THE IMPACT OF THE CHANGE IN THE DEFINITION OF BANK CAPITAL ACCORDING TO BASEL 3

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"IT ALWAYS SEEMS IMPOSSIBLE UNTIL IT'S DONE"

(NELSON MANDELA - 1918-2013)

DECLARATION

I hereby declare that the work on which this dissertation is based is entirely my own work, and all sources have been acknowledged through citations and referencing. Neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this university or any other academic institution. I authorize the University of Cape Town to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

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ABSTRACT

The objective of this study is to analyse the impact of the change in the definition of bank capital according to Basel 3. The 2008 financial crisis exposed the flaws in the global regulatory and supervision framework and also showed that Basel 2 could not fully protect against bank failures. In order to address the gaps, loopholes and deficiencies of Basel 2 and to guard against any future crises, the Basel 3 accord was implemented in 2013. The key change introduced by Basel 3 is the requirement that banks hold more capital. However, the Basel 3 accord also changed the definition of bank capital and risk-weighted assets (RWAs). In comparing Basel 2 with Basel 3, several changes in the definition of capital appear. It is therefore important to analyse the impact of the capital definition change introduced in Basel 3. The study used a sample of the fifty largest commercial and investment banks by asset size from the USA and the Europe region. The study calculated the Basel 2 Tier 1 capital ratio and Basel 3 Tier 1 capital ratio at the same point in time by only changing the reported capital under Basel 2 and Basel 3 but keeping the RWAs the same at Basel 2 level. This is to isolate the capital definition change and exclude changes to the RWA definition. The change in the regulatory Tier 1 capital ratio as is the estimated impact of the change in the definition of bank capital according to Basel 3. The data sample shows that the banks in the Europe region are larger in size than the USA banks on average. The results show that the change in the Basel 3 capital definition had a positive impact on the European banks' capital ratios and in contrast there was a negative impact on the USA banks' capital ratios. The limitations of the study include the use of a small sample size of fifty banks, the omission of Asian banks from the sample size even though these include some of the largest banks in the world, and the selection of banks with December year ends only. This study contributes to the literature because it is the first study to examine the capital definition change in Basel 3.

Key words: *Financial crisis; Basel Accords; Capital ratio; Capital definition.*

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1 INTRODUCTION

Banks are very important because they finance consumption, investment projects and also serve as payment mechanisms through which transactions are completed between two parties. For a country to grow, develop and maintain a stable economy, that country must develop its financial market and banking system (Barth, Gan & Nolle, 2009:2). Banks are exposed to market, credit and operational risks, amongst others; if these risks are not properly managed, they can cause bank runs and bank failures. For this reason, bank activities should therefore be closely monitored and the banks should be required to keep enough capital in relation to risks they may face (Amidu, 2007:68). Whenever a large financial institution fails, public confidence in the financial system is likely to diminish. Bank regulators have imposed minimum capital requirements for banks with the aim of reducing the scale of bank runs and bank failures and in order to maintain stability in the financial services sector because banks with sufficient capital are capable of managing their risks properly and thus reduce the risks of bank runs and bank failures (Dupuis, 2006:1). The challenge is how to determine what the sufficient capital level should be; on the one hand, if banks keep low levels of capital then they may increase the risk of failing while on the other hand, if they keep high levels of capital they may also decrease their ability to extend credit. A bank's liquidity becomes exhausted when too much capital is set aside to act as reserves but maintaining too low levels of bank capital also exposes banks to a greater risk of insolvency (Dupuis, 2006:1).

The banking sector remains one of the most regulated industries with an increased focus on adequacy of bank capital even though there is no agreement on a common formula for global banking supervision and regulation. However, increased invention and the development of new technology, together with the regulatory lapses in the financial system, all continue to expose the global financial markets and the banking system to greater risks (Sahajwala & Van den Bergh, 2000:1). The globalisation of financial markets therefore, aims to introduce common capital regulations that will stabilize the banking sector and the financial system world-wide. Bank supervising authorities are required to assess the bank operations and also ensure that banks have proper risk management frameworks in place to guard against the risks they face (Barth, Gan & Nolle, 2009:18). Several factors can explain differences between one country and another in

terms of banking regulation and supervision. These include: the differences in the level of complexity and financial system development, number and size of financial institutions; levels of transparency of the financial systems, disclosure requirements; and, resources and technological innovation (Sahajwala & Van den Bergh, 2000:2). Despite these differences, the regulation and supervision of banking institutions is still expected to be in line with the international best practices to ensure and maintain global financial sector stability.

The Basel Committee on Banking Supervision (BCBS) was formed as a result of the financial market crises that followed the failure of the Bretton Woods system of managed exchange rates that saw many banks suffer large foreign currency losses (Bank for international settlements, 2014:1). The Committee is a forum for regular cooperation on banking regulatory and supervisory matters. The aim of the Committee is to improve the global banking regulation and supervision knowledge with a view to bringing stability to the banking and financial services sectors. The Committee develops guidelines for bank regulations and recommends the best practices that banks should follow (Casu, Girardone & Molyneux, 2006). The decision to implement the standards and follow the recommended practices rests with the central banks in the individual countries. The Committee also sets the minimum standards for the regulation and supervision of banks. It shares supervisory issues, methodologies and procedures in order to promote common understanding and improve cross-border cooperation. Countries are represented on the Committee by their central banks in those instances where the central banks are responsible for banking supervision. In those instances where the central bank is not responsible for banking supervision, authorities with formal responsibility for banking supervision represent their countries on the Committee (Bank for international settlements, 2014:1).

Following on from increased concerns about the stability of the banking and financial services sectors, the 1988 Basel Capital Accord (Basel I) was implemented to safeguard the global banking system against unexpected financial crises. The objective of Basel I was to promote and harmonize the regulatory and capital adequacy standards. It proposed that the banks hold sufficient capital to guard against unexpected risks. Basel I proposed a minimum capital ratio of

8% of the risk-weighted assets for internationally active banks (Balin, 2008:2; Bank for international settlements, 2006:3). Basel I was criticized for dealing only with credit risk and for the omission of other important banking risks in calculating capital adequacy ratio. Basel I was also criticized for being very simple and for the use of broad categories of risk-weights where within each category the assets were treated as equally risky and given the same risk-weight. The framework did not consider that each risk category would contain debtors of different credit qualities and ratings.

Given these criticisms, the Committee proposed a new and a more comprehensive capital adequacy framework (Basel 2) which was published in 1999 (Balthazar, 2006). Basel 2 was officially implemented in 2004. It maintained the pillar framework of Basel I but expanded this framework to cover credit, market, operational, and interest rate risks, and also included market based supervision and regulation in the framework. The aim of Basel 2 was to improve the capital regulation requirement, assist banks to identify the risks they were likely to face and help banks develop and improve their risk management frameworks (Bank for international settlements, 1996:2). The definition of capital and the minimum capital requirements of 8 % remained unchanged from Basel I while operational risk was added to the components of the regulatory capital calculation.

The 2008 financial crisis exposed not only the flaws in the global regulatory and supervision framework and the weaknesses in the banks' risk management procedures but also showed that Basel 2 could not protect fully against bank failures. With the aim of correcting the gaps, loopholes and deficiencies of Basel 2 and of guarding against any future crises, the global regulatory and the supervisory authorities considered ways of maintaining and improving the stability of the financial markets and thus regaining confidence in the economy. The BCBS published its Basel 3 accord in 2010 with the implementation of the rules to be effected from 2013 (Schwerter, 2011:337). Basel 3 created stricter capital standards by reducing what can be counted as regulatory capital, proposing higher minimum capital ratios and additional capital buffers (Shaffer, 2011:12). Basel 3 maintained the banks' minimum capital ratio of 8% of the

risk-weighted assets. It increased common equity Tier 1 (CET 1) capital ratio from 2% to 4.5%. Additional Tier 1 capital ratio of 1.5% raises Tier 1 capital ratio from 4.5% to 6%. Basel 3 introduced extra capital buffers: these were a capital conservation buffer of 2.5% and a countercyclical buffer between 0% and 2.5% (Bank for international settlements, 2011a:2; Auer & Von Pfoestl, 2011:14).

The 2008 financial crisis also showed that the market ignored regulatory capital as a measure of a bank's capital adequacy and focused on tangible common equity (Tarullo, 2011:3). In order to raise the quality of regulatory capital, Basel 3 recognizes the unrealized gains or losses on available for sale (AFS) securities measured at fair value in its CET 1. One of the differences between Basel 2 and Basel 3 is that Basel 2 did not recognize unrealized gains or losses on AFS securities and excluded these from its Tier 1 capital while Basel 3 recognizes the unrealized gains or losses on AFS securities and includes them in Tier 1 capital; this leads to different leverage ratios and Tier 1 capital ratios under Basel 2 and Basel 3 (Song, 2014a:60). Under Basel 2, trading revenues and realized gains or losses on AFS securities are the major components of regulatory Tier 1 capital measured using fair value accounting. Unrealized gains or losses on AFS securities were excluded from Tier 1 regulatory capital because the volatility created by fair value accounting does not reflect a bank's true financial condition and also because unrealized gains or losses on AFS securities as opposed to net income are not useful and value relevant to the securities price (Dong, Ryan & Zhang, 2014:248). Basel 3 includes unrealized gains or losses on AFS securities with the view that unrealized losses could have an effect on a bank's capital (Song, 2014a:60).

The shortcomings in the risk management processes under Basel 1 and Basel 2 are one of the reasons why the BCBS focused more on the quality and quantity of capital that banks must hold under the new Basel 3 Accord, to ensure better risk absorption. The key change introduced by Basel 3 is the requirement that banks must hold more capital. However, at the same time, Basel 3 also changed the definition of capital. Thus, when comparing Basel 2 with Basel 3, several changes in the definition of capital appear. The literature shows that there are different views among researchers on the strength of the bank lobby with respect to Basel 3, but there is

consensus that the industry had a tangible impact on Basel 3 with some critics arguing that the European Union Commission wanted to make some of the Basel 3 requirements less stringent. The main objectives of this study are therefore to analyse the capital definition change made by Basel 3 and then determine whether this resulted in any change in a bank's capital, excluding changes in risk-weighted assets (RWAs). Basel 3 changed not only the definition of capital but also RWA. However, the study examines only the capital definition change and excludes changes to the RWA definition, in order to isolate the capital definition change. The study used a sample of the fifty largest commercial and investment banks by asset size in the USA and the European region.

In answering the research question, the study calculated the Basel 2 common equity Tier 1 capital ratio and the Basel 3 common equity Tier 1 capital ratio at the same point in time; in doing so, the RWA levels were kept the same, while changing only the common equity Tier 1 capital in the calculation. The following information for each of the fifty banks was collected:

- Total assets as at December 2012.
- Basel 2 Tier 1 capital as at December 2012.
- Basel 2 RWAs as at December 2012.
- Estimated Basel 3 Tier 1 capital as at December 2012 wherever the information was available. The estimated and reported figures were collected wherever these were available while in cases where they were not estimated, the study calculated the comparative figures using the Basel 3 capital definition.
- The Basel 3 Tier 1 capital ratio as at December 2012, calculated as Basel 3 Tier 1 capital divided by Basel 3 RWAs.

By using the collected data, the study calculated the following for each of the fifty banks:

- Basel 2 Tier 1 capital ratio as at December 2012.
- Estimated Basel 3 Tier 1 capital ratio as at December 2012, calculated by changing the capital part from Basel 2 to Basel 3 but keeping the RWAs part the same at Basel 2 level.
- Change in regulatory Tier 1 capital ratio as at December 2012. This change is the estimated impact of the change in the definition of bank capital according to Basel 3.

The data sample shows that the European banks are larger in size than the USA banks on average. The results show that the change in capital definition in Basel 3 resulted in a positive impact on the European banks capital ratios and a negative impact on the USA banks' capital ratios. The results suggest that the European banks benefited more from the change in capital definition than the USA banks and that the capital definition change benefited the larger banks more than the smaller banks. The advantage that the European banks have over the USA banks can maybe attributed to the fact that being in Europe they could have had influence on the BCBS decision making process since BCBS is also in Europe. The advantage that the larger banks have over the smaller banks can maybe attributed to the fact that being larger they have more financial resources and power to influence the BCBS decision making process than the smaller banks. Banks with relatively higher Basel 2 Tier 1 capital ratios did not derive more benefit from the change in capital definition because the correlation matrix show that capital definition change and the Basel 2 ratio variables are moving in the opposite directions and also banks with relatively higher Basel 2 ratio are already looking healthy and therefore their management does not need to be concerned about influencing the BCBS decision making process in their favour. Banks with relatively low Basel 3 Tier 1 capital ratio also did not derive benefit from the capital definition change because the overall impact of the change in capital definition was a reduction in bank capital ratios and banks with relatively low Basel 3 Tier 1 capital ratio needed to lobby for the change in capital definition in order to have more capital under Basel 3.

The study contributes to the literature because it is the first one that examined the capital definition change in Basel 3. The results of this study can be used as a guideline for further studies in which a larger sample can be used which includes the Asian banks and other banks that do not have December year ends.

The remainder of the study is organized as follows: Chapter 2 presents the literature review, research question and research hypotheses; Chapter 3 presents the research approach where the data and the method used in the study are explained; Chapter 4 presents the results of the study and Chapter 5 presents the conclusion.

2 LITERATURE REVIEW

2.1 Background

The globalization of the financial system has exposed the internationally active banks to lending and credit risks and has also raised more concerns about the profitability of financial institutions and confidence in the global financial system. In responding to these growing concerns, the Bank for International Settlements (BIS) developed regulatory frameworks known as the Basel Accords, for the internationally active financial institutions. The objective was to strengthen their capital adequacy and thereby regain and maintain public confidence in the stability of the financial system (Dupuis, 2006:3).

Most of the research on the Basel Accords are from the Bank of International Settlements. For this reason, there are a few journal articles cited for this study. Basel 3 is a relatively new subject matter having been effected only in 2013 and therefore not much research has been done on it especially on the capital definition change. Word searches were done for "Basel 3" and "capital definition" on google scholar and Journal Storage (JSTOR). It is against this background that most of the cited articles in this study are BIS documents and other recently published articles which are not journal articles.

2.2 Basel I

The 1988 Basel Capital Accord (Basel I) was designed to safeguard the global banking system against unexpected financial crises. This framework was designed for the member countries represented on the Basel Committee as well as for other countries with active international banks. Basel I was designed to promote and harmonize the regulatory and capital adequacy standards within the member states of the developed markets and was not intended to incorporate the needs of emerging market economies. Basel I mainly focused on credit risk and appropriate risk-weighting of assets. The framework proposed that the internationally active banks hold sufficient capital to guard against any unexpected risks they may face. Basel I proposed a minimum capital ratio of 8% of the risk-weighted assets for internationally active banks (Balin, 2008:2; Bank for international settlements, 2006:3). Basel I regulatory capital is

divided into Tier 1 and Tier 2. The elements of Tier 1 capital consist of paid-up share capital/common stock and disclosed reserves while Tier 2 capital consist of undisclosed reserves, asset revaluation reserves, general provisions/general loan-loss reserves, hybrid (debt/equity) capital instruments and subordinated term debt. Basel I required that the total of Tier 2 capital elements are limited to a maximum of 100 percent of the total of Tier 1 capital elements; subordinated term debt amounts are limited to a maximum of 50 percent of Tier 1 capital elements; loan-loss reserves are limited to a maximum of 1.25 percentage points and asset revaluation reserves in the form of hidden gains on unrealized securities are subject to a discount of 55 percent (Bank for international settlements, 2006:77). The equation was presented as:

$$\frac{Total\ capital}{Risk\ weighted\ assets} = \frac{Tier\ 1\ capital + Tier\ 2\ capital}{Risk\ weighted\ assets} \geq 8\%$$

Basel I was criticized for the omission of other important banking risks in calculating the capital adequacy ratio, especially the omission of market risk. Since Basel I only focused on credit risk and ignored the other risks, the scope of Basel I was considered to be too narrow to protect the banks against all risks and to ensure stability of the global financial system. Basel I was also criticized for its simplicity and its random method of assigning risk weights both to on- and off-balance sheet items. Assets were assigned the same risk weights even though they had different credit qualities and ratings: this over-simplistic approach was considered to be misleading and could have led to the wrong calculation of capital adequacy. Another weakness of Basel I was lack of a common understanding of the Tier 1 and Tier 2 capital definitions that resulted in some countries allowing banks to include some unclearly defined instruments in their capital reserves (King & Tarbert, 2011:2). Given these weaknesses of Basel I, the Basel Committee proposed a new and a more comprehensive capital adequacy accord: this was the Basel 2 framework that was published in 1999 (Balthazar, 2006).

2.3 Basel 2

Basel 2 was implemented in 2004. It was intended to create a global standard for the banking regulators that could help them determine how much capital banks would need to keep aside as a

reserve to guard against the unexpected financial and operational risks that they were facing. Basel 2 focused on maintaining consistency in regulatory matters of the internationally active banks to protect the global financial system from collapsing in the event of the failure of major banks. The aim of Basel 2 was to set up a global risk and capital management framework designed to ensure that internationally active banks had adequate capital reserves in relation to the risks they were facing. Basel 2 proposed that banks keep adequate capital reserves according to those risks but with riskier banks being required to hold greater capital to ensure that they remain solvent and the global economy remain stable. Basel 2 also required financial institutions to disclose the details of their operations and risk management procedures (Dobson & Hufbauer, 2001). It aimed at improving capital regulation requirements, assisting banks in identifying the risks they face and helping them to develop and improve their ability to manage those risks (Bank for International Settlements, 1996:1). Basel 2 maintained the pillar framework of Basel I and so the three pillars of Basel 2 were as follows: Pillar 1 which included minimum capital requirements for credit risk, market risk and operational risk; Pillar 2 which contained the supervisory review process outlining the demands on banks' management relating to management of risks and capital while also defining the roles and powers of the supervisors; and Pillar 3 which dealt with market discipline and set out demands on banks for public disclosure regarding each bank's management of risks and capital (Von Thadden, 2004).

2.3.1 Pillar 1: Minimum Capital Requirements

Pillar 1 dealt with the calculation of minimum capital requirements for three major risks that bank face: these are credit, operational and market risks. Other risks were not considered under this pillar. The Basel I definition of capital and the minimum capital requirement of 8% of the RWAs both remained unchanged in Basel 2 while operational risk was added to the components of the regulatory capital calculation. The credit risk element can be calculated in three different ways as follows: first, the standardized approach; second, the foundation internal rating based (IRB) approach; and third, the advanced internal rating based (AIRB) approach. For operational risk, the approaches were as follows: basic indicator approach; standardized approach; and, advanced measurement approach. For market risk, the two methods were the standardized approach and the internal model approach (IMA). As Basel 2 recommendations are

implemented, the banks will move from standardized requirements to specific requirements developed by individual banks for each risk category they are likely to face. Banks that develop their own risk measurement systems will have lower risk capital requirements (Bank for international settlements, 2006:12). The Basel 2 equation is presented as:

$$\frac{Tier\ 1\ capital + Tier\ 2\ capital + Tier\ 3\ capital}{Credit\ risk + Market\ risk + Operational\ risk} \geq 8\%$$

2.3.2 Pillar 2: Supervisory Review Process

The supervisory review process contained in Pillar 2 provided recommendations to the supervisory authorities to ensure that banks were able to deal with their potential financial problems. Pillar 2 helped banks identify other potential risks that they are likely to face but are not catered for in Pillar 1; this left the regulators to decide whether or not to adjust the regulatory capital requirement calculated in Pillar 1. Pillar 2 calls for a higher regulatory capital requirement than Pillar 1 and requires the banks to cater for all possible risks they might face including the risks not captured under Pillar 1 (Bank for international settlements, 2006:204).

2.3.3 Pillar 3: Market Discipline

Pillar 3 developed disclosure requirements that allowed market participants to measure the capital adequacy of financial institutions. This pillar added to the banking regulations insofar as it required banks to share their information for assessment by the public, which in turn enhanced good governance. Pillar 3 required financial institutions to disclose their operations, capital, potential risk exposures, capital adequacy and risk management framework (Bank for international settlements, 2006:226).

The 2008 crisis in the global financial markets has raised more concerns about the stability of the global financial system and the design of financial regulations, including Basel 2. One of the identified weaknesses of Basel 2 is the use of external credit rating agencies. Many financial institutions used the services of those external credit rating agencies because they did not have an

internal credit assessment department. Any error in calculations by those external rating agencies would mean exposing the affected banks to more risks because those risks would have been mispriced (Teply, 2010:1479). The use of external rating agencies also poses a conflict of interest because the banks selling securities pay the rating agencies to assign grades to their assets. The banks would put pressure on the agencies for a favourable rating of their instruments. Highly rated securities benefit both the asset issuers and purchasers. The benefit to the issuers is that they increase the asset sale prices and attract more business while the benefit to the asset purchasers such as banks is that highly rated assets allow the banks to hold less capital reserves under Basel 2 (Atik, 2011:750). The second weakness arises from the pro-cyclical effects of Basel 2. This term 'pro-cyclical' refers to the reduction of lending by banks during recessions (Berlin, 2009:2). Basel 2 required banks to raise their regulatory capital to deal with the additional risk to which they are exposed. The banks are required to hold less capital by increasing their lending practices during an economic boom, which is just when a systematic crisis is likely to occur: in contrast, in an economic downturn they hold more capital by reducing their lending practices, at just the time when the economy needs more capital. These pro-cyclical effects of Basel 2 can lead to instability in the economy (Atik, 2011:751). The third weakness of Basel 2 is that it was not designed for developing countries; indeed, the original driving force for Basel 2 came from developed countries to meet their needs. The capital requirements under Basel 2 leave the local banks with constrained capital, making them weaker and a target for takeovers by advanced international banks with capital and expertise required by the regulators to implement Basel 2 (Bailey, 2005:25). The fourth weakness is that Basel 2 favours larger banking institutions with resources and capacity to implement the Basel 2 capital requirements. This allows the internationally active banks to dominate the domestic banking sector and become a threat to the domestic banks in terms of business. Developing countries also risked the threat of failing to attract international banks if they fail to implement the new accord (Dupuis, 2006:8). The fifth weakness of Basel 2 is that it required very complex systems for risk measurement and management that required experts and greater financial resources. Banks needed to improve their internal systems to meet the required standard for implementing those advanced methodologies. This led to a delay in the implementation process of Basel 2 as banks had to plan and reorganize their resources to provide capital needed for the implementation of the advanced methodologies (Cornford, 2006:18).

2.4 Basel 3

The 2008 global financial crisis exposed the flaws in the global regulatory and supervision framework and the weaknesses in the risk management frameworks used by the banks. The crisis also demonstrated that some financial institutions in the United States of America (USA) had become too large and highly leveraged, to the extent that their failure could lead to financial instability in the USA and globally, as a result of their interconnectedness (Song, 2014b:3). The crisis started in the USA and spread to the rest of the world (Schwartz, 2009:19). It developed from the subprime crisis, into the credit crisis, then into a financial crisis and finally became a global financial crisis (De Jager, 2014:101). The crisis was caused by a sharp fall in the house prices and high liquidity levels in the financial markets in the USA (Ackermann, 2008:329). Another factor that contributed to that crisis was fair value accounting (De Jager, 2014:98). This played a major role at the beginning of the crisis and also contributed substantially at later stages, arising from the fact that the market used tangible common equity for measuring banks' capital adequacy: this led to substantial impacts on the leverage ratio and Tier 1 capital ratio of banks (Song, 2014b:5). Other factors that accelerated the financial crisis included financial innovations, failure of the risk management procedures for banks accompanied by weaknesses in the regulatory and supervisory frameworks. Until the early 1990s, there were strict requirements for house ownership in the USA and individuals had difficulties in meeting those requirements and thus owning houses. In particular, purchasers were required to find very large amounts of money for a deposit, provide proof of stable employment and a thorough analysis of their household income was done. The US government started to encourage individual home ownership in late 1990s, and this move led to the strict home ownership requirements being relaxed. In this environment the subprime mortgage segment was introduced, that allowed borrowers with bad credit histories and low incomes also to buy property. There were also low documentation loans for which the borrower's income was simply stated without proof in the loan application and loans for borrowers without income, job and assets. With these new relaxed requirements and the assumption that the housing prices would continue to go up, many lenders continued to extend credit facilities to the borrowers. This resulted in many banks taking on more risks than their capital base allowed. During 2006-2007, many individuals suddenly became unable to repay their loans and so they defaulted in their mortgage repayments. This raised the individuals'

interest rate and the debt level. Nonpayment of loans led to high levels of leverage of investment banks and this forced the banks to seek other sources of funding through borrowing. The financial institutions ran into trouble when it became difficult to access funds because of a decline in funds in the financial sector. This reduced the banks' ability to lend and as a result they required higher collateral for loans. The subprime mortgage industry collapsed, resulting in bank runs. Governments had to intervene and bail out financial institutions in fear of unknown consequences and more bank failures (Georg, 2011:2). Many financial institutions failed because they had taken on more risks than allowed for in terms of the capital reserves set aside to deal with risks (Varotto, 2011:3). The USA central bank intervened through bailouts to restore and maintain confidence in the banking industry: some banks were bailed out while others became bankrupt with one of the world's largest investment banks, Lehman Brothers, being the largest victim (Ackermann, 2008:328).

The global financial crisis and its consequences led to strong calls for the assessment of the global banking regulations. The crisis showed the need to restructure the risk approach and regulation of the global financial institutions. The global capital and liquidity rules needed to be strengthened while strict measures in banking regulation and supervision needed to be introduced in order to ensure a sound global financial system (Calomiris, 2009:88). In responding to these needs, the regulating and supervising authorities implemented adequate supervisory and regulatory measures to improve capital adequacies with the aim of resisting future financial crises (Varotto, 2011:1). Financial regulators designed new rules and regulations to deal with pressures still arising from the financial crisis and to prevent future financial crises. In 2010, the Basel Committee published the Basel 3 rules, to be effective from 2013 (Schwerter, 2011:343). Basel 3 improved several aspects of Basel 2, with proposed changes relating to capital requirements, risk coverage and measures on leverage ratios (Bank for international settlements, 2011a:1). The aim of Basel 3 is to introduce global standards of regulation governing bank liquidity levels (Giustiniani & Thornton, 2011:324). Basel 3 improves the three pillars of Basel 2 and focuses mainly on increasing the quality and quantity of the capital and to have stronger risk coverage.

One of the core changes made in Basel 3 is the requirement for banks to have more capital than under Basel 2. The minimum capital requirements under Basel 3 expressed as a percentage of risk-weighted assets (RWA) are: Common Equity Tier (CET) 1 capital ratio of 4.5%; Tier 1 capital ratio of 6%; and Total capital ratio of 8%. The total capital ratio remains at 8% of RWA, while the CET 1 capital ratio increases from 2% under Basel 2 to 4.5%. The Additional Tier 1 capital ratio is 1.5%, raising the Tier 1 capital ratio to 6%. Basel 3 introduces a capital conservation buffer of 2.5% and a countercyclical buffer of 0% to 2.5%. For both these buffers, extra CET 1 capital needs to be held, raising CET 1 capital ratio to 9.5%. On top of these requirements, supervisory authorities may also require extra capital to cover other risks (Auer & Von Pfoestl, 2011:14).

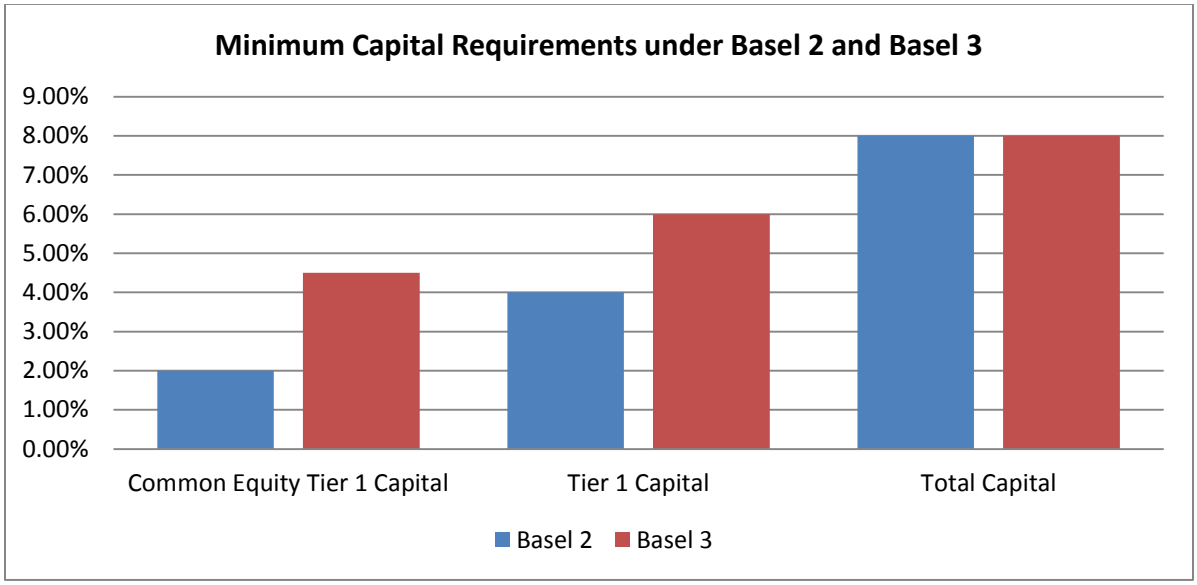

Figure 1: Minimum capital requirements under Basel 2 and Basel 3. Source: Babic (2011:147).

The main elements of Basel 3 are as follows: strengthening risk coverage, introducing leverage ratio, establishing additional buffers, dealing with Systematically Important Financial Institutions (SIFIs), improving liquidity and increasing the quality and quantity of capital (King & Tarbert, 2011:1).

2.4.1 Strengthening Risk Coverage

The Basel 3 accord strengthened the risk coverage of capital market activities by introducing a higher capital requirement for trading and securitization activities. The framework increased the risk weights assigned to securities in order to reflect their risks more accurately. Basel 3 requires

the banks to perform an internal assessment of externally rated securitization exposures. The banks are also required to use stressed inputs to determine their capital requirements for counterparty credit risk and hence address the issue of procyclicality. Basel 3 also raises standards for management of counterparty credit risk especially in instances where the exposure increases when the credit quality of the counterparty declines. Banks will face capital charges for the credit valuation adjustment risk that results from a decline in the counterparty credit worthiness. Basel 3 also aims to strengthen the collateral management standards and risk management practices (Bank for international settlements, 2011a:3).

2.4.2 Introducing Leverage Ratio

One of the causes of the financial crisis was identified as being high levels of leverage within the banking sector: this resulted in a global recession when banks were forced to reduce their high leverages significantly. Basel 3 proposed a leverage ratio requirement of 3% with the aim of capturing the risk that may not have been captured in the risk-weights for capital requirement measures. The objective of the leverage ratio is to reduce the leverage levels in the banking industry. The proposed leverage ratio is calculated by comparing Tier 1 capital with total exposure (Bank for international settlements, 2011a:4).

$$\frac{Tier\ 1\ capital}{Total\ exposure} \geq 3\%$$

2.4.3 Establishing Additional Buffers

The capital reserves of the banks declined because they continued to pay dividends at the start of the financial crisis, reducing their ability to absorb additional losses. In order to guard against future losses, as discussed below, Basel 3 introduced capital conservation and countercyclical buffers that require banks to hold extra capital during periods of strong growth, to be used when unexpected losses occur.

Basel 3 introduced the requirement for banks to hold an extra 2.5% capital conservation buffer, which must be met entirely by CET 1 after deductions. This buffer increases the minimum requirement for common equity from 2% before deductions to 4.5% after deductions. The capital conservation buffer increases the overall total common equity requirement to a minimum of 7%

but in practice, many banks are likely to hold more than 7% common equity to be safe. Banks that do not meet the capital conservation buffer rule are required to retain a percentage of dividend payments, share buy-backs, and staff bonus payments prior to regulatory deductions (Bank for international settlements, 2011a:5; King & Tarbert, 2011:1).

Common Equity Tier 1 Ratio	Minimum Capital Conservation Ratio (as a percentage of earnings)
4.5% - 5.125%	100%
> 5.125% - 5.75%	80%
> 5.75% - 6.375%	60%
> 6.375% - 7.0%	40%
> 7.0%	0%

Table 1: Minimum capital conservation ratios. Source: Bank for international settlements (2011a:56).

Basel 3 also introduced a countercyclical capital buffer ranging from 0% to 2.5% of RWAs and to be met by CET1. Banks were required to implement the countercyclical buffer within twelve months. Banks that do not meet the capital conservation buffer rule are required to retain a percentage of dividend payments, share buy-backs, and staff bonus payments prior to regulatory deductions (Bank for international settlements, 2011a:5).

Common Equity Tier 1 Ratio	Minimum Capital Conservation Ratio (as a percentage of earnings)
4.5% - 5.75%	100%
> 5.75% - 7.0%	80%
> 7.0% - 8.25%	60%
> 8.25% - 9.5%	40%
> 9.5%	0%

Table 2: Minimum capital conservation ratios under 2.5% countercyclical capital requirements. Source: Bank for international settlements (2011a:59).

2.4.4 Dealing with SIFIs

The Basel Committee and the financial stability board together developed a proposal for dealing with the SIFIs. The proposal includes, amongst others: capital and liquidity surcharges, tighter large exposure restrictions and compulsory recovery plans (King & Tarbert, 2011:10). The SIFIs

are to be assessed based on their size, interconnectedness, international activity and complexity. The SIFIs are required meet an extra capital requirement ranging between 1% and 2.5% depending on their level of importance. An additional 1% capital requirement is also recommended to discourage the banks from increasing their risk exposure through international activities (Bank for international settlements, 2011b).

2.4.5 Improving Liquidity

Basel 3 recognizes that liquidity and capital adequacy are important foundations for ensuring the stability of the banking sector. In view of this, two minimum standards are introduced for strengthening the banks' liquidity: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). The LCR is designed to ensure that internationally active banks have sufficient and high quality liquid assets to replace the cash outflows they face during the 30-day stress period. A ratio of at least 100% is required and so the bank's stock of high quality and liquid assets should at least be equal to its total cash outflows for the 30-day period. The banks can only use these assets in periods of financial stress (Bank for international settlements, 2013). High quality and liquid assets are assets that can easily be converted into cash with little or no loss in value during stress periods.

$$\frac{Stock\ of\ high\ quality\ liquid\ assets}{Total\ net\ cash\ outflows\ over\ the\ next\ 30\ calender\ days} \geq 100\%$$

The NSFR is designed to promote medium- and long-term funding. It helps to determine the minimum amount of liquidity based on a bank's assets and activities over a one-year period of extended stress. The NSFR requires that available stable funding (ASF) must exceed required stable funding (RSF). ASF is the total amount of a bank's regulatory capital that matures within one year or more but is expected to remain at the institution for an additional period during times of stress.

$$\frac{Available\ amount\ of\ stable\ funding}{Required\ amount\ of\ stable\ funding} \geq 100\%$$

2.4.6 Increasing the Quality and Quantity of Capital

Basel 3 increased the requirements concerning quality and quantity of capital by making several changes to the definition of capital with clear emphasis on greater unity in the definition of the key items. The aim of Basel 3 is to ensure that every internationally active bank is supported by a high quality capital buffer that can absorb losses during periods of economic distress. Basel 3 has eliminated Tier 3 completely as a capital component that covered market risks. Only Tiers 1 and 2 remain, with the intention of strengthening the Tier 1 component of capital. Basel I and Basel 2 both stipulated a total capital requirement of 8.0% of RWAs with total capital equally divided between Tier 1 and Tier 2. Basel 3 also maintains the 8% total capital requirement but requires that Tier 1 capital must constitute at least 75% with Tier 2 capital constituting the balance but only up to 25% of the total capital. Basel 3 also breaks down Tier 1 capital into the following: CET 1 and additional Tier 1 with CET 1 accounting for at least 4.5% of a bank's RWAs (Bank for international settlements, 2011a:2).

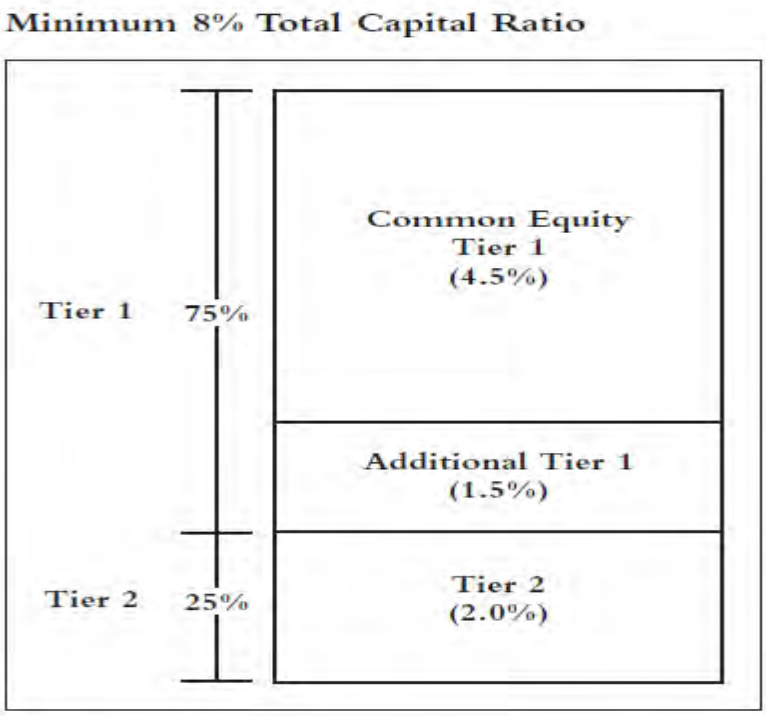

Figure 2: Minimum 8% total capital ratio. Source: King & Tarbert (2011:6).

Basel 2	Basel 3
Tier 1 • Paid-up share capital/common stock. • Disclosed reserves.	**Common Equity Tier 1** • Common shares issued by the bank that meet the criteria for classification as common shares for regulatory purposes. • Stock surplus (share premium). • Retained earnings including interim profit or loss. • Accumulated other comprehensive income and other disclosed reserves. • Common shares issued by consolidated subsidiaries of the bank and held by third parties. • Regulatory adjustments applied in the calculation of Common Equity Tier 1.
	Additional Tier 1 • Instruments issued by the bank that meet the criteria for inclusion in additional Tier 1 capital and are not included in common equity Tier 1. • Stock surplus resulting from the issue of instruments included in additional Tier 1 capital. • Instruments issued by consolidated subsidiaries of the bank and held by third parties. • Regulatory adjustments applied in the calculation of additional Tier 1 capital.
Tier 2 • Undisclosed reserves. • Asset revaluation reserves. • General provisions/general loan-loss reserves. • Hybrid (debt/equity) capital instruments • Subordinated debt.	**Tier 2** • Instruments that meet the criteria for inclusion in Tier 2 capital but not included in Tier 1 capital. • Stock surplus (share premium) from the issue of instruments included in Tier 2 capital. • Instruments issued by consolidated subsidiaries and held by third parties that meet the criteria for inclusion in Tier 2 capital but not included in Tier 1 capital. • Regulatory adjustments applied in the calculation of Tier 2 capital. • Provisions or loan-loss reserves held

	against future, limited to a maximum of 1.25% of credit risk-weighted risk assets calculated under the standardized approach.
Tier 3 • At the discretion of their national authority, banks may also use a third tier of capital (Tier 3), consisting of short-term subordinated debt for the sole purpose of meeting a proportion of the capital requirements for market risks.	
Deductions from Tier 1 • Goodwill. • Increase in equity capital resulting from a securitization exposure.	**Deductions from Common Equity Tier 1** • Minority interests in non-bank subsidiaries. • Goodwill and other intangibles. • Deferred tax assets (DTAs). • Cash flow hedge reserve relating to items not held at fair value (positive amounts deducted, negative amounts added back). • Defined benefit pension assets. • Gains and losses due to the bank's own credit risk. • Unrealized losses and any provision shortfall. • Any outstanding Tier 1 instruments that do not meet the definition of common equity
Deductions from Tier 2 • Investments in unconsolidated banking and financial subsidiary companies. • Investments in the capital of other banks and financial institutions (at the discretion of national authorities). • Significant minority investments in other financial entities.	

Table 3: Capital definition according to Basel 2 and Basel 3. Source: Author's own summary from literature review.

Table 3 presents the detailed capital definitions according to Basel 2 and Basel 3. Given below are the changes in the capital definition under Basel 3, highlighted in this study:

- Renaming Core Tier 1 to Common Equity Tier 1 and non-Core Tier 1 capital to Additional Tier 1 capital.

- Inclusion of accumulated other comprehensive income and retained earnings in Common Equity Tier 1 capital.

- Deducting the following from Common Equity Tier 1: unrealized losses on AFS securities; pension and deferred tax assets; cash flow hedge reserve and cumulative gains and losses to changes in own credit risk on fair valued financial liabilities. On the subject of minority interest: the net income of the third party minorities cannot be retained by the parent as common equity. Deferred tax assets are deducted only if these depend on future profit realization, and not on tax prepayment irrespective of the future profitability. In order to avoid double counting of equity under Basel 3 the following are excluded from the definition of common equity if they are sister companies: a bank's investments in its own shares; and, investments in other banks, financial institutions and insurance companies.

- Abolishing the distinction between upper Tier 2 and lower Tier 2 capital.

- Eliminating Tier 3 capital.

Basel 3 allows for a transition period before the new capital requirements are fully implemented. The minimum CET 1 and Tier 1 requirements came into effect between 1 January 2013 and 1 January 2015 while the capital buffers will come into effect between 1 January 2016 and 1 January 2019. On 1 January 2013, the minimum CET 1 requirement increased from 2% to 3.5%, while the Tier 1 capital requirement increased from 4% to 4.5%. Banks had to meet a 4% minimum CET 1 requirement and a Tier 1 requirement of 5.5% from 1 January 2014. On 1 January 2015, banks had to meet the 4.5% CET 1 and the 6% Tier 1 requirements. The total minimum capital requirement remains constant at 8.0% of RWAs and is already in use so there is no transition period. The capital buffers will come into effect between 1 January 2016 and 1 January 2019. The new deductions are being introduced incrementally at 20% a year from 2014 and reaching 100% in 2018. Capital instruments that are currently used but do not meet the new rules are being phased out incrementally at 10% a year over a 10-year period beginning in 2013.

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Minimum Common Equity Ratio	2.0%	2.0%	3.5%	4.0%	4.5%	4.5%	4.5%	4.5%	4.5%
Capital Conservation Buffer	0%	0%	0%	0%	0%	0.625%	1.25%	1.875%	2.5%
Minimum Common Equity + Capital Conservation Buffer	2.0%	2.0%	3.5%	4.0%	4.5%	5.125%	5.75%	6.375%	7.0%
Phase-in of deductions from Common Equity	0%	0%	0%	20%	40%	60%	80%	100%	100%
Minimum Tier 1	4%	4%	4.5%	5.5%	6.0%	6.0%	6.0%	6.0%	6.0%
Minimum Total Capital	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Minimum Total Capital + Capital Conservation Buffer	8.0%	8.0%	8.0%	8.0%	8.0%	8.625%	9.25%	9.875%	10.5%
Capital instruments that no longer qualify as Tier 1 or Tier 2	Phased out over 10-year period starting in 2013								
Shading indicates transition/change-over period and all dates as of 1 January									

Table 4: Capital ratios – transitional arrangements. Source: Price Waterhouse Coopers (2011:15).

2.5 Private Sector Influence on Basel 3

One can argue that international financial regulation is becoming increasingly influenced by the private sector and as a result, regulatory power is moving from the states to the private institutions (Mosley, 2009; Cohen, 2008). The private sector plays an important role as a source of information for drafting possible regulatory reforms. However, involvement of the private sector in drafting banking sector regulations may lead to the disadvantage of the public in favour of the banking industry. Both the regulators and the banking industry should agree on the importance of regulation, but when the private sector becomes too influential, regulations can be weakened or attenuated, thus loosing meaning (Mosley, 2009). The financial industry can exercise influence over the regulatory process through direct lobbying and policy advocacy and also through the power of the market (Cohen, 2008). The Institute for International Finance (IIF) is the representative of the international financial industry and the only global association of financial institutions: it represents over 450 leading institutions worldwide. It is considered to be the global voice of international banking (Westlake, 2010). The IIF participated in the Basel 3 process, published reports on the consequences of proposed changes to capital and liquidity regulations and commented extensively on all stages of the process. The literature shows that there are different views among researchers on the strength of the bank lobby with respect to Basel 3. Nevertheless, there is consensus that the industry did have a tangible impact on Basel 3 (Ballo & Lütz, 2012).

Some critics argue that the EU Commission sought to dilute some of the Basel 3 requirements. They argue that the EU banks wanted to count more of the capital in insurance subsidiaries than global rules permit; this would allow some banks to continue issuing hybrid capital for longer than expected. The relationship between the IIF and the BCBS has been questionable. There are reports of behind-the-scenes interaction based on personal relationships between the two organizations. The chairman of the BCBS is also a co-founder of the IIF while the managing director of IIF is said to have been a close associate of the BCBS chairman during the 1990's. These relationships suggest that the IIF has had many opportunities for exerting influence and may have had an enormous influence on the work and decision-making of the BCBS (Lall, 2010). Early in 2010, a BCBS member admitted that the bank lobby was making headway and that it won the battle on Basel 3. While the BCBS members admitted that reforms would happen,

they also conceded that the Basel 3 reforms would be a seriously weakened version (Jenkins & Masters, 2010). Jenkins & Masters (2010) reported that Basel 3 was being weakened because of the strong lobbying by the banking industry. They argue that the regulators had responded to politicians and banks, who argued that excessive tightening of the rules, could limit growth and lending of banks. They also claim that the Basel 3 requirements were amended in response to the pressure placed on the BCBS by the IIF, thus making the requirements less aggressive in the redefinition of capital and also less aggressive in the introduction of global liquidity proposals. Ross (2011) argues that banks rule the world because they succeeded in lobbying to ensure that the Basel 3 requirements ended up being inadequate to prevent another financial crisis.

2.6 Research Question and Hypotheses

In order to address the purpose of the study and the research objectives, one research question and four hypotheses were formulated, as shown below.

2.6.1 Research Question

The aim of the study is to answer the following question:

- What is the impact of the change in the definition of bank capital according to Basel 3?

2.6.2 Research Hypotheses

The following hypotheses were formulated:

H_1: The banks in Europe will derive more benefits than the USA banks, from the change in capital definition. This hypothesis is based on the assumption that the banks in Europe will take advantage of the region to influence the BCBS decision making process for their benefit since the BCBS is based in Europe.

- **H_2**: The large banks will derive more benefits from the change to capital definition than the small banks. This hypothesis is based on the assumption that larger banks have the financial power to influence the BCBS decision making process for their benefit.

- **H_3**: Banks with relatively higher Basel 2 Tier 1 capital ratios will derive more benefit from the change in capital definition. This hypothesis is based on the assumption that banks with higher Basel 2 will influence the BCBS decision making process to derive positive benefit that would make them appear healthier at the introduction of Basel 3.

- **H_4**: Banks with a relatively low Basel 3 Tier 1 capital ratio derived more benefit from the change in capital definition. This hypothesis is based on the assumption that banks with lower Basel 3 capital ratio will influence the BCBS decision making process to derive positive benefit that would make them look healthier.

3 RESEARCH APPROACH

This section presents the dataset used and describes the method of data collection, analysis, and interpretation.

The population of the study is the world's largest commercial and investment banks ranked by asset size as at 31 December 2012. The 31 December 2012 date is important because it marks the changeover date; in other words, the date when the provisions of Basel 2 were replaced by Basel 3. For the purpose of this study, banks are selected at consolidated (group) level and only banks with 31 December year ends are selected. The 31 December year end is also an important aspect in the study because many large banks report their financial statements at that time each year. It is important that only the large banks are in the sample because these are globally important financial institutions which are interconnected; consequently, their failure could lead to global financial instability. If results were to be drawn from larger samples that include large and small banks, then those results could not be generalized to describe what happens to globally important financial institutions; after all, the results might reflect only the situations of small banks that have very little effect on the global financial system (Shaffer, 2010).

The original intention was to use a sample size of the 200 largest commercial and investment banks in the world, ranked by asset size. It was anticipated that the data relating to these banks could be obtained from the commercially available databases such as BankScope and SNL financial. BankScope is a global database of banks' financial statements and ratings. SNL Financial also provides analysis and data for the banking, financial services and insurance industries. However, it became apparent that it would not be possible to use the data from any of these commercial databases because data points are missing on the capital definition components required for this study. Because of this, the required data had to be collected manually for the study. However it was not possible from a practical point of view to collect the data manually for each one of the 200 individual banks and so a decision was taken to reduce the sample size to the 75 largest commercial and investment banks in the world. The sample then comprised the 25 largest banks in each of the three regions: USA, Europe and Asia. The study then encountered another problem with data obtained from the banks in Asia. Thus, the financial statements of

most of the 25 largest banks in Asia are not in English and so it was very difficult to use their data. For this reason, it became necessary to remove the Asian banks from the sample resulting in a sample consisting of the 50 largest commercial and investment banks in the USA and Europe, ranked by asset size as at 31 December 2012 (see table 8 in the appendix).

Total Assets as at December 2012 in millions of $						
Region	N	Mean	Median	Std. Deviation	Minimum	Maximum
Europe	25	1,160,943	924,552	835,068	122,516	3,484,949
USA	25	501,575	183,872	693,666	44,012	2,359,141
Total	50	831,259	580,984	829,542	44,012	3,484,949

Table 5: Size comparison by total assets.
This table presents the data sample of the 50 observations of the banks' total assets as at December 2012. The banks are grouped into the USA and Europe regions. The data were obtained from the banks' 2012 financial records.

In answering the research question, the study will calculate Basel 2 common equity Tier 1 capital ratio and Basel 3 common equity Tier 1 capital ratio at the same point in time by keeping the RWAs unchanged and only changing the common equity Tier 1 capital in the calculation. As discussed above, Basel 3 changed the capital and the RWAs definitions in Basel 2. However, this study examines only the change in capital definition and so the RWAs need to be excluded in order to isolate that capital definition change. The following information for each of the 50 banks was collected:

- Total assets as at 31 December 2012.
- Basel 2 common equity Tier 1 capital as at 31 December 2012.
- Basel 2 RWAs as at 31 December 2012.
- Estimated Basel 3 Tier 1 capital as at 31 December 2012 where available. The estimated and reported figures were collected wherever these were available while in instances where these were not estimated, the comparative figures were calculated using the Basel 3 capital definition.
- Basel 3 Tier 1 capital ratio as at December 2012, calculated as Basel 3 Tier 1 capital divided by Basel 3 RWAs.

3.1 Data Collection Method

The required data were collected manually from the banks' financial reports and were then cleaned, captured in Microsoft Excel and summarized. All this was a very difficult and time consuming exercise. It was not easy to access all of the banks' financial reports from their websites and most of the websites only show recent information. In many instances, the 2012 financial reports have been archived and are therefore not easily visible on the website while some of the bank websites required registration in order to access their information. The following data relating to the 50 banks were collected manually from the 2012 financial reports: Total assets; Basel 2 common equity Tier 1 capital; and Basel 2 RWAs, all as at 31 December 2012. Since Basel 3 was only implemented from January 2013, banks were not required to report their estimated Basel 3 common equity Tier 1 capital in their December 2012 financial reports. Nevertheless 42 banks estimated and reported their Basel 3 common equity Tier 1 capital in the December 2012 financial reports. In this study, those reported figures are used for these 42 banks. In the case of the 8 banks that did not provide estimated and reported Basel 3 common equity Tier 1 capital, the comparative figure was calculated using the change in capital definition by Basel 3. The reported Basel 3 common equity Tier 1 ratio as at December 2012 was also calculated manually, being calculated as Basel 3 capital divided by Basel 3 RWAs as at December 2012.

Using the collected data, the following were calculated for each of the 50 banks in the sample:

- Basel 2 Tier 1 capital ratio as at 31 December 2012. Calculated as:

$$\frac{Basel\ 2\ common\ equity\ Tier\ 1\ capital\ as\ at\ 31\ December\ 2012}{Basel\ 2\ RWAs\ as\ at\ 31\ December\ 2012}$$

- Estimated Basel 3 Tier 1 capital ratio as at December 2012, calculated by changing the capital part from Basel 2 to Basel 3 but keeping the RWAs part the same at Basel 2. Calculated as:

$$\frac{Estimated\ Basel\ 3\ common\ equity\ Tier\ 1\ capital\ as\ at\ 31\ December\ 2012}{Basel\ 2\ RWAs\ as\ at\ 31\ December\ 2012}$$

- Change in regulatory Tier 1 capital ratio as at December 2012. Calculated as:

  Estimated Basel 3 Tier 1 capital ratio ***less*** *Basel 2 Tier 1 capital ratio*

Descriptive data for the two regions included in the data sample are reported in Table 9 (see appendix). In the case of the ratio difference (ratio difference is used in the study as a proxy for the impact of the capital definition change), banks in Europe have a positive mean, median and a higher maximum value while the banks in the USA region have a negative mean, median and a lower maximum value. The combined position shows a negative mean, median and a higher maximum value. An examination of the estimated Basel 3 ratio shows that banks in Europe have a higher mean, median and the maximum value than those in the USA region. The combined position shows a higher mean, median and the maximum value. In the case of the Basel 2 ratio, the banks in Europe have a higher mean, median and the maximum value than those in the USA region. The combined position shows a higher mean, a lower median and a higher maximum value. The descriptive data show that the banks in Europe are larger than those in the USA on average. The data shows that the banks in Europe derived positive benefits than the USA banks from the change in capital definition. The data also shows that larger banks derived more benefit from the change in capital definition than the smaller banks.

3.2 Data Analysis Methods

In this section the methods used to analyse the collected data are presented.

3.2.1 Correlation Coefficient

The correlation coefficient is a number that gives a measure of the strength of the relationship between two variables. That relationship is interpreted to be positive if the values in one set of data increases at the same time as another but negative if the values in one set of data increases as the other decreases. The calculation of a correlation coefficient leads to a value between -1 to 1. The value of -1 means that there is a negative correlation between the variables, the value of 0 means that there is no correlation between the variables while the value of 1 means that there is a

positive correlation between the variables. The relationship between the predictors and the dependent variable will be determined in this study by performing a correlation matrix.

3.2.2 Regression Analysis

Regression analysis tests the relationships between variables. It is used for analysing several variables, focusing on the relationship between a dependent variable and one or more independent variables. Regression analysis is performed to give a clear indication about the similarities among the variables that cannot be looked at independently. A simple regression analysis was performed to improve the understanding of the relationship between the variables used in the study. It involved regressing ratio difference against some predictors. The variables used in the regression analysis are presented in Table 6 below.

Category	Variable	Description
Dependent	RD	Ratio difference which is the proxy for the impact of the capital definition change
Independent	B3R	Reported Basel 3 Tier 1 capital ratio
Independent	B2R	Basel 2 Tier 1 capital ratio
Independent	Log(B2RWA)	Logged values of Basel 2 RWAs
Independent	Region	Location of the banks

Table 6: Variables used in the study.
This table presents the variables used in the regression analysis. The dependent variable is RD, calculated as the difference between the estimated Basel 3 Tier 1 capital ratio and the Basel 2 Tier 1 capital ratio. One of the four independent variables is B3R, calculated as Basel 3 common equity Tier 1 capital divided by Basel 3 RWAs. A second independent variable is B2R, calculated as Basel 2 common equity Tier 1 capital divided by Basel 2 RWAs; The third such variable, Log(B2RWA), is the logged value of Basel 2 RWAs. Since B2RWAs is reported in millions of dollars, it is logged to make it easily comparable to the ratio difference which is reported in percentage terms. The log scale makes it easier to compare values which cover a large range. The fourth variable 'Region' represents the location of the bank and is denoted either by 0 = USA 1 = Europe.

The impact of the capital definition change (RD_i) regression model is presented as:

$$RD_i = \alpha_0 + \beta_1 * B3R_i + \beta_2 * B2R_i + \beta_3 * Log(B2RWA)_i + \beta_4 * Region_i + \mathcal{E}_i$$

where i represents the banks. RD_i is the ratio difference. α_0 is the constant term. β_1, β_2, $\beta 3$ and β_4 are the co-efficients. $B3R_i$ is the reported Basel 3 Tier 1 capital ratio. $B2R_i$ is the Basel 2 Tier 1 capital ratio. $Log(B2RWA)_i$ is the logged value of Basel 2 RWAs, $Region_i$ represents the location of the bank and $\mathcal{E}_i$ represents the error term.

4 RESULTS

In this study, a descriptive data analysis method is first used; here, the relevant descriptive statistics include measures of central location, variation and linear relationship. The mean and standard deviations were calculated in order to improve the understanding and interpretation of the sample data.

4.1 Descriptive Statistics

Table 9 (see appendix) presents the number of observations, mean, median, standard deviation, minimum and maximum values of the variables used in the study. The data sample shows that the banks in Europe are larger in size than the USA banks on average. If we examine the Basel 2 Tier 1 capital ratio, then the data show that the banks in Europe have a higher mean, median and a higher maximum value than the USA banks. The overall position is a higher mean, median and a higher maximum value. Similarly, the Basel 3 Tier 1 capital ratio data show that the banks in Europe have a higher mean, median and a higher maximum value than the USA banks. The overall position is a higher mean, median and a higher maximum value. The impact of the capital definition change data show that the European banks have a positive mean, median and a higher maximum value while the USA banks have a negative mean, median and a lower maximum value. The overall position is a negative mean, median and a higher maximum value. The data suggest that the change in capital definition in Basel 3 resulted in a positive impact on the European banks' capital ratio and a negative impact on the USA banks' capital ratio. The results suggest that larger banks derived more benefit than the smaller banks from the capital definition change.

4.2 Correlation Matrix

Table 10 (see appendix) presents the correlation matrix applicable to the predictors and the dependent variable. The results show that there is some association between the predictors and the dependent variable. Thus, there is a weak positive relationship between the ratio difference and the Basel 3 Tier 1 capital ratio with a correlation coefficient of 0.279, which is significant at the threshold of 10%. Basel 3 Tier 1 capital ratio has a positive relationship with Basel 2 Tier 1

capital ratio with a correlation coefficient of 0.763, significant at the threshold of 5%. Basel 2 RWAs shows a strong positive relationship with total assets with a correlation coefficient of 0.856, significant at the threshold of 5%. Total assets have a moderate positive relationship with the region, having a correlation coefficient of 0.401, significant at the threshold of 5%.

4.3 Regression Results

In this section the regression analysis are presented, to improve the understanding of the relationship between the variables used in the study. The study used the Newey-West robust standard error and covariance in the regression analysis. The results of the regression analysis are presented in the table below.

Variables	**Coefficients (Standard Error)**	**P-Value**
Constant	-0.0350 (0.0230)	0.1349
RB3R	0.2668 (0.0811)	0.0019
B2R	-0.2638 (0.1219)	0.0358
Log(B2RWA)	0.0028 (0.0016)	0.0847
Region	0.0049 (0.0035)	0.1641
Adjusted R-squared	0.2829	
F-statistic	5.8315	
Probability(F-statistic)	0.0007	
Observations	50	

Table 7: Regression analysis results.

The results show a positive relationship between the variables. One finding is that, all things being equal, the change in capital definition resulted in a decrease of approximately 3.5% in the ratio difference; a one percent increase in the reported Basel 3 Tier 1 capital ratio leads to an increase of approximately 27% in the ratio difference; a one percentage point increase in the Basel 2 Tier 1 capital ratio results in a decrease of approximately 26% in the ratio difference and a one percentage point increase in RWAs also results in an increase of approximately 0.28% in the ratio difference. Larger banks derived a benefit of approximately 0.5% from the change in capital definition.

A test was made for heteroscedasticity using the Breusch-Pagan-Godfrey in the residuals and the results are presented in table 11 (see appendix). These results indicate that there is no homoscedastic (constant variance) error term in the model: it changes over time. Robust standard errors and covariance clustered across the cross-sections per bank are thus necessary.

4.4 Discussion of Results

The results shown in the descriptive statistics indicate that the change in the Basel 3 capital definition resulted in a positive impact on the European banks' capital ratios and a negative impact on the USA banks' capital ratios. The results showed that the larger banks derived more benefit from that change than the smaller banks. From the descriptive statistics data above, the study accepted hypothesis H_1 stating that the banks in Europe will derive more benefits than the USA banks, from the change in capital definition because the descriptive statistics data confirms that. The study also accepted hypothesis H_2 stating the large banks will derive more benefits from the change in capital definition than the small banks because this is also confirmed in the descriptive statistics data. The correlation matrix shows a negative correlation between the capital definition change and the Basel 2 ratio. The study rejected hypothesis H_3 stating that banks with relatively higher Basel 2 Tier 1 capital ratios will derive more benefit from the change in capital definition. This is not the case because the capital definition change and the Basel 2 ratio variables are moving in the opposite directions and banks with relatively higher Basel 2 ratio are already looking healthy and therefore their management does not need to be concerned about the change in capital definition. The regression results show that the average impact of the change in capital definition on the 50 banks excluding everything else is a

reduction in capital. From the regression results, the study rejected hypothesis H_4 stating that banks with relatively low Basel 3 Tier 1 capital ratio derived more benefit from the change in capital definition. This is not true because the overall impact of the change in capital definition is a reduction in bank capital ratios and banks with relatively low Basel 3 Tier 1 capital ratio needed to lobby for the change in capital definition in order to have more capital under Basel 3.

The overall impact of the change in the capital definition can be summarized as: positive impact on the European banks capital ratios and a negative impact on the USA banks capital ratios; more benefit for the European banks than for the USA banks on average and also larger banks deriving more benefits from the definition change than the smaller banks. The advantage that the European banks have over the USA banks can maybe attributed to the fact that being in Europe they could have had influence on the BCBS decision making process since BCBS is also in Europe. The advantage that the larger banks have over the smaller banks can maybe attributed to the fact that being larger they have more financial resources and power to influence the BCBS decision making process than the smaller banks.

4.5 Robust Check for Undue Influence by Outliers

Figure 3 (see appendix) shows the possible presence of outliers in the collected data. To test whether these outliers unduly influenced the regression results, the regression was re-performed with winsorised data. The results of the winsorised data did not differ substantially from the results obtained using the original data. The outliers did not have any significant influence on the regression analysis.

5 CONCLUSION, LIMITATIONS OF THE STUDY AND OPPORTUNITIES FOR FURTHER STUDIES

5.1 Conclusion

The aim of this study was to determine the impact of the change in the capital definition according to Basel 3 and specifically whether that change has led to any changes in the banks' reported capital ratios excluding changes in the definition of RWAs. Basel 3 changed the definitions of capital and the RWAs. However, the study examined only the change in the capital definition and by doing so, excluded the change in RWAs: this allowed the capital definition change to be isolated. The study used a sample of the fifty largest commercial and investment banks by asset size from the USA and the Europe region. The study calculated the Basel 2 Tier 1 capital ratio and Basel 3 Tier 1 capital ratio at the same point in time by only changing the reported capital under Basel 2 and Basel 3 but keeping the RWAs the same at Basel 2 RWAs. The difference between the two ratios is the estimated impact of the change in the definition of bank capital according to Basel 3.

The data sample shows that the European banks are larger in size than the USA banks on average. The results show that the change in capital definition in Basel 3 resulted in a positive impact on the European banks capital ratios and a negative impact on the USA banks' capital ratios. The results suggest that the European banks benefited more from the change in capital definition than the USA banks and that the capital definition change benefited the larger banks more than the smaller banks. The advantage that the European banks have over the USA banks can maybe attributed to the fact that being in Europe they could have had influence on the BCBS decision making process since BCBS is also in Europe. The advantage that the larger banks have over the smaller banks can maybe attributed to the fact that being larger they have more financial resources and power to influence the BCBS decision making process than the smaller banks. Banks with relatively higher Basel 2 Tier 1 capital ratios did not derive more benefit from the change in capital definition because the correlation matrix show that capital definition change and the Basel 2 ratio variables are moving in the opposite directions and also banks with relatively higher Basel 2 ratio are already looking healthy and therefore their management does not need to be concerned about influencing the BCBS decision making process in their favour.

Banks with relatively low Basel 3 Tier 1 capital ratio also did not derive benefit from the capital definition change because the overall impact of the change in capital definition was a reduction in bank capital ratios and banks with relatively low Basel 3 Tier 1 capital ratio needed to lobby for the change in capital definition in order to have more capital under Basel 3.

All other things being equal, the higher capital and tighter liquidity requirements under Basel 3 will increase the capital requirements in banks. Given that banks are likely to raise the increased capital requirement under Basel 3 from the market, the economic growth and profitability of the banks is likely to be affected. The results of this study suggest that all other things being equal, the USA banks, given their smaller capital base will have better return on equity (RoE) and improved profitability going forward while the European banks with larger capital base will have lower RoE and reduced profitability going forward. The aggregate impact on the fifty banks is lower RoE and reduced profitability going forward. While implementation of Basel 3 calls for strict measures and higher capital requirements, the change in the capital definition has also made it easier for banks to raise capital under Basel 3 in that some items which could not count as capital under Basel 2 are now counted as capital.

5.2 Limitations of the Study

The study had certain limitations. First, the sample size was reduced to include only 50 large commercial and investments banks from the USA and Europe. As explained above, this reduction took place because it was not possible to obtain data from commercially available data bases. These databases have missing data points concerning the capital definition components required for this study. Secondly, the study did not include banks from Asia even though these are some of the largest banks in the world; as explained above, this exclusion took place because most of their financial reports are not reported in English, making it difficult to collect the data. Thirdly, only banks with 31 December year ends were examined and this excluded some of the largest banks in the world because their financial year ends are not in December.

5.3 Opportunities for Further Studies

Despite the contributions made to the existing literature by this study, much remains to be investigated. For example, the results show that the change in capital definition benefited the European banks more than the USA banks on average. Also, it benefited the larger banks more than the smaller ones. Further studies could therefore be conducted using a larger sample size, to examine the situation of the Asian banks and also banks with year ends other than in December.

6 APPENDIX

	Bank Name	Region	Total Assets in $M (31 December 2012)	Impact of the capital definition change on the bank capital ratio
1	Danske Bank	Europe	3,484,949	0.78%
2	HSBC	Europe	2,692,538	0.14%
3	JPMorgan Chase & Co.	USA	2,359,141	0.29%
4	DNB Group	Europe	2,264,845	0.82%
5	Bank of America Corporation	USA	2,209,974	-0.40%
6	Deutsche Bank	Europe	2,022,275	1.44%
7	BNP Paribas	Europe	1,907,290	-0.53%
8	Citigroup Inc.	USA	1,864,660	-1.82%
9	Swedbank AB	Europe	1,846,860	-0.50%
10	Barclays	Europe	1,490,321	-0.96%
11	Nykredit Realkredit A/S	Europe	1,433,405	0.16%
12	Wells Fargo & Company	USA	1,422,968	0.45%
13	Royal Bank of Scotland	Europe	1,312,295	1.45%
14	UBS	Europe	1,259,232	1.75%
15	Banque Populaire CdE	Europe	1,147,521	-1.73%
16	Groupe BCPE	Europe	1,147,521	-1.73%
17	Goldman Sachs Group	USA	938,555	0.04%
18	Lloyds Banking Group	Europe	924,552	0.06%
19	Credit Suisse Group	Europe	924,280	3.00%
20	ING Group	Europe	836,068	0.06%
21	Rabobank Group	Europe	752,410	-0.34%
22	Nordea Group	Europe	677,420	0.93%
23	Intesa Sanpaolo	Europe	673,472	-0.73%
24	Credit Mutuel Group	Europe	645,216	0.28%
25	Standard Chartered	Europe	636,518	1.34%
26	BMO Financial Group	USA	525,449	-2.08%
27	La Caixa Group	Europe	359,109	1.50%
28	Bank of New York Mellon Corporation	USA	358,990	-0.72%
29	U.S. Bancorp	USA	353,855	-0.26%
30	Capital One Financial Corporation	USA	312,918	-0.92%
31	PNC Financial Services Group, Inc.	USA	305,107	-0.94%
32	KBC group	Europe	256,886	-1.92%
33	State Street Corporation	USA	222,582	-0.15%
34	Erste Group	Europe	213,824	-0.27%
35	Belfius Bank	Europe	212,947	-2.73%
36	HSBC USA Inc.	USA	196,567	-0.07%
37	BB&T Corporation	USA	183,872	-0.30%

38	Ally Financial Inc.	USA	182,347	0.40%
39	SunTrust Banks, Inc.	USA	173,442	-0.15%
40	American Express Company	USA	153,140	-0.10%
41	Citizens Financial Group, Inc.	USA	127,053	-0.74%
42	Allied Irish Banks	Europe	122,516	-0.08%
43	Fifth Third Bancorp	USA	121,894	0.39%
44	Regions Financial Corporation	USA	121,347	-0.33%
45	Northern Trust Corporation	USA	97,464	-0.53%
46	KeyCorp	USA	89,236	-1.52%
47	Comerica Incorporated	USA	65,359	-0.68%
48	Huntington Bancshares Incorporated	USA	56,153	0.28%
49	Zions Bancorporation	USA	53,279	-2.22%
50	CIT Group Inc.	USA	44,012	-0.99%

Table 8: List of banks used in the study.
The total assets figures were obtained from the individual bank's annual report of 31 December 2012.
Impact of the capital definition change on the bank capital ratio is calculated as estimated Basel 3 ratio less Basel 2 ratio.

Region		Ratio Difference	Estimated Basel 3 Tier 1 Capital Ratio (December 2012)	Basel 2 Tier 1 Capital Ratio (December 2012)	Basel 2 Risk Weighted Assets (December 2012)	Total Assets (December 2012)
USA	N	25	25	25	25	25
	Mean	-0.52%	11.20%	11.72%	295,677	501,575
	Median	-0.33%	10.85%	11.63%	125,700	183,872
	Std. Deviation	0.76%	2.09%	2.30%	384,357	693,666
	Minimum	-2.22%	7.38%	6.98%	43,970	44,012
	Maximum	0.45%	16.25%	17.24%	1,270,378	2,359,141
Europe	N	25	25	25	25	25
	Mean	0.17%	13.07%	12.90%	362,210	1,160,943
	Median	0.14%	12.10%	12.06%	301,861	924,552
	Std. Deviation	1.26%	2.70%	2.28%	272,122	835,068
	Minimum	-2.73%	9.00%	10.24%	50,261	122,516
	Maximum	3.00%	20.80%	19.05%	1,123,900	3,484,949
Total	N	50	50	50	50	50
	Mean	-0.18%	12.13%	12.31%	328,943	831,259
	Median	-0.15%	11.65%	11.95%	218,685	580,984
	Std. Deviation	1.09%	2.57%	2.34%	331,295	829,542
	Minimum	-2.73%	7.38%	6.98%	43,970	44,012
	Maximum	3.00%	20.80%	19.05%	1,270,378	3,484,949

Table 9: Descriptive statistics.
The table presents the data sample of the 50 observations. The data were obtained from the banks' 2012 financial reports. The Ratio Difference is measured in percentage terms and it is calculated as estimated Basel 3 Tier 1 capital ratio less Basel 2 Tier 1 capital ratio. The Estimated Basel 3 Tier 1 capital ratio is measured in percentage terms and is calculated as Basel 3 Tier 1 capital divided by Basel 2 RWAs. The Basel 2 Tier 1 capital ratio is measured in percentage terms and is calculated as Basel 2 Tier 1 capital divided by Basel 2 RWAs. Basel 2 RWAs and Total Assets are measured in millions of dollars.

	Ratio Difference	Basel 3 Tier 1 Capital Ratio	Basel 2 Tier 1 Capital Ratio	Basel 2 RWAs	Total Assets	Region
Ratio Difference	1.000					
Basel 3 Tier 1 Capital Ratio	0.279*	1.000				
Basel 2 Tier 1 Capital Ratio	-0.014	0.763**	1.000			
Basel 2 RWAs	0.158	-0.147	-0.100	1.000		
Total Assets	0.276	0.060	0.138	0.856**	1.000	
Region	0.323*	0.246	0.254	0.101	0.401**	1.000

Table 10: Correlation matrix between the predictors and the dependent variable.
The table presents the correlation matrix between the predictors and the dependent variable. The ratio difference is measured in percentage terms and it is calculated as estimated Basel 3 Tier 1 capital ratio less Basel 2 Tier 1 capital ratio. The Basel 3 Tier 1 capital ratio is measured in percentage terms and calculated as Basel 3 Tier 1 capital divided by Basel 3 RWAs. The Basel 2 Tier 1 capital ratio is measured in percentage terms and calculated as Basel 2 Tier 1 capital divided by Basel 2 RWAs. The Basel 2 RWAs and Total Assets are measured in millions of dollars. Region indicates the location of the banks, in this case either Europe or the USA. * and ** indicate statistical significance at the 10% and 5% levels respectively.

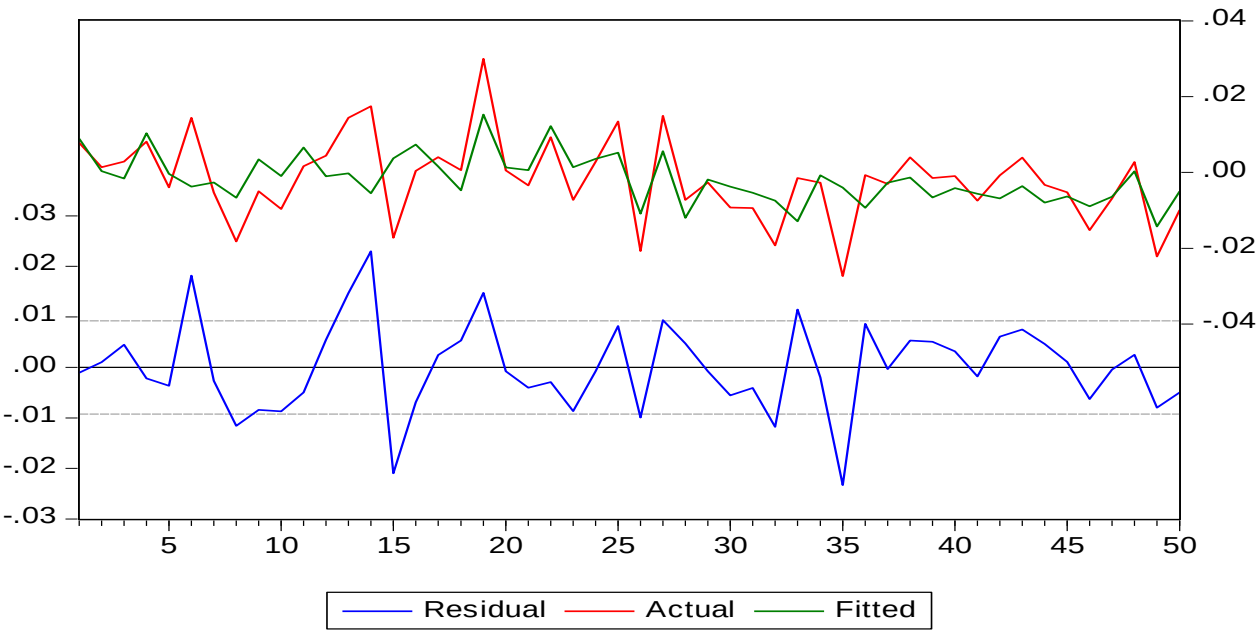

Figure 3: Plot of Residuals per Bank before Winsorisation

F-statistic	2.6474
Observed R-squared	9.5248
Scaled explained SS	10.4684
Probability F(4,45)	0.0455
Probability Chi-Square(4)	0.0492
Probability Chi-Square(4)	0.0332
Observations	50

Table 11: Heteroscedasticity Test: Breusch-Pagan-Godfrey

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