. Previous research used market data to measure liquidity while we use accounting data available from call reports information.

#### **5.3.2 Data description:**

The collection of data from the SNL global data base used the years 2004-2016, the FDIC began issuing funds for senior unsecured debt from depository institutions from 2008-2012 according to the FDIC website. To measure the accomplishment of FDIC's goals we compared participants of the TDGP and those depository institutions that did not part-take in the TDGP during the funding process and after. The FDIC's two main objectives are measured and analysed using accounting data that is available on call reports, we use the SNL global data base which takes the call reports and conveniently allocates the figures in a more user-friendly profile. The data in this chapter differs from the sample of the previous chapters. This section looks closely at some important variables used in the study on how they were constructed and used.

#### 5.3.2.1 Variable definitions:

Below are definitions extracted from the SNL global data base in which they define the variables. We base our definitions on those provided and some calculations of our own.

Liquidity Ratio: (Cash & Balances Due + Securities + Fed Funds Sold & Repos + Trading Account Assets - Pledged Securities)/ Total Liabilities. Liquidity ratio is the proxy used to measure the liquidity strength of a depository institution, this variable is calculated by SNL global. The use of liquidity ratio shows the readiness of a depository institution ability to be liquid, a higher ratio establishes a strong liquidity measure while negative ratios will indicate a weaker financial entity.

**Gap Ratio:** The ratio of a company's rate sensitive assets to its rate sensitive liabilities. Rate sensitive assets and liabilities are those likely to increase or decrease substantially in value due to changes in interest rates. Like fluctuating market data that is widely used in measuring liquidity we use changes in interest rates of rate sensitive assets and rate sensitive liabilities. Gap ratio is a proxy of liquidity; the higher the ratio the stronger the liquidity position of a depository institution, while the lower the ratio the weaker the position.

Loan growth rate: The annualized change in loans and leases calculated as current period loans and leases less prior period loans and leases as a percent of prior period loans and leases. Growth rates are calculated using prior quarter balance for quarter periods, corresponding last twelve months (LTM) balance for last twelve months (LTM) periods and prior year end balance for year to date (YTD) periods. The cost of funding proxy used is loan growth rate. A variable calculated by SNL global. A positive and high growth rate express lower cost of funding as more funds are available, negative and lower growth rates represent higher cost of funding and less funds available.

**Bank Size:** Our bank size variable is calculated taking the natural logarithm of total assets; we use bank size to later distinguish the largest depository institutions in the sample.

Large Banks: We further take bank size to separate large depository institutions from their smaller counter-parts. Depository institutions in the 90<sup>th</sup> percentile and greater are considered large banks while the remainder of the depository institutions are considered smaller.

**TDGP:** Indicates the degree of the institution's participation during the Temporary Debt Guarantee Program (TDGP). Companies that were eligible to issue debt are flagged as "Opted In" and those that chose to opt out of the program are flagged as "Opted Out". We construct TDGP as a dummy variable, 1 equals depository institutions who "opted in" and zero to depository institutions who "opted out".

**TARP:** Indicates the degree of the institutions participation of the Troubled Asset Relief Program (TARP). Companies were classified as following; "No" – meaning they did not take part in TARP, "Acquired or Defunct", "Converted", "Participating", "Resold" and "Redeemed" – meaning they paid back the Treasury in full. **ROAE:** Return on Average Equity, defined as; Net Income/ Average Total Equity. A second proxy for performance, the higher the ratio the better performance allocated to the depository institution.

Loan Loss Reserve/Total Assets: Total loan loss and allocated transfer risk reserves as a percent of total assets, net of unearned income and gross of reserve, a proxy for asset quality. The lower the ratio the less risk on the depository institution.

**Tier 1 capital:** Tier 1 capital, for Call Report and FRY-9C filers, depending on institution attributes and time period, represents Tier 1 capital reported under either the General risk-based (GRB) regulatory capital rules or the U.S. Basel III (B3) revised regulatory capital rules. Preference between GRB and B3 values is given based on the nature of the filing and the attributes of the various Tier 1 risk-based ratios.

**Nonperforming assets/total loans (npas/loans):** Nonperforming assets as a percent of total loans and leases (net of unearned income and gross of reserve). Nonperforming assets include total nonaccrual loans, restructured loans, nonaccrual debt securities and other assets, and other real estate owned for banks and bank holding companies. Nonperforming assets include total nonaccrual loans, loans 90 days or more past due and other real estate owned for savings institutions. A proxy for a depository institutions financial health and sustainability and the ability to cover loans: the lower the ratio the better the health and sustainability measure. Lower ratios indicated less nonperforming assets to loans.

#### 5.3.2.2 Data visualization:

Table 19 TDGP: Participants and non-Participants

tdgp	Overall	Between	Within
	Freq. Percent	Freq. Percent	Percent
0	5935849.076162050.93	4566 49.07	100
1		4740 50.93	100
Total	120978 100.00	9306 100.00	100

TDGP represents commercial banks and Bank Holding Companies that have either "opted-in" the FDICs Temporary Debt Guarantee Program (TDGP) equal to 1 or "opted-out" TDGP equal to 0. Institutions that have taken part in TDGP have sold Senior unsecured debt

to the FDIC. From 9306 institutions 51% of the institutions have "opted-in" the TDGP initiative, while 49% of the institutions "opted-out" of the voluntary FDIC initiative.

Table 20 TARP: Participants and non-Participants

	Overall		Between		Within
tarp	Freq.	Percent	Freq.	Percent	Percent
0	116038	95.92	8926	95.92	100
1	4940	4.08	380	4.08	100
Total	120978	100	9306	100	100

TARP represents commercial banks and Bank Holding Companies that have either participated with Treasury's Troubled Asset Relief Program (TARP) equal to 1 for participated TARP equal to 0 to those that did not. Institutions that have taken part in TARP have sold Preferred stock to Treasury. From 9306 institutions 4% of the institutions have participated in TARP initiative, while around 95% of the institutions did not participate. And the 1%?

Table 21 Large Bank: Depository Institutions that at considered large.

largebank	Overall	Between	Within
	Freq. Percent	Freg. Percent	Percent
0	67167 55.52	6289 67.58	82.15
	53811 44.48	5082 54.61	81.45
Total	120978 100.00	11371 122.19	81.84

Large bank is a user defined variable in which depository institutions that are within the 90<sup>th</sup> percentile have been allocated as a 1 for our binary variable and 0 otherwise. Approximately 44% of the depository institutions are within or larger than the 90<sup>th</sup> percentile threshold.

Table 22 Large Bank & TDGP: Large banks that participated in the TDGP

largebank	Overall	Between	Within	
	Freq. Percent	Freq. Percent	Percent	
0 1	34156 55.43	3261 68.80	80.57	
	27464 44.57	2689 56.73	78.57	
Total	61620 100.00	5950 125.53	79.66	

Table 17 depicts the demographics in depository institutions between participants of TDGP whether they are large institutions or not. 45% of depository institutions that "opted-in" are considered large depository institutions while 55% of TDGP participants are considered smaller institutions.

Table 23 Large Bank non-TDGP: Large Banks that did not participate in the TDGP

largebank	Overall	Between	Within
	Freq. Percent	Freq. Percent	Percent
0	33011 55.61	302866.32239352.41	83.86
1	26347 44.39		84.69
Total	59358 100.00	5421 118.73	84.23

Looking at depository institutions that did not take part of the FDIC initiative and "opted-out" of the TDGP we have a similar distribution of 44% of depository institutions are considered large banks, while 56% are considered on the smaller.

Table 24 TDGP & TARP: TDGP participants that took part in TARP

. 1	Overall	Between	Within
tdgp	Freq. Percent	Freq. Percent	Percent
0 1	241848.95252251.05	186 48.95 194 51.05	100 100
Total	4940 100.00	380 100.00	100

Table 19 looks at TDGP participants that repaid TARP, we see that out of 380 TARP participants 194 (51%) of these TARP participants also "opted-in" TDGP. The remaining 186 (49%) of TARP participants did not "opt-in" TDGP.

Table 25 TDGP & non-TARP: TDGP participants that did not repay TARP

tdgp	OverallBetweenFreq. PercentFreq. Percent		Within Percent
0 1	56940 49.07 59098 50.93	4380 49.07 4546 50.93	100 100
Total	116038 100.00	8926 100.00	100

The above table 20 looks at the depository institutions that did not repay TARP. From our sample of 9306 depository institutions 8926 did not take part in TARP while at the same time could have took part in TARP but did not repay. Those that were part of TDGP and we either part of TARP and not repay or did not take part in TARP were 51%. While non TDGP participants and not part of TARP were 49% of the sample.

#### Table 26 Summary Statistics

VARIABLES	Ν	mean	sd	min	max
ROAE	73,648	8.473	11.80	-725.7	579.3
NPAS/Loans	73,703	2.560	4.022	0.681	100
LLR/Assets	74,531	0.952	0.630	0.027	36.73
TARP_TDGP	120,978	0.0128	0.113	0	1
interaction	120,978	0.157	0.364	0	1
Large Banks	120,978	0.445	0.497	0	1
Loan Growth Rate	72,478	7.920	16.41	-20.15	97.56
Liquidity Ratio	73,863	26.25	17.27	3.230	91.19
Gap Ratio	72,829	1.580	1.330	0.272	9.605
Tier 1 Capital	74,285	36,148	39,668	4,612	129,437
Bank Size	74,630	12.30405	1.495589	9.420277	17.84142

Table 21 summarises the variables used in the study, the data set is comprised of 120, 978 observations. ROAE has 73,648 observations with a mean of 8.473, performance is positive, relating that depository institutions return on equity is having good returns, there is a great variation in return of average equity with a min of -725.7 and max of 579.3. Nonperforming assets to total loans has 73,703 observations, depository institutions have the ability to cover their loans and show stability at around 2.5% on an industry standard. Loan loss reserves to total assets proxies asset quality, the industry prerogatives that the lower the ratio the better asset quality of a depository institution, the max ratio of asset quality in the study is at 36.73%; our mean is at 0.952% leading us to say that asset quality of depository institutions from 2004 – 2016 are well managed. Loan growth rate is at 7.920% having a min of -20.15 and a max of 97.56; we see that even though loans are available and positive we see that as a data set they are towards a slower growth rate and not optimised despite the fact of available funding from various government interventions and not just TDGP. Liquidity and Gap ratio are also positive but again have ratios toward the minimum of the data set. This could indicate that having a low liquidity measure makes depository institutions not as capable of liquidation if need be. The capital ratio measure specifies that depository institutions have enough capital and are within government standards, confirmed by looking at the mean, which is at 36,148 and standard deviation, which is at 39,668. Finally, we look at bank size in which we use this variable to describe large banks, we see that the mean of depository institutions for bank size compared to its standard deviation are not that far apart since the variation between depository institutions is 1.5%.

Figure 28 Bank Size all banks TDGP & Non-TDGP



In figure 28, we can see a normally distributed histogram of the bank size variable. Bank size is defined as natural logarithm of total assets. The depository institutions commercial banks and Bank Holding Companies- exhibit a high variance in terms of size, with the majority of the banks being small.

Figure 29 Bank Size & TDGP



In figure 29 we look at our bank size variable in terms of participants and nonparticipants in the TDGP initiative. Larger banks took part in the FDIC's TDGP initiation. This could be since larger banks could distribute liquidity into the financial sector as a more efficient process than smaller depository institutions. Figure 30 Liquidity Ratio over time& TDGP participants and non-participants



In the above graph we look at participants and non-participants in the TDGP program by the FDIC. We compare our dependent variable Liquidity ratio between participants and non – participants in the TDGP program. Liquidity ratio is defined as using (Cash & Balances Due + Securities + Fed Funds Sold & Repos + Trading Account Assets - Pledged Securities)/ Total Liabilities. Having a higher liquidity ratio is interpreted here as being able to come up with liquidity as fast as possible. We see that "opting-out" depository institutions maintained a higher liquidity ratio from 2004-2016; this could be the reason for "opting-out". The liquidity ratio declines for both participants and non-participants, around 2008 the liquidity ratio recovers and trends upwards, peaks and declines slightly.



In figure 31 we can see that both non TDGP and non-TARP participants both have higher liquidity measures than TDGP and TARP participants from 2004 -2016. The participants of both programs have lower liquidity ratios, while TDGP participants have the lowest ratios.

Figure 32 GAP Ratio over time& TDGP participants and non-participants



Figure 32 compares TDGP participants and non-participants to our alternative liquidity measure "gap-ratio" which is defined as; The ratio of a company's rate sensitive assets to its rate sensitive liabilities. Rate sensitive assets and liabilities are those likely to increase or decrease substantially in value due to changes in interest rates. As it can be seen non-TDGP participants had a higher ratio in 2008 but quickly dropped before 2009. This said, the ratio of non-participants does not increase much during the study's time span. A gradual increase over the years is perceptible, but the change of increase of TDGP participants is much more perceptible from 2011-2013 and again from 2015-2016.





Figure 33 represents both TDGP and TARP participants, I see that TARP participants have the best gap ratio for the duration of the study; while TDGP participants start in 2004 with a good gap ratio, it falls drastically during the financial crisis. After the crisis from around 2010 gap ratio measurements improve for TDGP participants. Non TDGP participants have the lowest gap ratio.





The figure 34 looks at the loan growth rate variable which is calculated by SNL global and defined as the annualized change in total loans and leases (net of unearned income and gross of reserves) from the previous quarter, expressed as a percentage of total loans and leases at the end of the previous quarter. We compare loan growth rate with TDGP participants and non-participants. Both participants and non-participants have similar growth rates but a difference in growth rate is evident from the period of 2009-2011. The thought would be that TDGP participants should have a higher loans growth rate due to the FDIC's injection of funds; however, what we see that from 2008 -2011, TDGP participants start to have a slighter loan growth rate.

Figure 35 Loan Growth Rate (TDGP & TARP)



Figure 35 depicts that during times of crisis loan growth for TDGP participants was at its lowest while non TDGP participants had the highest loan growth rates; non-TARP participants also had better loan growth rates than TARP participants. We also see that before the crisis in 2008 TARP and TDGP participants have better loan growth rates than non-participants of both interventions. While after 2013 both TDGP and TARP participants regain loan growth rates.

Next, we provide the following correlation table. The table shows the variables are not collinear, and are not overly correlated.

Variable	ROAE	NPAS/Loans	LLR/Assets	Loan Growth Rate	Liquidity Ratio	Gap Ratio	Tier 1 Capital	Bank Size
ROAE	1.000							
NPAS/Loans	-0.418	1.000						
LLR/Assets	-0.213	0.384	1.000					
Loan Growth Rate	0.081	-0.270	-0.132	1.000				
Liquidity Ratio	-0.055	-0.035	-0.221	-0.144	1.000			
Gap Ratio	0.037	-0.029	0.030	0.040	0.138	1.000		
Tier 1 Capital	0.054	0.019	0.082	0.069	-0.207	0.104	1.000	
Bank Size	0.061	0.045	0.072	0.070	-0.267	0.103	0.897	1.000

Table 27 Correlation Table	е
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### 5.3.3 Summary and Discussion of Main Points in the Data:

Section 5.3 discussed the data sample: the data showed that 51% of 9,306 depository institutions participated in the TDGP initiation while 49% did not. We further look at the number of depository institutions that took part in TARP and were recorded as repaid in full;

these were 380 depository institutions out of 707. The 380 depository institutions represent 4% of the sample data set while 96% of the depository institutions either did not repay TARP or they did not participate. The definition of what a large bank is in the study showed that 44% of depository institutions are considered large banks while the remaining 56% are not large. When considering how many depository institutions that took part in TDGP results show that 45% of TDGP participants are large banks. Also, from the 380 TARP repaid participants 51% of these participants also took part of the TDGP while 49% did not, from the remaining 8,926 nonrepaid and non-TARP participants 51% also took part in the TDGP initiation this leaves 4,380 depository institutions that did not take part in either TDGP nor TARP. Looking closely at our variables on a standalone basis, we see that TDGP participants are larger than non-TDGP. Non - TDGP have higher liquidity ratios and have less volatility in their gap ratio. When we look at both TDGP and TARP participants we also see that they have lower liquidity ratios than non - participants for both interventions and that their gap ratios are higher; which indicates higher sensitivity leading to lower liquidity ratios. The loan supply proxy loan supply shows that it dropped between 2008 -2012 for TDGP participants but was higher before and after those times; results are the same for TARP participants. Both non - participants showed more consistent ratios in general leading to believe they were not in need of government interventions and maybe liquidity disbursement for the economy should be done from their facilities. Yet again the size and of TDGP participants warrant more exposure to the industry which could lead to better facilitation of liquidity injection into the economy.

#### **5.4 Methodology**

#### **5.4.1 Introduction:**

This chapter focuses on the post financial crisis of 2007-2008; we look at the Temporary Liquidity Guarantee Program (TLGP) and more specifically the Temporary Debt Guarantee Program (TDGP). The TDGP focused on two main outcomes; the first was to decrease the cost of funding for the entire economy. The second was to strengthen liquidity in the economy. The method was simple, allow depository institutions to sell senior unsecured debt for funds. By doing this, depository institutions had the means to give out more loans at lower more competitive prices that would accomplish the main goals of the FDIC while restoring faith in the banking sector. The TDGP was considered the largest government intervention but received very little media attention and thus very little knowledge is known to the public, and more importantly tax payers. Another aspect is we look at allegations by various media outlets that state TARP participants that took part in the TDGP used these funds not to increase liquidity but to payback Treasury. We also assess the data to see if larger banks were able to allocate more liquidity from this intervention. This section looks at the method of analysis and how the models are constructed.

## 5.4.2 Empirical Specification 5.4.2.1 Loan Supply & TDGP loan growth rate<sub>it</sub> = $\alpha + \beta_1 tdgp dummy_{it} + \epsilon_{it}$ (12)

The above equation (12) analyses the loan supply within TDGP participants and nonparticipants. The data used is a panel data from the years 2004-2016. The assumption is that loan supply increases for TDGP participants and non-participants as the goal of the FDIC is to make loan supply more available to help stimulate the US economy. This simple regression considers *loan growth rate<sub>i,t</sub>* in which this variable represents our proxy for loan supply for each unique depository institution represented by **i** and for each year represented by **t**. While  $\alpha$  is a representation of the slope intercept.  $\beta_1 tdgp dummy_{i,t}$  is the dummy variable for TDGP participants and non-participants. 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out", while  $\epsilon_{i,t}$  is the error term. A negative coefficient would represent low loan supply for depository institutions. The construction of this simple equation is to assess if there is a difference between participants and non-participants of TDGP. If loan growth rate has a positive coefficient, and is significant, we proceed with the knowledge that TDGP participants do have larger loan supplies than non – participants.

#### 5.4.2.2 Liquidity Ratio & TDGP

### $liqudity \ ratio_{i,t} = \alpha + \beta_1 t dgp \ dummy_{i,t} + \epsilon_{i,t} \qquad (13)$

Equation (13) analyses the strength of liquidity of TDGP participants. The data used is a panel data from the years 2004-2016. The assumption is that liquidity strength increases for TDGP participants as the goal of the FDIC is to make liquidity available via channels of depository institutions, to help stimulate the US economy. This simple regression considers *liqudity ratio<sub>i,t</sub>* in which this variable represents our proxy for liquidity for each unique depository institution represented by **i** and for each year represented by **t**. While  $\alpha$  is a representation of the slope intercept.  $\beta_1 t dgp dummy_{i,t}$  is the dummy variable for TDGP participants and non-participants, 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out", while  $\epsilon_{i,t}$  is the error term. A positive coefficient would represent a strong measure of liquidity for depository institutions that took part in the TDGP in respect to non – participants of TDGP.

5.4.2.3 Gap Ratio & TDGP

## $gap \ ratio_{i,t} = \alpha + \beta_1 tdgp \ dummy_{i,t} + \epsilon_{i,t}$ (14)

We use a second proxy to measure liquidity in equation (14), this liquidity proxy differs from the previous as it uses shifts in interest rates to determine the depository institutions strength of liquidity. The use of rate sensitive assets and rate sensitive liabilities were defined in the previous section. The data used is a panel data from the years 2004-2016. The assumption is that liquidity strength increases for TDGP participants as the goal of the FDIC is to make liquidity available via channels of depository institutions, to help stimulate the US economy. This simple regression considers **gap ratio**<sub>*i*,*t*</sub> in which this variable represents our proxy for liquidity for each unique depository institution represented by **i** and for each year represented by **t**. While  $\alpha$  is a representation of the slope intercept.  $\beta_1 tdgp dummy_{i,t}$  is the dummy variable for TDGP participants and non-participants, 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out", while  $\epsilon_{i,t}$  is the error term. A positive coefficient would represent a strong measure of liquidity for depository institutions that took part in the TDGP in respect to non – participants of TDGP.
#### 5.4.2.4 Loan Supply & Interaction

## $loan growth_rate_{i,t} = \alpha + \beta_1 interaction_{i,t} + \epsilon_{i,t}$ (15)

The above equation (15) analyses loan supply within TDGP participants and nonparticipants as an interaction from the years 2004-2011 and 2012-2016. The data used is a panel data from the years 2004-2016. The assumption is that loan supply increases for TDGP participants especially after the introduction of the TDGP initiative (2008 - 2012) as the goal of the FDIC is to make more available loans to help stimulate the US economy. This simple regression considers *loan growth rate<sub>i,t</sub>* in which this variable represents our proxy for loan supply for each unique depository institution represented by i and for each year represented by t. While  $\alpha$  is a representation of the slope intercept.  $\beta_1$  interaction<sub>i,t</sub> (TDGP×Post) is the dummy variable for TDGP participants and non-participants; 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out" (tdgpdummy). It is interacted with **post**, which is a dummy variable for 1 is equal to years between 2013 and 2016 and zero for years between 2004 and 2012 taking t for time. The interaction will distinguish loan supply between participants and non-participants before the FDIC intervention and after, while  $\epsilon_{i,t}$  is the error term. A positive coefficient would represent more loan supply for depository institutions that took part in the TDGP. In the case of a positive coefficient for loan supply, this would indicate that TDGP participants loans supply increased after receiving funds from the FDIC and could contribute to the notion that the FDIC goal was in order.

#### 5.4.2.5 Liquidity Ratio & Interaction

# liquidity ratio<sub>*i*,*t*</sub> = $\alpha + \beta_1$ interaction<sub>*i*,*t*</sub> + $\epsilon_{i,t}$ (16)

Equation (16) analyses the strength of liquidity within TDGP participants and nonparticipants as an interaction from the years 2004-2012 and 2013-2016. The data used is a panel data from the years 2004-2016. The assumption is that liquidity increases for TDGP participants especially after the introduction of the TDGP initiative (2008 – 2012) as the goal of the FDIC is to strengthen liquidity access to the US market. This simple regression considers *liquidity ratio<sub>i,t</sub>* in which is a representation to our proxy for liquidity for each unique depository institution represented by **i** and for each year represented by **t**. While  $\alpha$  is a representation of the slope intercept.  $\beta_1$  *interaction<sub>i,t</sub>* (TDGP×Post) is our dummy variable for TDGP participants and non-participants; 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out" (tdgpdummy). It is interacted with **post**, which is a dummy variable for 1 is equal to years between 2013 and 2016 and zero for years between 2004 and 2012 taking **t** for time. The interaction will distinguish between liquidity measures between participants and non-participants during the FDIC intervention and after, while  $\epsilon_{i,t}$  is the error term. A positive coefficient would represent strong liquidity for depository institutions taking part of TDGP, also a positive coefficient for the interaction would suggest that liquidity increased after the initiation of TDGP leading depository institutions to be more liquid.

### 5.4.2.6 Gap Ratio & Interaction

## $gap \ ratio_{i,t} = \alpha + \beta_1 interaction_{i,t} + \epsilon_{i,t} \qquad (17)$

Equation (17) analyses the strength of liquidity within TDGP participants and nonparticipants as an interaction from the years 2004-2012 and 2013-2016 using the second liquidity proxy. This proxy differs from the previous as it uses shifts in interest rates to determine the depository institutions strength of liquidity by using rate sensitive assets and rate sensitive liabilities. The data used is a panel data from the years 2004-2016. The assumption is that liquidity increases for TDGP participants especially after the introduction of the TDGP initiative (2008 - 2012) as the goal of the FDIC is to strengthen liquidity access to the US market. This simple regression considers  $gap ratio_{i,t}$  in which is a representation to our proxy for liquidity for each unique depository institution represented by i and for each year by t. While  $\alpha$  is a representation of the represented slope intercept.  $\beta_1$  interaction<sub>i.t</sub> (TDGP × Post) is the dummy variable for TDGP participants and nonparticipants; 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out" (tdgpdummy). It is interacted with post, which is a dummy variable for 1 is equal to years between 2013 and 2016 and zero for years between 2004 and 2012 taking t for time. The interaction will distinguish between liquidity measures between participants and non-participants during the FDIC intervention and after, while  $\epsilon_{i,t}$  is the error term. A positive coefficient would represent strong liquidity for depository institutions taking part of TDGP, also a positive coefficient for the interaction would suggest that liquidity increased after the initiation of TDGP leading depository institutions to be more liquid.

 $\begin{aligned} & \text{loan growth rate}_{i,t} = \alpha + \beta_1 \text{interaction}_{i,t} + \beta_2 \text{tarp} - tdgp_{i,t} + \\ & \beta_3 \text{performance}_{i,t} + \beta_4 \text{asset quality}_{i,t} + \beta_5 \text{capitilization}_{i,t} + \\ & \beta_6 \text{risk indicator}_{i,t} + \beta_7 \text{size}_{i,t} + i. \text{ year} + \epsilon_{i,t} \end{aligned} \tag{18}$ 

Equation (18) illustrates the final form of our first hypothesis if there is a relationship between loan supply and TDGP participants and non-participants. We use **loan growth rate**<sub>*i*,*t*</sub> to represent our loan supply proxy, as defined in the previous section loan growth rate is the annualized change in loans and leases calculated as current period loans and leases less prior period loans and leases as a percent of prior period loans and leases. Growth rates are calculated using prior quarter balance for quarter periods, corresponding last twelve months balance for last twelve months periods and prior year end balance for year to date periods. In which **i** is represented by a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis.

As to previous equations  $\beta_1$  interaction<sub>*i*,*t*</sub>(TDGP×Post) is our dummy variable for TDGP participants and non-participants; 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out" (tdgpdummy). It is interacted with **post**, which is a dummy variable for 1 is equal to years between 2013 and 2016 and zero for years between 2004 and 2012 taking **t** for time.  $\beta_2 tarp - tdgp_{i,t}$  is used to annotate the tarp-tdgp variable, 1 equals depository institutions that took part in TARP and repaid and took part in the TDGP while zero defines all other depository institutions which include failed to repay, sold, or even if they did not take part in TARP; we use this definition since allegations were to depository institutions that took TDGP funding and used the money to repay the Treasury.

For our performance proxy annotated by  $\beta_3 performance_{i,t}$  we use Return on Average Equity (roae) we consider **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. The annotation for asset quality  $\beta_4 asset quality_{i,t}$  is proxied with the use of loan loss reserves to total assets (llr/assets). Tier 1 common capital as a percent of risk-weighted assets (tier1) is our choice of proxy for Capitalization annotated by  $\beta_5 capitilization_{i,t}$  as previous annotations **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. The annotation  $\beta_6 risk_indicator_{i,t}$  is proxied by non-performing assets to total loans (npas/loans) this variable overlooks the ability of depository institutions to cover loans, annotations **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis.  $\beta_7 size_{i,t}$  is proxied by our large bank (large\_bank) variable in which Depository institutions in the 90<sup>th</sup> percentile and greater are considered large banks represented by 1, while the remainder of the depository institutions are considered smaller represented by zero, **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. When analysing size, we also discuss the third hypothesis on how there is a difference between the size of depository institutions, *i. year* accounts for year effects, and  $\epsilon_{i,t}$  is the error term.

## 5.4.2.8 Liquidity Ratio

 $\begin{aligned} & liquidity \ ratio_{i,t} = \alpha + \beta_1 interaction_{i,t} + \beta_2 tarp - tdgp_{i,t} + \\ & \beta_3 performance_{i,t} + \beta_4 asset \ quality_{i,t} + \beta_5 capitilization_{i,t} + \\ & \beta_6 risk \ indicator_{i,t} + \beta_7 size_{i,t} + i. \ year + \epsilon_{i,t} \end{aligned}$ (19)

Equation (19) illustrates the final form of our second hypothesis: if there is an increase of liquidity with TDGP participants and non-participants. We use *liquidity ratio*<sub>*i*,*t*</sub>to represent our liquidity proxy, as defined in the previous section; (Cash & Balances Due + Securities + Fed Funds Sold & Repos + Trading Account Assets - Pledged Securities)/ Total Liabilities. Liquidity ratio is the proxy used to measure the liquidity strength of a depository institution; this variable is calculated by SNL global. We use **I**, which is represented by a unique identifier given by the SNL database for each depository institution and **t** represents time from 2004-2016 on a yearly basis.

As with previous equations  $\beta_1$  interaction<sub>*i*,*t*</sub>(TDGP×Post) is the dummy variable for TDGP participants and non-participants; 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out" (tdgpdummy). It is interacted with **post** is a dummy variable for 1 is equal to years between 2013 and 2016 and zero for years between 2004 and 2012 taking **t** for time.  $\beta_2 tarp tdgp_{i,t}$  is used to annotate the tarp-tdgp variable, 1 equals depository institutions that took part in TARP and repaid while also being part of the TDGP while zero defines all other depository institutions which include failed to repay, sold, or even if they did not take part in TARP; we use this definition since allegations were to depository institutions that took TDGP funding and used the money to repay the Treasury.

For our performance proxy annotated by  $\beta_3 performance_{i,t}$  we use Return on Average Equity (roae) we take into account **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. The annotation for asset quality  $\beta_4 asset quality_{i,t}$  is proxied with the use of loan loss reserves to total assets (llr/assets). Tier 1 common capital as a percent of risk-weighted assets (tier1) is our choice of proxy for Capitalization annotated by  $\beta_5 capitilization_{i,t}$  as previous annotations **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis.

The annotation  $\beta_6 risk indicator_{i,t}$  is proxied by non-performing assets to total loans (npas/loans); this variable overlooks the ability of depository institutions to cover loans, annotations **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis.  $\beta_7 size_{i,t}$  is proxied by our large bank (largebank) variable in which Depository institutions in the 90<sup>th</sup> percentile and greater are considered large banks represented by 1 while the remainder of the depository institutions are considered smaller represented by zero, **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. When analysing size, we also discuss our third hypothesis on how there is a difference between the size of depository institutions, *i. year* accounts for year effects, and  $\epsilon_{i,t}$  is the error term.

## 5.4.2.9 Gap Ratio

# $gap \ ratio_{i,t} = \alpha + \beta_1 interaction_{i,t} + \beta_2 tarp - tdgp_{i,t} + \beta_3 performance_{i,t} + \beta_4 asset \ quality_{i,t} + \beta_5 capitilization_{i,t} + \beta_6 risk \ indicator_{i,t} + \beta_7 size_{i,t} + i. \ year + \epsilon_{i,t}$ (20)

Equation (20) illustrates the final form of our second hypothesis, but using a different proxy in which there is an increase of liquidity with TDGP participants and non-participants. We use  $gap \, ratio_{i,t}$  to represent our liquidity proxy, as defined in the previous section; the ratio of a company's rate sensitive assets to its rate sensitive liabilities. Rate sensitive assets and liabilities are those likely to increase or decrease substantially in value due to changes in interest rates. Like fluctuating market data that is widely used in measuring liquidity we use

changes in interest rates of rate sensitive assets and rate sensitive liabilities.  $\mathbf{i}$  is represented by a unique identifier given by the SNL database for each depository institution and  $\mathbf{t}$  represents time from 2004-2016 on a yearly basis.

As to previous equations  $\beta_1$  interaction<sub>*i*,*t*</sub>(TDGP×Post) is our dummy variable for TDGP participants and non-participants; 1 equals depository institutions that "opted-in" TDGP zero are for depository institutions that "opted-out" (tdgpdummy). It is interacted with **post** is a dummy variable for 1 is equal to years between 2013 and 2016 and zero for years between 2004 and 2012 taking **t** for time.  $\beta_2 tarp - tdgp_{i,t}$  is used to annotate the tarp\_tdgp variable, 1 equals depository institutions that took part in TARP and repaid and also took part in the TDGP while zero defines all other depository institutions which include failed to repay, sold, or even if they did not take part in TARP; we use this definition since allegations were to depository institutions that took TDGP funding and used the money to repay the Treasury.

For our performance proxy annotated by  $\beta_3 performance_{i,t}$  we use Return on Average Equity (roae) we take into account **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. The annotation for asset quality  $\beta_4 asset quality_{i,t}$  is proxied with the use of loan loss reserves to total assets (llr/assets). Tier 1 common capital as a percent of risk-weighted assets (tier1) is our choice of proxy for Capitalization annotated by  $\beta_5 capitilization_{i,t}$  as previous annotations **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis.

The annotation  $\beta_6 risk indicator_{i,t}$  is proxied by non-performing assets to total loans (npas/loans) this variable overlooks the ability of depository institutions to cover loans, annotations **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis.  $\beta_7 size_{-i,t}$  is proxied by our large bank (largebank) variable in which Depository institutions in the 90<sup>th</sup> percentile and greater are considered large banks represented by 1 while the remainder of the depository institutions are considered smaller represented by zero, **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. When analysing size, we also discuss our third hypothesis on how there is a difference between the size of depository institutions, *i. year* accounts for year effects, and  $\epsilon_{i,t}$  is the error term.

#### **5.4.3 Empirical Motivation**

The reasons for our empirical choices are similar to the ones discussed in subsection 3.3.2 and 4.4.3. Very similar reasons to the one discussed in those subsections motivate our discussion on the limitations of our empirical methodology, we mention some of them here. Some omitted factors that affect our dependent variables might be correlated with participation in the CPP program. This omitted variable might affect the errors and the estimate of our coefficients. The coefficient estimate might be picking up some of the effect of the omitted variable. Time effects might mitigate some of these issues, since it sweeps up some of the effects of these possible omitted variables. Finally, we included fixed effects in a separate regression as a robustness check and did not see a significant difference in the results. This increased our confidence in our results.

Following is the Hausman test, which shows the validity of our approach, by rejecting the null hypothesis.

	(b)	(B)	(b-B)	<pre>sqrt(diag(V_b-V_B))</pre>
Variables	fe	re	Difference	S.E.
Post Crisis dummy	-0.278	0.099	-0.377	
TDGP Interaction	-1.158	-1.137	-0.020	
Return on Average Equity	-0.027	-0.034	0.007	0.002
Non-Performing Assets/Total Loans	-1.375	-1.262	-0.113	0.009
Loan Loss Reserves/Total Assets	-5.278	-3.187	-2.091	0.086
Tier 1 Capital	-0.0153	-0.0524	-0.0101	0.0277
Large Banks	1.512	3.244	-1.732	0.371

Table 28Hausman Test

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V\_b-V\_B)^(-1)](b-B)

= 1359.35

Prob>chi2 = 0.0000

(V\_b-V\_B is not positive definite)

## **5.4.4 Conclusion**

We looked at the Temporary Liquidity Guarantee Program (TLGP) and more specifically the Temporary Debt Guarantee Program (TDGP) and how it focused on two main outcomes; the first being to increase loan supply, which will decrease cost of funding for the entire economy. The second was to strengthen liquidity in the economy. The method was simple, to allow depository institutions to sell senior unsecured debt for funds. Two other outcomes are to look at allegations in which TARP participants used FDIC funding to repay Treasury and if larger depositories had more liquidity? Discussed above were equations to try and measure these outcomes by using proxies for loan supply and liquidity from accounting data from the years 2004-2016 and data that showed if TARP participants repaid Treasury or not. In the next section we will look at the results generated by the previous equations with an analysis of the results and if it supports our hypothesis.

## **5.5 Results**

#### 5.5.1 Introduction

In this section we shall discuss the results from the previous section equations. Look at the outcomes and if they align with the FDIC's initial goals. The proxies used are from previous literature discussion on accounting data and using the CAMELS rating system but with the silent "M".

## 5.5.2 Loan Growth Rate Simple

Table 29 Loan Growth Rate Simple

VARIABLES	Loan Growth Rate Simple (12)
Tden dummy	-3.55532***
8r9	(0.16016)
Constant	10.73398***
	(0.07597)
Observations	72,478
R-squared	0.25889
Absorb	snlkey
Adj R-sq	0.186
Time Effects	Yes

Equation 12 consists of a simple panel regression with 72,478 observations with 6,524 unique SNL identifiers Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The table 29 of loan growth rate (12) illustrates a simple regression of our basic hypothesis; which would emphasise a correlation between "opted-in" participants of the TDGP initiative led by the FDIC in having a lower growth rate in comparison with "opted-out" or non-participants of the FDIC liquidity injection. Loan growth rate is used to proxy loan supply. A positive correlation would suggest that participants in TDGP would resemble facilitating a lower cost of funding and thus an increase of loan supply than non-participants, this could lead to the assumption that one of the core outcomes of the FDIC was to increase liquidity in the market by decreasing the cost of funding. However, when regressing our loan supply proxy (loan growth rate) and our dummy variable 1 equal to "opted-in" or participants of the TDGP zero otherwise; we find that loan supply is negatively significant to tdgp dummy variable, this indicates that TDGP participants have a lower loan supply than non - participants. This goes against our hypothesis that TDGP participants are issuing more loans due to the liquidity injection by the TDGP.

## 5.5.3 Liquidity Ratio Simple

Table 30 Liquidity Ratio Simple

VARIABLES	Liquidity Ratio Simple (13)	
Tdgp dummy	3.38879***	
	(0.09432)	
Constant	25.14517***	
	(0.04486)	
Observations	73,863	
R-squared	0.75982	
Absorb	snlkey	
Adj R-sq	0.736	

Equation 13 consists of a simple regression with 73,863 observations and 6,626 unique SNL identifiers Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The liquidity ratio table 30 shows a simple regression between the first proxy of liquidity, we use a calculated ratio from the SNL global database, which defines liquidity ratio as,: (Cash & Balances Due + Securities + Fed Funds Sold & Repos + Trading Account Assets - Pledged Securities)/ Total Liabilities. We regress this variable with participants and non-participants proxied by our dummy variable tdgp\_dummy in which 1 equals participants of the TDGP zero to non-participants. The assumption is that TDGP participants should have a stronger liquidity base since a major outcome proposed by the FDIC is; depository institutions that participate in the TDGP will have access to funds that will be used to inject liquidity into the market leading to stronger liquidity figures for these institutions which will restore confidence into the economy while promoting the circulation of funds. The results warrant to a positive correlation between TDGP participants and liquidity. This indicates that TDGP participants had higher liquidity measures from 2008 -2016 than non-participants.

#### 5.5.4 GAP Ratio Simple

Table 31 GAP Ratio Simple

VARIABLES	GAP Ratio Simple (14)
	0.07154***
l dgp dummy	(0.00935)
Constant	1.49136***
	(0.00444)
Observations	72.829
R-squared	0.60961
Absorb	snlkey
Adj R-sq	0.571

Equation 14 consists of a simple regression with 72,829 observations and 6,567 unique SNL identifiers Standard errors in parentheses The above table 31 illustrates our second proxy for liquidity; we use the gap ratio. Gap ratio is also calculated by SNL global database and is defined as the ratio of a company's rate sensitive assets to its rate sensitive liabilities. Rate sensitive assets and liabilities are those likely to increase or decrease substantially in value due to changes in interest rates. We regress our liquidity proxy with a dummy variable in which 1 is equal to participants in the FDIC's TDGP initiative zero for non-participants. Results indicate that a significance at the 99% interval correlates to our liquidity proxy and dummy variable, having a positive correlation signifies the outcome that TDGP participants had stronger liquidity measures than non-participants reflecting on initial outcomes from the FDIC.

#### **5.5.5 Loan Growth Rate Interaction**

Table 32 Loan Growth Rate Interaction

VARIABLES	Loan Growth Rate Interaction (15)
	<b>)</b> 1270 <i>1</i> ***
TDOI ~I OSI	$-2.15/64^{-1}$
Constant	(0.10104)
Constant	8.330/3***
	(0.06506)
Observations	72,478
R-squared	0.22853
Absorb	snlkey
Adj R-sq	0.152
Equation 15 consists of a simple pa	nel regression with 72,478 observations with 6,524 unique SNL identifiers

An interaction is added between TDGP participants and years post 2012. Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

In the loan growth rate table 32, loan growth rate, our proxy for loan supply, is being assessed with participants and non-participants of the TDGP injection from the FDIC, we add an interaction of a dummy variable (post) if 1 is equal to years 2013-2016 and zero for years less than 2013. The time frame from 2008-2012 is the period in which the FDIC gave out TDGP injections into depository institutions. We can see that there is a negative correlation between our dummy variable interaction that spans from 2013-2016 with a 99% significance level. This correlation between interaction and loans growth rate indicates that loan supply was lower; for every increase in loan supply there was -2.13 decreases in the period between 2013 and 2016, bank fixed effects are taken into account. These results warrant that after the injection period of the FDIC participating banks offered less funding than non-participating depository institutions.

## 5.5.6 Liquidity Ratio Interaction

Table 33 Liquidity Ratio Interaction

VARIABLES	Liquidity Ratio Interaction (16)
TDGP×Post	2 85203***
	(0.09373)
Constant	25.67117***
	(0.03787)
Observations	73,863
R-squared	0.75854
Absorb	snlkey
Adj R-sq	0.735

Equation 16 consists of a simple panel regression with 73,863 observations with 6,626 unique SNL identifiers An interaction is added between TDGP participants and years post 2012. Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The liquidity ratio interaction table 33 illustrates our test between liquidity ratio and our liquidity proxy with TDGP participants and non-participants and an interaction at two-time periods which is represented by our dummy variable (interaction). Interaction equals 1 from years between 2013 and 2016 and zero for years from 2004-2012(**TDGP**×**Post**). We find that that there is a significant positive correlation between our interaction and liquidity variables stating that liquidity ratio of depository institutions was higher for TDGP participants at the period between 2013-2016 by around 2.8% than those depository institutions before 2013 and non-participants of the TDGP. The increase in liquidity for TDGP participants were one of the main goals of the FDIC, these results warrant a high correlation to the FDIC's intent, the goodness of fit for the model can be seen by the adjusted R-squared which is at 73.5%; this indicates a high correlation to the model.

## **5.5.7 GAP Ratio Interaction**

Table 34 GAP Ratio Interaction

VARIABLES	GAP Ratio Interaction (17)	
	0.50(45***	
IDGP×Post	0.52645***	
	(0.00910)	
Constant	1.47225***	
	(0.00368)	
Observations	72,829	
R-squared	0.62366	
Absorb	snlkey	
Adj R-sq	0.586	

Equation 17 consists of a simple panel regression with 72,829 observations with 6,567 unique SNL identifiers An interaction is added between TDGP participants and years post 2012.

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Gap ratio interaction (17) shows our second liquidity proxy represented by gap ratio, we interact in which it is a dummy variable where 1 is equal to years between 2013-2016 and zero for years between 2004 - 2012. The results show that the interaction variable had a positive significance to our liquidity proxy at a 99% level. The positive significant correlation is like the first liquidity proxy measure in which TDGP participants after the injection of funds show a higher liquidity proxy, gap ratio is used to measure interest rate volatility between rate sensitive assets and liabilities, as it is mainly a liquidity risk measure we use both proxies to measure liquidity exposure in respect to TDGP participants and non-participants. A positive significant correlation indicates more liquidity leading to correlate significance between both proxies. The model shows a goodness of fit at 59%.

5.5.8 Loan	Growth	Rate
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Table 35 Loan Growth Rate

VARIABLES	Loan Growth Rate (18)
TDGP×Post	-0.92177***
	(0.21816)
Tarp-tdgp	-2.51258***
	(0.76863)
roae	-0.03003***
	(0.00633)
Npas/loans	-1.12465***
-	(0.02210)
Llr/assets	-4.96044***
	(0.15021)
Tier1	-0.00002***
	(0.00001)
Largebank	3.54261***
	(0.51521)
Constant	19.49338***
	(0.29060)
Observations	72,302
R-squared	0.34001
Year FE	YES
Absorb	snlkey
Adj R-sq	0.275

Equation 18 consists of a panel regression with 72,302 observations, which include 6,500 unique SNL key Identifiers. Time effects are incorporated in the model while the description of the variables are available below. Main variable used is loan growth rate. Which proxies loan supply. Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 35 illustrates the final form of the first hypothesis, if there is a relationship between loan supply and TDGP participants and non-participants. We use **loan growth rate**<sub>*i*,*t*</sub>to represent our loan supply proxy, as defined in the previous section, loan growth rate is the annualized change in loans and leases calculated as current period loans and leases less prior period loans and leases as a percent of prior period loans and leases. Growth rates are calculated using prior quarter balance for quarter periods, corresponding last twelve months balance for last twelve months periods and prior year end balance for year to date periods. In which  $\mathbf{i}$  is represented by a unique identifier given by the SNL data base for each depository institution and  $\mathbf{t}$  represents time from 2004-2016 on a yearly basis.

As with previous equations,  $\beta_1$  interaction<sub>i,t</sub>(TDGP×Post) is an interaction between tdgp participants, which are equal to 1 in our dummy variable, and non-participants which are equal to zero. Post is interacted with TDGP as it represents two-time periods. The first period is represented by 1 for years between 2013 and 2016 while the second-time period is represented by zero for years from 2004-2012. We find negative significance in the interaction between TDGP participants and that of post FDIC initiation period, this leads to the assumption that TDGP participants showed that, after the FDIC initiation, loan supply decreased from TDGP participants which goes against the reason for the injection of the funds from the FDIC. As to allegations that TARP participants used other governmental funding programs to pay back TARP we use a dummy variable to represent 1 if they were TARP participants and repaid while also taking TDGP funds, zero otherwise.

 $\beta_2 tarp - tdgp_{i,t}$  is used to annotate the TARP dummy variable, the results warrant that TARP and TDGP participants also had less loan supply than non-TARP and TDGP participants, this can indicate that loans were less likely given if a depository institution took part in both TARP and in TDGP, these results could indicate that allegations in regard to using TDGP funds to repay TARP could be warranted. For our performance proxy annotated by  $\beta_3 performance_{i,t}$  we used Return on Average Equity (roae) we consider **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis.

Results warrant a negative significant correlation between performance and loan supply, for every increase in cost of funding/ loan supply we see a negative return in performance measurements; this could be due to more risky investments prior to the financial crisis, as many depository institutions were under surveillance by Treasury as well for taking TARP funds. The annotation for asset quality  $\beta_4 asset quality_{i,t}$  is proxied with the use of loan loss reserves to total assets (llr/assets). A negative significant correlation between loan loss reserves to total assets and loan supply relays an optimistic explanation, for every change in cost of funding a negative correlation in asset quality indicates a higher asset quality.

Tier 1 capital (tier1) is our choice of proxy for Capitalization annotated by  $\beta_5 capitilization_{i,t}$  as previous annotations i represents a unique identifier given by the SNL

database for each depository institution and t represents time from 2004-2016 on a yearly basis. Capitalization is negatively and significantly correlated to cost of funding, for every 1% increase in loan growth rate, Capitalization decreases by less than -0.0%. This could indicate a weaker and less liquid depository institution in which capital ratios are a major criterion in the efficiency of depository institutions as we saw in the CAMELS system. The annotation  $\beta_6 risk indicator_{i,t}$  is proxied by non-performing assets to total loans (npas/loans) this variable overlooks the ability of depository institutions to cover loans, annotations i represents a unique identifier given by the SNL data base for each depository institution and t represents time from 2004-2016 on a yearly basis. For every increase in loan supply credit risk drops by the same denomination, this indicates a significantly negative correlation between our credit risk indicator and loan.

 $\beta_7 size_{i,t}$  is proxied by our large bank (largebank) variable in which Depository institutions in the 90<sup>th</sup> percentile and greater are considered large banks represented by 1, while the remainder of the depository institutions are considered smaller represented by zero, **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. When analysing size, we also discuss the theory on how there is a difference between the size of depository institutions.

Results warrant that large depository institutions are 3.5 times more likely to have an increase in loans growth rate which would increase loan supply since the large bank variable is positively and significantly correlated to loan growth rate and having our graph in section three between tdgp participants and non- participants we see that even though tdgp participants were larger and are more likely to issue more loans the participants as a group did not. We use time effects in the equation, we see a negative significant correlation this states that loan supply was low, the model has a goodness of fit at around 28% this is a fairly acceptable, indicating that the extent to which observed data matches the values expected by actual population.

#### 5.5.9 Liquidity Ratio

Table 36 Liquidity Ratio

VARIABLES	Liquidity Ratio (19)
TDGP×Post	0.24887**
Tarp-tdgp	-0.95202**
roae	(0.42153) -0.06056***
	(0.00347)
Npas/loans	0.20604***
	(0.01201)
Llr/assets	-3.29042***
	(0.08221)
Tierl	-0.00003***
T 1 1	(0.00000)
Largebank	-0.12697
Constant	(0.28210)
Constant	29.6/199***
	(0.13919)
Observations	72 718
R-squared	0.80308
Year FE	YES
Absorb	snlkev
Adj R-sq	0.784

Equation 19 consists of a panel regression with 72,718 observations which include 6,532 unique SNL key Identifiers. Time effects are incorporated in the model while the description of the variables is available below. Main variable used is liquidity ratio. Which proxies' strength of liquidity. Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 36 illustrates the final form of our hypotheses' if there is an increase of liquidity with TDGP participants and non-participants. We use *liquidity ratio*<sub>*i*,*t*</sub> to represent our liquidity proxy, as defined in the previous data section; (Cash & Balances Due + Securities + Fed Funds Sold & Repos + Trading Account Assets - Pledged Securities)/ Total Liabilities. Liquidity ratio is the proxy used to measure the liquidity strength of a depository institution, this variable is calculated by SNL global. We use **i** which is represented by a unique identifier given by the SNL database for each depository institution and **t** represents time from 2004-2016 on a yearly basis.

As with previous equations  $\beta_1$  interaction<sub>i,t</sub>(TDGP×Post) is an interaction between tdgp participants which are equal to 1 in our dummy variable and non-participants which are equal to zero. Post is interacted with TDGP as it represents two-time periods. The first period is represented by 1 for years between 2012 and 2016 while the second-time period is represented by zero for years from 2004-2011. We have a positive and significant correlation at the 95<sup>th</sup> percentile, TDGP participants have higher liquidity ratio than non-participants; this indicates for a stronger liquidity position for TDGP participants.

As to allegations that TARP participants used other governmental funding programs to pay back TARP, we use a dummy variable to represent 1 if they were TARP participants and repaid while also taking TDGP funds, zero otherwise.  $\beta_2 tarp - tdgp_{i,t}$  is used to annotate the TARP dummy variable, the results warrant that TARP and TDGP participants had less liquidity than non-TARP and TDGP participants, this can indicate that liquidity is less available if a depository institution took part in both TARP and in TDGP and the fact that depository institutions of both programs could have used funding from one program to repay the other.

We annotate for our performance proxy annotated by  $\beta_3 performance_{i,t}$  we use Return on Average Equity (roae) we consider **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. However, as liquidity increases performance drops, a negative significant correlation emphasises this interpretation. The annotation for asset quality  $\beta_4 asset quality_{i,t}$  is proxied with the use of loan loss reserves to total assets (llr/assets). A highly significant and negative correlation between loan loss reserves and liquidity indicates for every increase in liquidity ratio a decrease in loan loss reserves shows higher asset quality.

Tier 1 capital (tier1) is our choice of proxy for Capitalization annotated by  $\beta_5 capitilization_{i,t}$  as previous annotations i represents a unique identifier given by the SNL database for each depository institution and t represents time from 2004-2016 on a yearly basis. Lower Capitalization is also indicated by a negative and highly correlated outcome between tier1 and liquidity ratio. However, the coefficient is very low it is not even greater than .05%. The annotation  $\beta_6 risk indicator_{i,t}$  is proxied by non-performing assets to total loans (npas/loans) this variable overlooks the ability of depository institutions to cover loans, annotations i represents a unique identifier given by the SNL data base for each depository institution and t represents time from 2004-2016 on a yearly basis.

The ability to default on loans increases with every increase in liquidity ratio, a highly significant positive correlation denotes our analysis.  $\beta_7 size_{i,t}$  is proxied by our large bank (largebank) variable in which Depository institutions in the 90<sup>th</sup> percentile and greater are considered large banks represented by 1, while the remainder of the depository institutions are considered smaller represented by zero, **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis.

When analysing size, we also discuss our theory on how there is a difference between the size of depository institutions. Using liquidity ratio as our liquidity proxy, we see that there is no significant correlation between large banks and strength of a depository institutions ability of producing liquidity. Results convey the larger the institution the weaker its liquidity position, this relates to previous studies by Strahan, (2008) in which he linked smaller banks in having more liquidity. While time effects show that since the inception of the TDGP initiative liquidity has been positive and highly significant, this leads to the assumption that since the FDIC started to give funds for unsecured senior debt, liquidity in the industry started to increase.

While depository institutions did lack in performance they gained in Capitalization and asset quality, this goes with many policy agendas set for the banking industry. The goodness of fit of the model is high at 78%, this gives a strong illustration between our assumptions and real-life scenario, highly correlated variables in the model with a high goodness of fit seem to illustrate a good picture of what is happening between liquidity ratio, the TDGP and TARP participants.

#### 5.5.10 GAP Ratio

Table 37 GAP Ratio

VARIABLES	GAP Ratio (20)
TDGP×Post	0.12706***
	(0.01172)
Tarp-tdgp	0.04649
	(0.04139)
Roae	-0.00140***
	(0.00034)
Npas/loans	-0.01315***
	(0.00123)
Llr/assets	-0.08820***
	(0.00807)
Tier1	-0.00000***
	(0.00000)
Largebank	0.04210
	(0.02773)
Constant	1.68478***
	(0.01559)
Observations	71,991
R-squared	0.67772
Year FE	YES
Absorb	snlkey
Adj R-sq	0.646

Equation 20 consists of a panel regression with 71,991 observations which include 6,521 unique SNL key Identifiers. Time effects are incorporated in the model while the description of the variables is available below. Main variable used is gap ratio. Which proxies' strength of liquidity. Standard errors in parentheses

\*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1Table 37 illustrates the final form of our hypotheses' but using a different proxy in

which there is an increase of liquidity with TDGP participants and non-participants. We use  $gap \ ratio_{i,t}$  to represent our liquidity proxy, as defined in the previous section: the ratio of a company's rate sensitive assets to its rate sensitive liabilities. Rate sensitive assets and liabilities are those likely to increase or decrease substantially in value due to changes in interest rates. Like fluctuating market data that is widely used in measuring liquidity and sensitivity in CAMELS rating system, we use changes in interest rates of rate sensitive assets and rate sensitive liabilities. **i** is represented by a unique identifier given by the SNL database for each depository institution and **t** represents time from 2004-2016 on a yearly basis.

As with previous equations,  $\beta_1$  interaction<sub>*i*,*t*</sub>(TDGP×Post) is an interaction between tdgp participants which are equal to 1 in our dummy variable and non-participants which are equal to zero. Post is interacted with TDGP as it represents two-time periods. The first period is represented by 1 for years between 2013 and 2016, while the second-time period is represented by zero for years from 2004-2012. We have a negative and highly significant correlation at the 99<sup>th</sup> percentile, TDGP participants have higher gap ratio than nonparticipants; this indicates stronger liquidity positions for TDGP participants. We see a positive and highly significant indicator showing that liquidity increased after 2012 which was the period after which participants joined the TDGP. As to allegations that TARP participants used other governmental funding programs to pay back TARP, we use a dummy variable to represent 1 if they were TARP participants and repaid while also receiving funds from the TDGP, zero otherwise.

 $\beta_2 tarp - tdgp_{i,t}$  is used to annotate the TARP dummy variable, the results illustrate that TARP and TDGP participants were not significant in the amount of liquidity performance of TDGP and TARP participants. For our performance proxy annotated by  $\beta_3 performance_{i,t}$  we use Return on Average Equity (roae) we consider **i** represents a unique identifier given by the SNL data base for each depository institution and **t** represents time from 2004-2016 on a yearly basis. Significant at the 99<sup>th</sup> percentile performance shows a negative correlation, as liquidity increases depository institutions performance decreases.

The annotation for asset quality  $\beta_4$  asset quality<sub>*i*,*t*</sub> is proxied with the use of loan loss reserves to total assets (llr/assets). Asset quality shows higher asset quality and gap ratio increases loan loss reserves to total assets decrease leading to higher asset quality. Tier 1 capital (tier1) is our choice of proxy for Capitalization annotated by  $\beta_5$  capitilization<sub>*i*,*t*</sub> as previous annotations **i** represents a unique identifier given by the SNL database for each depository institution and **t** represents time from 2004-2016 on a yearly basis. Capitalization decreases with a highly significant and positively correlated result; however, the coefficient is less than -.05%.

The annotation  $\beta_6 risk indicator_{i,t}$  is proxied by non-performing assets to total loans (npas/loans) this variable overlooks the ability of depository institutions to cover loans, annotations i represents a unique identifier given by the SNL data base for each depository institution and t represents time from 2004-2016 on a yearly basis. The ability to cover loans decreases as liquidity strength increases with a negative and highly significant correlation.  $\beta_7 size_{i,t}$  is proxied by our large bank (largebank) variable in which Depository institutions in the 90<sup>th</sup> percentile and greater are considered large banks represented by 1 while the remainder of the depository institutions are considered smaller represented by zero, i represents a unique identifier given by the SNL data base for each depository institution and t represents time from 2004-2016 on a yearly basis.

When analysing size, we also discuss our hypothesis on how there is a difference between the size of depository institutions. Large banks state in the regression that there is a no significance between strength of producing liquidity and bank size. In terms of our time effects, years prior to 2012 show negative correlation to gap ratio while years after 2012 show a positive correlation, this indicates that liquidity measures have improved since the induction of the TDGP in 2008 - 2012. The goodness of fit is strong at 65% reflecting a strong correlation between our assumptions and data.

In this section we discussed the results, the attempt to show if FDIC's goals for the TDGP have been meet, came out with continual results. Regarding loan supply we see that in general there is a difference between participants and non-participants the latter having higher loan supply. While the proxies for liquidity show the same results, in which participants have stronger liquidity position than non- participants. Allegations by various news agency stating that TARP participants used other various governmental interventions to pay back Treasury showed no warrant in our results, if anything it showed that if a depository institution took part in both interventions, they were less liquid and less likely to supply loans. However, that said time effects showed that our two liquidity proxies, results suggested that after the injection of funds for unsecured senior debt the industry did have a stronger liquidity standing. In the next section we will conclude the results, and share some suggestions and limitations to the chapter.

### 5.5.11 Model Fit

Regression	Adjusted R-Squared
Loan Growth Rate Simple	0.186
Liquidity Ratio Simple	0.736
GAP Ratio Simple	0.571
Loan Growth Rate Interaction	0.152
Liquidity Ratio Interaction	0.735
GAP Ratio Interaction	0.586
Loan Growth Rate	0.275
Liquidity Ratio	0.784
GAP Ratio	0.646

Table 38 Adjusted R-Squared

Concerning model fit, we notice the intuitive results that the models that deal with liquidity has a high R-squared, reflecting the fact that the programs we discuss were important for

liquidity creation. On the other hand, we find low R-squared for models that have to do with loan growth. Because, as discussed before, the programs did not have a high impact on loan growth. Overall, the model fit is good and improves our confidence that we have captured most of the factors affecting the dependent variables.

## **5.6 Discussion & Conclusion**

Liquidity production continues to be the core function of banking, but its form has changed in response to development over the years and deepening of securities markets. Traditional banks issued liquid deposits to finance illiquid loans. Most bank liquidity production came in the form of issuing transactions deposits and supporting the payments system. Banks continued to run but in a more efficient manner and reduced the float available to finance lending. In this paper we came to analyse the main goals of the FDIC's TDGP initiative. The FDIC gave depository institutions funds for senior unsecured debt. The FDIC wanted to accomplish a spike in liquidity within the industry by lower the cost of funds and strengthening liquidity. We also tested for allegations that TARP participants used funding from the TDGP to repay Treasury while also testing to see if large depository institutions had an advantage of liquidity compared to smaller competitors.

We took a simple approach to this method as little information is available on the TDGP. We simply took information available if depository institutions 'opted-in' or 'optedout' of the program from the SNL data base. With this we had our two groups to compare if our proxies changed within two periods. The first period consisted of years in prior to the FDIC's intervention from 2004 – 2012, the second-time period is from 2013 until 2016 where depository institutions would have received funds and dispersed their funding and liquidated the market. In terms of proxies used we took a similar approaches to papers from Aspal and Dhawan, (2016) in which they used the CAMELS rating system to select their proxies for the each category. From the CAMELS system the "L" for liquidity we choose loan supply to be represented by loans growth rate, this variable result was not what we fully envisioned. TDGP participants had lower loan supplies, our most basic analysis was between loan supply and our dummy variable that represented if a depository institution was part of the TDGP or not. These results showed that TDGP participants had lower loan growth rates than non - participants, these results also replicated the second test in which we measured to see if TDGP participants had better loan supply measurements after the FDIC's initiation in 2008. Both these test show that for every 1% increase in loan growth rate approximately there was approximately a 9% decrease for TDGP participants. When we tested for our full model to incorporate all our hypotheses, we observed that TDGP participants had around 1 % less loan supply than non participants while TARP participants were also less likely to issue loans by around 2.5%. The results are like Vazquez & Federico, (2015) as they state the marginal stability gains associated with stronger liquidity and capital cushions do not appear to be large for the average bank but

seem substantial for the weaker institutions. At the same time, there is evidence of systematic differences across bank types. The smaller banks were more susceptible to failure on liquidity problems, while the large cross-border banking groups typically failed on insufficient capital buffers. This difference is crucial from the financial stability perspective and implies that regulatory and supervisory emphasis should be placed on ensuring that the capital buffers of the systemically important banks are commensurate with their risk-taking.

Furthermore, we take into consideration two proxies for strength of liquidity. The first is liquidity ratio, a variable used by the SNL data base to calculate the liquidity strength of a depository institution. The second choice is Gap ratio, the use of gap ratio is mainly for sensitivity testing of a depository institution since it relies on interest rate sensitivity. Gap ratio has been used to measure a depository institutions liquidity position. The results warrant similar results for both proxies. Liquidity ratio is higher for TDGP participants, Gap ratio depict that TDGP depository institutions also had stronger liquidity positions than non-participating depository institutions. Like liquidity ratio, in a way the interaction between TDGP participants and post TDGP initiation warrant for a stronger liquidity position. This states that both proxies show stronger liquidity positions for TDGP participants. Using liquidity ratio as a proxy; depository institutions that were considered large were not significant, measures of performance, the ability to pay back loans Capitalization and asset quality covered regulatory standards or at least on track of what regulators wanted as an industry standard. Gap ratio showed that larger banks also had no significance, while performance proxy was negative for each increase in gap ratio, Capitalization and loan coverage performed to industry and regulatory standards or capitalizing on available liquidity.

When we look at allegations that referred to TARP participants and specifically the depository institutions that paid back TARP and took part within the TDGP, we see that loan supply is negatively correlated to these depository institutions and the same for results on liquidity ratio. This suggests that TARP and TDGP depository institutions had less liquidity and less loan supply which could suggest that the funds received from one government intervention could have gone to repay the other, these results warrant for further research on the 194 depository institutions that did take funds from both interventions; access to more data is needed but is not publicly available. Reasons for depository institutions to not be able to increase loan supply even after increasing liquidity measurements from receiving FDIC intervention funds could be the following. Lowering interest rates could have been a cause not looked at in this study, interest rate reduction can make borrowing cheaper. This should increase the demand for bank

lending as firms and consumers are more willing to borrow rather than save. That of course would be in normal circumstances, a cut in interest rates probably would increase lending. However, in times of distress, lower interest rates could be viewed as ineffective in increasing lending. Lower interest rates might not have increased lending since people may have wanted to borrow at low interest rates, at the same time depository institutions may have not wanted to lend. Depository institutions are constantly worried about the state of their balance sheets from a regulatory perspective; they needed more liquidity. Because of the turmoil and consumer confidence, they were also worried about making loans to firms who might not profit. Another reason could be that lower interest rates may increase demand, but they do not affect the supply. Quantitative easing could have been the general policy to try and increase the money supply and indirectly increase lending by; increasing the liquidity of depository institutions (receiving cash for the unsecured senior debt) as the method of the FDIC and what was looked at in this study. It was hoped with this increase in liquidity that depository institutions would be encouraged to lend to the private sector. However, depository institutions seemed to prefer to hold onto and increase cash reserves, which would also point to the direction of attempting to improve their balance sheets.

The results for strength of liquidity are similar to Berger et al., (2016), in which the creation of liquidity by banks is essential for the macroeconomy, these issues are of importance for academics, bank regulators, and policymakers. Regulatory interventions are generally associated with statistically and economically significant reductions in both risk taking and liquidity creation in the short run. We also find that capital support is associated with statistically significant decreases in both cost of funding and liquidity strength. Cost of funding and liquidity strength analysis suggests that most of the changes in liquidity creation occur in the short term and remain in place in the long run. In terms of policy implications, the results suggest that regulatory interventions and capital support have intended and unintended consequences. Policy makers should be aware that while these policies may be effective in reducing bank risk taking, they may also have adverse effects on the macroeconomy through reductions in bank liquidity creation. With efficient supervision and effective regulation in the picture, bank liquidity can be recast in proper policy implications and reform guidelines. Namely, central bank liquidity can act as a first buffer against the problems caused by liquidity risk and try to cope with the vicious circle between funding and market liquidity. This said even though the FDIC's intervention was successful in increasing banking liquidity they cannot force banks to supply more loans, nor can they force consumers to take it. More research can

be done on the matter as this study faced limitations on more specific data referring to the FDIC's participants, looking at market data could also warrant different results.

# **Chapter 6: Conclusion**

To conclude we will revise the outcome of the chapters three, four and five. Chapter three revealed that, credit risk positions of non-de-novo commercial banks in the US from 1999Q1 to 2015Q3 which has been defined as total unused commitment plus various letters of credit. Using the most significant regulatory Acts from after 1995 which are the Gramm-Leach-Bliley Act of 1999 that deregulated the banking sector in the US, the chapter assumed better credit risk allocation due to the ability of diversifying credit risk by using OBS activity in hedging through various aspects of the banks' activities. Considering other important regulatory Acts in the time period such The Sarbanes-Oxley Act of 2002 that imposed harsher accounting standards and more transparent standards and The Dodd-Frank Act of 2010 which emerged after the financial crisis around 2008, that was attributed to a credit bubble in the subprime mortgage lending sector. The results showed that de-regulation and high OBS usage had a negative significant effect on credit risk. Considering that OBS activities as defined in this study are not considered as financial innovations but are now a traditional part of banks fee income the results show that when regulation is relaxed, banks despite their size and capital constraints partake in high OBS usage and tend to have better credit risk management than banks with less emphasis on OBS activity. A paper by Brewer and Koppenhaver, (1992) investigates the capital markets' perception of an off balance sheet instrument issued by banks using standby letter of credit. Their results warrant if banking firm stock returns and the volume of standby letters of credit outstanding, is standby issuance increases the systematic and total risk of bank stock returns increases. These results support the arguments that the risk of standby letter of credit issuance is like the risk of balance sheet lending, and that equity investors perceive the senior creditor status of standby beneficiaries. Their results are similar in which we view OBS activities as being used like on-balance sheet activities.

The study also found that bank size and Capitalization did not have any effect on credit risk of the banks as previous studies have assumed, what can be contributed is that regardless of bank size but more importantly the emphasis of OBS usage with strong banking performance, lending orientation and efficiency; commercial banks can rely on investing in OBS activity to better allocate and manage credit risk. This, however, cannot be done under harsh and stringent regulatory standards; a deregulated industry will encourage banks to invest in proper OBS activities. Premise such as the market discipline hypothesis backs the results of the study, in which investors and investees can monitor pricing and amounts of OBS activities in proper conditions. While Koppenhaver and Stover, (1991) suggest that if market discipline exists and is important, it should be linked to bank decisions and have an impact on the way decisions are made. The relationship between the issuance of standby letters of credit and primary capital is presented in the context of market discipline, and then estimated. Their suggestion that market discipline causes a joint relationship between bank capital and standby letter of credit decisions for banks that are active participants in the standby market, or that rely heavily on purchased funds, is tested and cannot be rejected. Further work on the subject can include other risk measures, with the inclusion of various innovative OBS activities and how they differ under stringent regulatory Acts. Banks have moved from interest-bearing profits to a more stable fee-based income, and having more tools to work with will grow the industry if proper management and monitoring from government agencies work with better understanding of the industry. As the industry may face a new set of de-regulation with Trump's administration, the banking sector could flourish if correct innovation and market discipline are in harmony with the way a proper competitive and capitalist could develop.

Chapter four's main objectives of encompassing TARP were to improve the stability of the financial system and increase the availability of credit. TARP was one of the largest government interventions in the U.S. during the recent financial crisis. As discussed earlier, TARP's Capital Purchase Program (CPP), was a bank preferred stock and equity warrant purchase program led by the U.S. Treasury's Office of Financial Stability. The main objectives of TARP were to enhance the overall stability of the financial system, increase the availability of credit, and improve real economic conditions. This chapter aligns with the moral hazard theory, which could be described in two variations. Under the increased moral hazard theory, there may be increases in risk taking because of a perceived increased probability of future bailouts. Which gives depository institutions a safety net that the government will always bail them out, even if tax payers' dollars are never returned, or the economy suffers, business must go on. The other variation is that the increases in risk taking may take the form of amplified supplies of bank loans and guarantees to riskier applicants, diminished supplies to safer applicants, or shifts from safer to riskier applicants without changing the overall quantities of loans and guarantees. On the other hand, under the decreased moral hazard theory, the surge in capital from the TARP injections may reduce moral hazard, resulting in shifts into safer portfolios, also with an profound effect on the overall loan and guarantee supplies (Berger and Roman, 2015).

The American Recovery and Reinvestment Act of 2009 enacted in February 2009 not only imposed ex post restrictions on TARP recipients' pay practices, but also it made it easier for banks to leave TARP early. They stated no publicly traded bank that entered after the ARRA legislation chose to exit TARP in 2009. While they did confirm that CEO pay, accounting performance metrics, and capital measures do predict TARP exit, they cannot explain why banks often replaced cheap government capital with more expensive private capital. Hence, the decision by most banks to exit the TARP programs cannot be easily reconciled with standard investment analysis. We also find little difference between banks that entered TARP after executive pay restrictions were added to the investments in February 2009. What we do find is that those latter participants were significantly smaller and had significantly less capital and more problem assets. There are many studies that address which banks enter or are selected for TARP. This is does not lend much support to the claim that adverse selection became more prevalent after the ARRA legislation added more restrictions on TARP recipients. Instead, post-ARRA banks were less concerned with executive pay restrictions and any stigma associated with TARP (Wilson and Wu, 2012).

The study is very closely related to Wilson and Wu (2012), in terms of who exited TARP, however our focus is on bank groups. Bank groups should have had a better probability of exiting TARP, many factors supporting this notion as banks owned by larger companies have support of their parent company in times of financial distress. As discussed, there is a legal standpoint from the Source of Strength Doctrine. The decreased moral hazard theory gives assumptions that an increase in capital will reduce moral hazard, resulting in shifts into safer portfolios. The results illustrated a different scenario, being part of a bank group did not give a better probability to repay TARP, in fact it was less likely to repay TARP, depository institutions did not show significance in post ARRA initiation, while accounting metrics such as performance and bank size had no significance on the financial institutions inclination to pay back TARP. Non-performing assets to total assets were significant at 5%, inferring that regulated financial institutions with less non-performing assets to total assets are more likely to repay TARP.

The findings are related to increased moral hazards. Specifically, although TARP recapitalized troubled banks, the repaying efficiency of the banks in groups were weaker because the government intervention showed no sign of enforcing legislation such as the Source of Strength Doctrine or the addition of the American Reinvestment and Recovery Act of 2009. Our results also reveal that when new government legislation was introduced in 2009,

financial institutions were not motivated to pay back the Treasury. Our study makes a notable contribution to the growing literature on TARP, as well as the literature on bank groups around financial crises and regulatory reforms. In addition, our results have important implications for policymakers. The results suggest that future bailout schemes should have efficiency requirements as bailouts contribute to moral hazard if tighter regulation is not enforced in complete repayment (Treasury selling at auctions for discounts and other ways of not collecting full amounts).

Chapter five looked on how liquidity production continues to be, the core function of banking, but its form has changed in response to development over the years and deepening of securities markets. While traditional banks issued liquid deposits to finance illiquid loans, most bank liquidity production came in the form of issuing transactions deposits and supporting the payments system. Banks continue to run but in a more efficient manner and the float available to finance lending reduced. In this chapter we came to analyse the main goals of the FDIC's TDGP initiative. The FDIC gave depository institutions funds for senior unsecured debt. The FDIC wanted to accomplish a spike in liquidity within the industry by lowering the cost of funds and strengthening liquidity. Some allegations were made that TARP participants used funding from the TDGP to repay Treasury, so we test for that, while also testing to see if large depository institutions had an advantage of liquidity compared to smaller competitors.

As little information is available on the TDGP, information used was if depository institutions 'opted-in' or 'opted-out' of the program from the SNL data base. With this we had our two groups to compare if our proxies changed within two periods. The first period consisted of years in prior to the FDIC's intervention from 2004 – 2012, the second-time period is from 2013 until 2016 where depository institutions would have received funds and dispersed their funding and liquidated the market; this of course was the intended outcome of the FDIC. In terms of proxies we took a similar approach to papers from Aspal and Dhawan, (2016) in which they used the CAMELS rating system to select their proxies for the each category. From the CAMELS system uses the "L" for liquidity we chose loan supply to be represented by loans growth rate, this variable's result was not what we fully envisioned. TDGP participants had lower loan supplies, the most basic analysis was between loan supply and the dummy variable that represented if a depository institution was part of the TDGP or not. These results showed that TDGP participants had lower loan growth rates than non – participants, these results also replicated the second test in which we measured to see if TDGP participants had better loan supply measurements after the FDIC's initiation in 2008. Both these test show that for every

1% increase in loan growth rate approximately there was approximately a 9% decrease for TDGP participants. When we tested for our full model to incorporate all the hypotheses we saw that TDGP participants had around 1 % less loan supply than non – participants, while TARP participants were also less likely to issue loans by around 2.5%. The results are like Vazquez & Federico, (2015) as they state; the marginal stability gains associated with stronger liquidity and capital cushions do not appear to be large for the average bank but seem substantial for the weaker institutions. At the same time, there is evidence of systematic differences across bank types. The smaller banks were more susceptible to failure on liquidity problems, while the large cross-border banking groups typically failed on insufficient capital buffers. This difference is crucial from the financial stability perspective and implies that regulatory and supervisory emphasis should be placed on ensuring that the capital buffers of the systemically important banks are commensurate with their risk-taking.

Additionally, the two proxies for strength of liquidity showed the following: the first is liquidity ratio, a variable used by the SNL data base to calculate the liquidity strength of a depository institution. The second choice is Gap ratio used to measure a depository institutions liquidity position in other past studies. Our results warrant similar results for both proxies. Liquidity ratio is higher for TDGP participants, Gap ratio depict that TDGP depository institutions. Like liquidity ratio in a way the interaction between TDGP participants and post TDGP initiation warrant for a stronger liquidity position. This states that both proxies show stronger liquidity positions for TDGP participants. Using liquidity ratio as a proxy; depository institutions that were considered large were not significant, measures of performance, the ability to pay back loans Capitalization and asset quality covered regulatory standards or at least on track of what regulators wanted as an industry standard. Gap ratio showed that larger banks also had no significance as a variable, while performance proxy was negative for each increase in gap ratio, Capitalization and loan coverage performed to industry and regulatory standards or capitalizing on available liquidity.

Looking at allegations that referred to TARP participants and specifically the depository institutions that paid back TARP and took part within the TDGP we see that loan supply is negatively correlated to these depository institutions and the same for results on liquidity ratio. This suggests that TARP and TDGP depository institutions had less liquidity and less loan supply, which could suggest that the funds received from one government intervention could have gone to repay the other, these results warrant for further research on

the 194 depository institutions that did take funds from both interventions, access to more data is needed but is not publicly available.

Motives that are possible for depository institutions to not be able to increase loan supply even after increasing liquidity measurements from receiving FDIC intervention funds could be of the following reasons. The reduction of interest rates, more study on this issue could be looked at, whether interest rate reduction can make borrowing cheaper. This should increase the demand for bank lending as firms and consumers are more willing to borrow rather than save. Depository institutions are constantly worried about the state of their balance sheets from a regulatory perspective; they needed more liquidity. Because of the turmoil and consumer confidence, they were also worried about making loans to firms who might not profit. Another reason could be, that lower interest rates may increase demand, but they do not affect the supply. Quantitative easing could have been the general policy to try and increase the money supply and indirectly increase lending by; increasing the liquidity of depository institutions (receiving cash for the unsecured senior debt) as the method of the FDIC and what was looked at in this study. It was hoped this increase in liquidity that depository institutions would be encouraged to lend to the private sector. However, depository institutions seemed to prefer to hold onto and increase their cash reserves which would also point to the direction of attempting to improve their balance sheets.

The results for strength of liquidity are similar to Berger et al., (2016), in which the creation of liquidity by banks is essential for the macroeconomy, these issues are of importance for academics, bank regulators, and policymakers. Regulatory interventions are generally associated with statistically and economically significant reductions in both risk taking and liquidity creation in the short run. We also find that capital support is associated with statistically significant decreases in both cost of funding and liquidity strength. Cost of funding and liquidity strength analysis suggests that most of the changes in liquidity creation occur in the short term and remain in place in the long run. In terms of policy implications, the results suggest that regulatory interventions and capital support have intended and unintended consequences. Policy makers should be aware that while these policies may be effective in reductions in bank liquidity creation. With efficient supervision and effective regulation in the picture, bank liquidity can be recast within proper policy implications and reform guidelines. Namely, central bank liquidity can act as a first buffer against the problems caused by liquidity risk and try to cope with the vicious cycle between funding and market liquidity. This said,

even though the FDIC's intervention was successful in increasing banking liquidity they cannot force banks to supply more loans, nor can they force consumers to take it. More research can be done on the matter as this study faced limitations on more specific data referring to the FDIC 's participants, looking at market data could also warrant different results.

There have been many instigations to regulatory reform for the banking industry over the coming months or years, recently the US presidential administration's announced plans, but nothing is certain yet. The reasons for instigating reform were issues such as a prolonged period of slow economic growth and persistently low and volatile interest rates led to diminished profitability in some sectors. Also, reasons of prospective regulatory reform were 2017, an executive order on Core Principles for Regulating the US financial system particularly, the order directs the Secretary of the Treasury to report to the President that promote or inhibit the Core Principles and what actions have or might be taken. These principles include development of economic growth and financial markets; making regulation efficient, effective and appropriately tailored; and restoring public accountability within Federal regulatory agencies. Globally the Basel Committee on Banking Supervision will attempt to conclude most of its banking framework, but face issues with; recovery and resolution planning which is expected to move closer to being implemented for most large banks and increasingly clarified for non-banks; and markets are expected to continue to shift toward central clearing and higher standards for transparency.

This is considered the new age of capital planning and stress testing. Initiatives such as: New capital order; in which both US and global depository institutions must contend with new reform initiatives for some aspects of Basel III. There changes are several and affect a wide range of capital calculations for banks, and, in addition to potentially raising regulatory capital requirements, stand to substantially increase the complexity of measuring risk and the resources needed to do so. The new standards seek to limit the extent to which banks can use their own models to determine their risk exposures, but, in doing so, they also place even more pressure on bank business models, and raise fresh questions over when regulators will draw a line under the capital regime. Data quality, analytics and reporting is another area in which regulators have increasingly made clear that they expect banking organizations including both US bank holding companies, as well as foreign banking organizations to have the aptitude to access and provide high-quality data. These include credible internal data management and analysis that supports regulatory reporting requirements and management information. Financial technology markets represent both a competitive threat and an opportunity for traditional banks. Cyber threats and risk are another main concern of regulators, who are increasingly articulating their expectations for cyber risk and focusing on integrating a cyber risk assessment into their view of operational risk. In other areas, such as resolution planning, in which the potential consequences of failure are so severe, firms are continuing to emphasize not only addressing key resolution vulnerabilities but also importantly embedding resolution planning into existing business-as-usual processes, procedures, and capabilities. Consumer protection, an issue discussed in the Dodd-Frank Wall Street Reform and Consumer Protection Act continues regular operations, and regulated institutions should continue to monitor its supervisory practices.

Liquidity requirements for foreign and domestic US financial institutions, largely as part of the final rule on enhanced prudential standards, have been discussed as it is still a growing concern despite attempts from the FDIC to increase liquidity in the market. The liquidity requirements apply to US bank holding companies and foreign banking organizations with total consolidated assets of \$50 billion or more. Several other key requirements, such as the US liquidity coverage ratio and complex institution monitoring reporting, also made important strides toward implementation. Governance and risk management has higher standards, with attempts at enforceable guidelines. Many firms haven't yet developed risk governance and cultural frameworks sufficient to fully meet regulatory expectations. Credit quality concerns have arisen since issues regarding credit environment, underwriting standards continue to loosen, and concentrations have increased at several firms. Although most credit indicators remain sympathetic, regulators have communicated that credit risk is increasing within the system.

As these issues are currently being addressed and may have improved slightly, but they have not been fully resolved. Regulation can only be effective when proper data is available to analyse, and better policy will be recommended to the industry, whether it is regulating the industry or deregulating it. The main outcome is for economic growth. The issues discussed above are related to this thesis and could contribute to the ever-growing literature of the banking industry.

## **6.1 Discussion of Limitations**

Empirical banking models of the sort discussed in this thesis share some of the same issues. We enumerate some of them here:  A key outcome of social science is to uncover a causal relationship between variables. The main tool for uncovering causal relationships is experiments. However, experimental data is fairly rare and costly. Since experimental data is limited and most data is observational, the model estimation uncovers an association between the variables and hope that this association has a causal interpretation.

Social scientists conducting empirical research are often confronted with questions regarding the validity of their causal claims. Whereas in many cases presenting some observational data is enough to validate the plausibility of a theoretical idea, testing causal hypotheses requires different approaches. Experiments are one of the most powerful tools to reach this goal, and they are becoming increasingly popular in social scientific research as well as in other fields where decisions are evidence-based. For banking empirical research however, the best way to motivate the causal relationships between variables is to provide a theory for why the variables are related. This gives a causal interpretation to the associations we uncover with our empirical estimation.

- 2) Since our data is observational, estimation and errors suffer from some issues like endogeneity, serial correlation, and the like. There are some techniques that can be used to mitigate some of these issues, and we do take these steps. However, full elimination of all the issues involved is hard. The hope is that the approach we take eliminates a significant amount of these issues, that the remaining issues to do not raise serious questions about our results.
- 3) Our empirical strategy amount to a before and after test, but a lot might change with the before and after. How can we isolate the effect of the factor we identify when a lot of factors change in the window of time we consider? The best way for this to work perfectly is if we guarantee a ceteris paribus assumption. However, we rarely have such an assumption with observational data. Particularly during the last crisis, many factors were at play during the crisis. It is fair to say that this multitude of factors affect the before and after. We hope that this does not bias our coefficients to a large degree.

## **6.2 Future Avenue for Research**

This research opens a door to the analysis of regulation in the banking industry. We focus on the US banking industry. Expanding this thinking to the international arena might be a fruitful way to go forward. The US has one of the most developed financial

markets and banking system in the world. It would be interesting to see if our results hold for other countries.

Moreover, it would be interesting to see the interaction between regulation and market maturity. Does regulation have the same effects and the same role when the market is less mature? Expanding our analysis to countries with less developed markets and banking systems might show a role for market maturity in the effect of the regulatory system on risk.
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