Examining the effectiveness of the new Basel III banking standards: Experience from the South African Customs Union (SACU) banks.

by

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I declare that * Examining the effectiveness of the new Basel III banking standards: Experience from the South African Customs Union (SACU) banks, is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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***Abstract*:** This dissertation explored the efficacy of the new Basel III banking standards in SACU, grounded on the conjecture that they are not reflective of economies of SACU, but are merely an intensification of Basel II, rather than a substantial break with it. Firstly, loans and assets were tested for causality, since Basel III believes growth in these variables led to securitization. The leverage ratio has been introduced in Basel III as an anti-cyclical buffer. The OLS technique was employed to test for its significance in determining growth in bank assets. SACU feels the impact of debt, with credit is marginally treated in Basel III and is not introspective of the realities of its economies. ANOVA tests using debt, credit and GDP were done to determine a better method of addressing cyclicality. The leverage ratio was insignificant in Namibia, with debt and credit having momentous impacts on GDP in SACU.

***Key terms*:** Basel standards, leverage ratio, Granger Causality, Minimum Capital Requirements, Cyclical buffer, Liquidity Requirements, Analysis of Variance.

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CHAPTER 1: INTRODUCTION

Basel accords came into existence with a view to addressing crises emanating from banking operations. The growth of securitization led to the subprime crisis of 2009, paving the dermis of Basel II (Underhill, Blom and Mugge, 2010:13). Basel III is awaiting implementation from beginning 2015, and it is hoped that it will lead to long term stability of the financial system (Federal Reserve Bank, 2011:27). Rating Agent Standard & Poor (2010:3) is of the opinion that the effectiveness of the Basel III proposals could be jeopardized by the implementation of a leverage ratio which is not well calibrated. Others like Murinde (2011:12) say central banks of SACU and Africa were never actively involved in the architecture of Basel III. He suggests a review of the recommendations in order to decide on the key aspects to be incorporated in their bank regulatory frameworks.

SACU membership comprise of South Africa, Botswana, Namibia, Lesotho and Swaziland. This study will use sixteen banks from SACU, namely: Barclays, FNB and Stanbic of Botswana; ABSA, FNB, Nedbank and Standard bank of South Africa; Standard bank, FNB, and Nedbank of Namibia; Standard bank, Absa and FNB of Swaziland and Standard bank, FNB and Nedbank of Lesotho. South Africa will be represented by four banks in this study to reflect the size of its economy.

Since Basel III standards are biased towards American and European banks, this study will use SACU financial institutions to examine the errors committed by financial institutions generally. These errors revolve around the manner in which loans were generated as assets grew; differences in the use and interpretation of the leverage ratio and errors committed from credit and debt acquisition which negatively impacted on GDP. The researcher in the study finds it important to investigate the strength of these standards, as some researchers are of the opinion that the proposed capital reserve requirements are low (Ponte, Gibbon and Vestergaard, 2011:66). SACU feels the credit to GDP guide for activating the Basel III counter cyclical buffer is too mechanistic and not reflective of the realities of the economies of its member countries (FSB[1], 2012:15).

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[1] FSB, FINANCIAL SERVICES BOARD

There is strong evidence that the accord has relegated the concern with counter cyclicality to margins and that the latest prescriptions fail to relate risk taking with risk absorption (Ponte, et. al 2011:70). Moreover, there is strong consensus that the calibrations used in the calculation of the liquidity standards do not correctly capture SACU countries' financial market structures (Murinde, 2011:12).

In view of the findings of other related researches such as Blinder (2010:1), Ponte, et.al (2011:67), and others across the globe, the latest Basel III standards suffer from a range of conceptual and methodological limitations. As such this study intends to test the effectiveness of these standards and to propose better banking standards in the form of Basel IV.

In view of the above, this study hypothesizes that: The Basel III Accord is essentially, an intensification of Basel II rather than a substantial break with it. This does not augur well for the financial stability of the world economy. This study will be confined to the major banks in SACU, sampled using a stratified random sampling technique. This study will be empirical and will use quantitative methods and the deductive approach. The data will be collected from secondary sources and analysed using Time Series data. Tests will be done by EVIEWS 7 software package and results will be presented in tables.

When the governors of the world's major central banks and bank supervisory agencies met on September 12, 2010 to give approval of the Basel III accord, this was met with jubilation that the panacea to problems affecting the banking industry had been found. Besides, it just took eighteen months for twenty seven countries; each with its own disparate views and parochial interests to reach an agreement, barely a few months after the financial crisis had passed.

There is consensus amongst researchers that the agreed increase in capital reserve requirements is far from sufficient, and that the provision of the counter cyclicality is marginal, just an addendum and not at the centre of capital reserve requirements. Concerns exist that the monitoring and governing of credit growth and capital market inflation are also relegated to the margins of the new accord, regardless of the centrality of such efforts to macro prudential financial regulation. There is no effort to adopt a differentiated approach to financial regulation, ensuring different kinds of financial institutions take the types of risk that they are most capable of absorbing.

FSB (2012:15) claims SACU is concerned with the complexity of Basel III rules and the negative effect they may pose on the development and functioning of capital markets within its jurisdiction and on certain types of banking activities, such as trade finance. In a study by Tobias and Hyuan (2008:1), bank leverage was found to be the main cause of financial crises. This study will test the viability of the leverage ratio, the impact of debt and credit on GDP in SACU. Major banks in SACU such as Barclays, FNB and Stanbic of Botswana; Absa, FNB, Nedbank and Standard Bank of South Africa; Standard Bank, FNB and Nedbank of Namibia; Standard Bank, Absa and FNB of Swaziland and Standard Bank, FNB and Nedbank of Lesotho will be used in this study. This amounts to a total of sixteen banks.

The Basel Committee mandates bank managers to use their discretion, depending on the bank's circumstances in relation to other banks. It is the opinion of this study that the discretionary approach weakens the efficacy of the standards to adequately address cyclicality, since individual decisions are susceptible to errors. Reserves on capital requirements are viewed as patently inadequate as they are set at 3% level. Researchers on Basel standards foresee even European and American banks failing to meet these capital requirements.

1.1 The Leverage Ratio

A leverage ratio is an expression of the total value of a bank's assets, relative to its equity capital. Differing opinions on the viability of the leverage ratio in stemming the financial crisis exist today amongst financial experts. KPMG[2] (2012:12) believes the leverage ratio will act as a non risk sensitive backstop measure. The institution claims the cause of the financial crisis was the uncontrolled piling of leverage in both the European and American banking systems. Therefore, the leverage ratio was believed to be the panacea in curtailing financial crisis in the whole world, while it failed to do so in the US, where it already existed. Tobias and Hyuan (2008:1) subscribed to this idea; they believed bank leverage is high during a boom and low during recessions. For example, the Lehman Brothers had an excessively high leverage which led to a higher sensitivity of its balance sheet to trading, resulting in its closure (Moorad, 2011:266).

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[2] KPMG, Klynveld , Peat Marwick Goerdeler (accounting firm)

Howell (2010: 23) stated that, the fact that the financial crisis originated and had its greatest impact in the US albeit the presence of the leverage ratio for banks is evidence that a leverage ratio is unlikely to be a panacea per se. Denmark's largest bank, Danske, says the leverage ratio would be unable to capture the low risk of its large mortgage portfolio (Shearman and Sterling, 2011:4). The Association of German Banks has called for its elimination, claiming it compels banks to scale down lending and slacken economic recovery (Ponte, et al 2011:92). SACU has expressed concern about aspects of the leverage ratio and measures to reduce pro cyclicality that may impact domestic credit and output growth (FSB, 2012:14).

To date, only three countries are using the ratio (USA, Canada and Switzerland). To implement a consistent leverage ratio across the globe requires a coordinated effort from regulators. In the three countries where it is in current use, variations in calculations of the leverage ratio exist. This weakens the value of the measure (Standard & Poor, 2010:4). Disclosures about the components necessary in calculating the leverage ratio should make the measure more valuable. This view is shared by Rustom, et.al (2010:26) who advocate for an integrated approach containing all the other proposals, including those regarding the framework for liquidity risk.

Furthermore, the proposal is silent on how the leverage ratio would interact with the capital weighting approach and these issues have been deferred to be discussed in the near future with banks across diverse jurisdictions with very different banking structures. Blundell, Wignal and Atkinson (2010:16) believe part of the reason for the postponement is that the risk weighting and the leverage ratio are not compatible.

1.2 Counter Cyclical Measures

Cyclicality refers to variations in GDP in an economy over time. Counter cyclicality measures are systems used by banks to avoid cyclicality. A number of these measures have been proposed by researchers. Ponte, et. al (2011:65) supposed counter cyclical measures are useful when provisioning of bank credit is growing faster relative to the economy itself. The use of the leverage ratio is one way of addressing cyclicality. Capital buffers set between 0 to 2.5% of risk weighted assets by national authorities are also proposed. Improvising and diversifying market management models through tailoring them to

individual firm's characteristics and business lines is another method (Andritzky, et. al, 2009:4).

Different methods to counter cyclicality have been recommended. Firstly, the discretionary approach, and secondly the formula-based approach. The discretionary system allows bank regulators to judge the right level of required capital ratios in light of the macroeconomic cycle. The formula-driven approach proposes that the level of capital depends on a predetermined metric as growth of the balance sheet. This study believes that the effectiveness in countering cyclicality relies heavily on the use of tools of moving averages, extrapolation and forecasting which are elementary in timing a business cycle. Griffith, Jones and Ocampo, (2009:7) confirm that, counter cyclical regulation has received wider recognition in global reports including those of the UK and US Treasuries.

In Switzerland, counter-cyclical regulation identifies between minimum capital adequacies requirements during recession periods and doubling them during boom times. However, countries differ in characteristics; therefore, this criterion may not yield similar results in all countries. Empirical evidence show that credit precedes business cycles, therefore measures that incorporate credit may not be a good measure for the release of the buffer (Afroditi, 2011:3).Forward-looking dynamic provisioning is being used in Spain, Peru and Columbia as another method. It requires banks to account for future credit losses when calculating their pre-tax incomes.

Of the two methods, that is, the discretionary and rule based, Rustom, et. al (2010:29) suggested for the use of a combination of discretion and formula as a way of addressing cyclicality. This study does not subscribe to the use of the discretionary method as this largely depends on the expertise of bank management. This study does not find this approach convincing, as the subprime crisis was caused by the discretion of bank management, manipulating the loopholes in the Basel II standards in securitizing debt obligations. As a result, management committed a lot of errors in this regard.

1.3 Minimum liquidity measures

Minimum liquidity measures are ways used by a bank to maintain sufficient funds to meet its commitments when they fall due. It entails matching the maturity of assets and liabilities daily and coping with short term pressures that may arise in the process of assets being fully funded. The US Treasury report of 2009 argues that, excessive funding of long term assets with short term debt by a bank can contribute to its failure (Griffith, et.al 2009:15).

The Subprime crisis of 2008 was a wakeup call on the need for banks to always monitor liquidity levels. Basel III seeks to introduce internationally harmonized minimum liquidity requirements: Liquidity Coverage Ratio (LCR), which focuses on short term liquidity and the Net Stable Funding Ratio. Monetarists are of the opinion that the introduction of the liquidity standards will help bring to an end the recurrence of a liquidity crunch of the size witnessed in the recent crisis (Delahaye, 2011:11).

No limit is set for the NSFR and bank supervisors are expected to use their discretion depending on the bank's circumstances in relation to that of other banks. Moorad (2011:274) believes this measure should not be seen as a metric on which one could set a 'one size fits all' limit; but to see it as part of a set of other metrics before determining regulatory compliance.

1.4 Capital Reserve Requirements

Capital reserve requirements refer to the amount of capital a bank holds to provide a cushion for the transactions that it enters into. It is the difference between the assets and liabilities on its balance sheet. Basel II has three weaknesses relative to Basel I. These are, reduced capital requirements; assigning the role of risk assessments to credit rating agencies such as Moody and Standard & Poor and allowing banks to use their own internal models to measure risk. This presents a serious risk-weighting (denominator) problem. Banks exploited this loophole and used structured investment vehicles to bypass capital requirements by shifting assets off balance sheet. Basel III intends to address this anomaly. Blinder, (2010:1) agreed to this, when stating that, 'Basel III places the focus squarely where it belongs, on common equity, which is real capital, when it calls for capital requirements to be raised'.

Basel III has resurrected the leverage ratio with no risk weighting, but the capital requirement is only 3%, a level the Lehman Brothers had. In a Latin American research study by Diaz, Olivero and Powell (2011:14), it was concluded that Basel III's anti cyclical rules on the financial accelerator effect of fixed bank capital requirements will have little impact depending on the overall levels of capital. They therefore advocate for a much aggressive rule than the one contemplated in Basel III.

1.5 Motivation of study

Economies of SACU have not been spared from the depressing effects of the business cycles caused by financial markets failure. As part of the global village SACU, financial institutions have been implementing an assortment of changes to banking standards, as prescribed by the different Basel accords. In spite of these changes bank failure with devastating effects on SACU economies continue to exist.

Monetary authorities within SACU are reluctant to implement some of the Basel requirements because they believe they negatively affect their growth targets. SACU members argue the banking standards are not home grown because they lack their input and fail to capture the liberation history of their economies. They argue the banking standards are tailor-made to suit European and American economies.

Each time a bank failure occurs in these economies, the blame is placed on the complexity of the Basel banking standards. The importance of the leverage ratio introduced in Basel III is not understood. The new capital requirements are deemed to be anti growth. Measures that are prescribed to counter cyclicality, such as the creation of an excess capital buffer for banks, the use of discretion by banking supervisors and the rule based approaches, are deemed not reflective of the realities of the economies of SACU members. Consequently, the problem questions for this study are:

 * To what extent is the leverage ratio significant to economies of SACU?

 * Is the growth in loans preceded by growth in assets within the customs union?

 * To what extend is debt and credit impacting negatively on GDP?

1.6 Objectives of study

The aim of this study is to investigate the effectiveness of the LR on bank assets in the SACU area.   The technique of 'Granger causality' will be used to observe the presence of causality between bank assets and loans. Time series data on bank loans and assets from 2000 to 2013 will be sampled per panel and used. Assets and loans will be used because some researchers argue that growth in assets led to increased leveraging by banks.

The OLS technique will then test for the significance of the leverage ratio in determining the level of bank assets. The test will involve a regression of the leverage ratio on assets for the period under study. Panel data analysis will also be employed in this study. Time series data analysis on the efficacy of the leverage ratio will be conducted. The trend in the series will be identified by calculating the correlations at different time periods. This will enable this study to identify whether the leverage ratio is consistent in providing protection to banks over a long period. Leedy and Ormrod (2010:183) advocates for the suitability of time series data analysis in identifying a particular pattern in a variable over a certain period. In that case, correlation analysis is proposed to identify any patterns inherent in the entities' assets over time.

Finally, a two way ANOVA on the impact of credit and debt on GDP will be carried out. SACU believes the credit to the GDP guide for activating the Basel III banking counter cyclical buffer is too mechanistic because it's based on assumption that countries are identical and fails to capture the realities of its member economies. This study will use debt and credit to test for the amount of their impact on GDP in SACU. Weiers,(2011:442) believes, a two- way analysis of variance, simultaneously examines the effect of credit and debt on GDP, along with the effects of interactions between the different levels of these three factors.

1.7 Hypothesis

This study will hypothesize that:

a) The leverage ratio is not significant enough to determine bank assets level, hence cannot insulate banks from financial crisis that arise in financial markets, otherwise, the leverage ratio is significant enough to determine bank assets level and can insulate banks from financial crisis that arise in financial markets.

b) Furthermore, this study will hypothesize that debt and credit have no bearing on GDP. The null and alternative hypotheses for the second hypothesis will be expressed in terms of the main effects, that is, debt and credit and interaction effects (a combination of these factors), otherwise debt and credit have a bearing on GDP.

1.8 Outline of Chapters

In **Chapter 2**, developments of the various Basel banking standards will be discussed and an outline of the proposals contained in the new Basel III banking standards will conclude the chapter.

Chapter 3 will provide a literature review on the previous studies done on Basel banking standards.

Chapter 4 outlines with the methodology of this study. Firstly, the format of data is outlined, followed by the testing of the hypotheses.

Chapter 5 will analyse the findings from the estimations. Findings from causality will be discussed first, followed by findings from OLS estimations on the significance of the leverage ratio on bank assets. Lastly, the chapter will explain the impact of debt and credit on GDP using the technique of ANOVA.

Chapter 6 is the concluding chapter, giving the implications of the findings of this study and providing some recommendations on further research.

CHAPTER 2: DEVELOPMENTS OF THE BASEL BANKING STANDARDS

Non alignment of regulations in international banking hampered transactions in financial markets. The lack of an internationally harmonised banking framework implied that it remained difficult to supervise the flows of funds across nations. Variation in bank capitalisation made comparison and implementation of banking regulations difficult, globally. The rise in bank securitization exacerbated the need for an international banking framework to protect public funds and the world economies in general. This chapter will be divided into two subsections. Sub-section 2.1 will provide a brief overview leading to the developments of the Basel banking standards with a discussion on those aspects that were wrongly and rightly done. Expectations and criticism levelled against Basel III will also be alluded to in subsection 2.2.

2.1 Background

International cooperation in financial regulation resulted from the collapse of two large international banks in 1974, namely Bankhause Herstatt, an insolvent institution in Cologne in West German; and Franklin National Bank of the United States of America. Bankhause Herstatt was a very small bank that had foreign exchange dealings with banks in other countries. It occurred that due to time differentials, the payments of the foreign exchange dealings had not been sent, and by the time the bank closed, the inflow of these funds was blocked, causing massive losses at many other banks of the globe (Jackson, et. al 1999:1).

As Bankhause Herstatt was crumpling, the financial authorities in United States were battling to avert the collapse of Franklin National Bank caused by shortage of liquidity since it also had a disproportionately large position in international currency markets. Bankhause Herstatt was the first to collapse and Franklin National Bank followed. Privy of the consequences posed by the demise of the Franklin National Bank, the monetary authorities of the United States had no option, but to sell it. After the collapse of the above named banks came the 1983 Mexican debt obligations default to the U.S banks which caused exposure on the banks' balance sheets. This culminated in the U.S congress ordering regulators in the country to compel banks to make improvements on their capitalization. Banks did not welcome the decision as higher capitalization placed them at a competitive disadvantage compared to their trading partners in Japan.

The Japanese banks by then were the world's largest, lending at low interest rates due to regulators in that country allowing them to lend while maintaining little capital on hand. Jackson, et.al (1999:2) observed that where banks were required to maintain equity cushions exceeding what they had otherwise chosen it was natural for banks to view capital standards as a form of regulatory taxation.

The collapse of Franklin National Bank and Bankhause Herstatt Bank and the Mexican debt crises made it apparent that international banking activities lacked proper supervision. There was a need to create a framework that would harmonize banking standards. There was a call for international regulations to impose the same standards on all global banks. The U.S congress empathized with the bankers' concerns and made progress towards bringing about international convergence on the financial policy (Disyatat, 2008:50). This exercise was a complicated one because each country had its own standards on the amount of capital that banks needed and how that capital was measured. Therefore, no country was keen to impose heavier costs on its own financial sector.

Realizing international backtracking on the need for internationally harmonized banking standards, Britain and the U.S signed a bilateral accord on bank capital rules in 1986. Wary that the move by the U.S and Britain would have deleterious effects on its undercapitalized banks, Japan was forced to join them and the three countries adopted a single negotiating position in Basel. These developments made other countries from the G-10 (Canada, France, German, Japan, Belgium, Switzerland, Italy and Sweden including the monetary authorities of Netherlands and Luxembourg to discard their stance and subjected themselves to common banking standards. This gave birth to the introduction of Basel accord I of 1988, whose proposals were to be enforced by the Basel Committee on Banking and Supervisory Standards (Jackson, et.al. 1999:5).

The Basel Committee was mandated to examine the complexity of the modern banking system and to provide parameters for appropriate supervision. The committee focused on effective supervision of international banking operations and proposals aimed at harmonizing various national capital adequacy regulations. A supervisory framework premised on a common standard of risk assessment was devised. It required all international banks to maintain a certain minimum fixed relation between their capital and assets. It focused on credit risk by defining capital requirements by the function of a bank's on – and off balance sheet positions. Banks were also required to hold a backing for weighted assets of no less than 8% of total capital and at least 4% of tier 1 or core capital.

Furthermore, the first step in defining the capital requirement was to determine what would be considered as capital. The committee recognized two classes of capital by the function of its quality: that is, Tier 1 and Tier 2. Goodwill had to be deducted from Tier 1 capital and investments in subsidiaries had to be deducted from total capital base. Goodwill was subtracted because it was considered an element whose valuation was very subjective and fluctuating with a generally low value in the case of the liquidation of a bank. The investments in subsidiaries that were not consolidated were also deducted to avoid several entities using the same capital resource (Levison, 2010:3).

The Basel Committee was divided on the question of deduction of all banks' holdings of capital issued by other banks to prevent the '' double-gearing'' effect. Double gearing effect is for instance, when bank A invests in the assets of bank B while bank B simultaneously invests in the capital of bank A and this artificially increases the equity. The committee did not retain the deduction, but it has since been applied in several countries by national supervisors.

Balance sheet amounts were weighted to reflect the assumed risk level. For example cash; claims on OECD[3] central governments and claims on other central governments if they were determinate and funded in the national currency (to avoid country transfer risk) were given a zero rating. Claims on OECD banks and on banks outside OECD with residual maturity less than one year and claims on public sector entities of OECD countries received a weighting of twenty. Mortgage loans had a weighting of fifty. Claims on corporate, claims

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[3] OECD, Organisation for Economic Cooperation and Development

on banks and claims outside OECD with a maturity greater than one year, fixed assets and all other assets were allocated a 100 % rating.

The 1988 accord was the first ever international agreement designed to smoothen the risk of a banking crisis. The motive in implementing the banking regulation was to control bank activities as originators of credit by encouraging them to improve their capital positions. The argument was that the central bank actions caused recessions. For instance, when the monetary authorities pursued expansionary monetary policy, they bought securities from commercial banks. This increased the reserve holdings for the commercial banks and permitted them to accept more deposits which gave them leverage to issue out more loans thus expanding the supply of money (Jackson, et. al. 1999:4).

Advocates for the Basel rules argued that these rules were crafted to define a minimum capital level; but did not preclude national supervisors from implementing stronger requirements. The main principle of insolvency rule was brought in to assign a weight that was a function of their estimated risk level to both on-balance sheet items and to acquire a capital level equivalent to 80% of those weighted assets.

The capital ratio was commended for differentiating assets by function of their assumed risk and also for incorporating requirements for off-balance sheet items that had grown significantly in the 1980s, with the development of derivative instruments. However, the Basel committee lacked supervisory authority and its conclusions did not have legal force (Disyatat, 2008:56). It only acted as an advisory body whose aim was to provide recommendations for concordats and accords, than laws per se and encouraging harmonization of member countries' regulatory standards, this was because of country sovereignty.

The good aspects of the 1988 accord included the creation of a worldwide benchmark for banking regulations. Originally, the accord had been designed to cater for internationally active banks of the G-10 countries, but to date Basel standards stand as a beacon of inspiration for banking regulation in more than 100 countries and are often imposed on national banks as well. International banks are now faced with a uniform set of rules which eliminated the need to discuss with each national regulator what the correct capital level should have been for conducting the same business in many different

countries. It should be noted that banks from different countries competing on the same markets now have equivalent regulatory capital requirements.

Furthermore, The introduction of different assets, risk-weights for different assets classes, although this did not show completely the true risks of banks credit portfolios, it was a clear improvement on previous regulatory ratios that were used in some countries, such as equity, assets or deposits ratios. This was an improvement compared to the situation before 1988.

However, Blinder, (2010:1), argues that a cause for concern was that the Basel Committee did not consult widely with the entire global financial institutions when setting minimum capital levels. There was growing perception that the new capital requirements introduced in 1988 fuelled banks to hold higher capital ratios. Brondt and Prast (1999:25) in a study, reported an increase of about 2% points from 9% to 11% in a selected group of G-10 countries (the UK, US, Italy, France, Germany and the Netherlands) in the years 1990 and 1997. Peura and Jokivuolle (2003:5) observed that the average capital ratios for G-10 banks in 2001 stood at 11.2% (11.9% in the U.S, with 10.8% in Europe).

Meanwhile, Jablecki (2009:6) believed that the reason for the increase in capital ratio was as a result of competitive challenges such as securitization rather than new regulations. His argument was plausible because capital ratios had increased more than would seem necessary to comply with new regulations. Even econometrics studies failed to provide clarity on causation. An analysis of the banking pattern from studies concluded that poorly capitalized banks tended to boost their capital ratios to a larger magnitude than better capitalized ones; this was achieved through increasing their ratios of capital to risk-weighted assets (RWA).

The increases in capital ratios paved way for non-compliance by banks contravening the principle of financial prudence. Capital arbitraging was on the increase. This capital arbitraging practice involved a restructuring process of the financial institution's portfolio to reflect a position of the same or higher risk, hence justifying low capital requirement. Merton (1995:12) claimed that when capital was not directly matched with a wide range of assets weighted by risk, such circumventing banking practices were likely to perpetuate into the future. Capital arbitraging was manipulated when banks increased their capital

through gains trading; this was only feasible in the short run and in the long run the only option was to securitize. This helped to lessen the banks' measures of risk.

Levinson, (2010:4) pointed out that although securitization had gained prominence; it remained difficult to estimate the full scope of securitization because not all financial institutions were willing to disclose adequate information. Ergungor (2003:24) on the other hand maintained that it was the imposition of the new capital requirements and regulations that constrained asset growth that led to securitization. The other problem was its ''one size fits all'' approach whose requirements were virtually the same whatever the risk level of sophistication and activity of the bank. The 8% capital ratio was an arbitrary measure not based on explicit solvency targets. Some scholars alluded to the fact that the accord did not recognize diversification. Credit risk requirements were only additive while diversification through granting loans to various sectors and regions was not recognized.

Therefore, as a result of these flaws, among others, the Basel Committee was compelled to review the 1988 accord culminating into the Basel II accord in 2004. The Basel II accord was successful in increasing sensitivity of capital requirements to risk levels; it also introduced regulatory capital needs for operational risk and brought flexibility to the accord by having several options left to the discretion of the national regulators. Basel II accord increased power of the national regulators, as expected under pillar I to evaluate a bank's capital adequacy considering its specific risk profile. However, it was silent on the form of operational risk; especially the type of losses to consider given that some losses would be estimated immediately because their values were not known but others were unpredictable.

Furthermore, it did not clearly provide clarity on how to classify operational risk, that is, which type of operational risk should regulation have considered? If operational risk was to be charged to pillar I, then its definition and the diverse statistical properties of its components would have been ascertained. Danielsson, et.al (2001:13) were of the view that, any losses accruing due to operational risk should have been directly charged to equity holders, management and bondholders of a particular institution since they did not spread to other institutions. They differed in opinion with the inclusion of operational risk in pillar I. They saw it as premature from a methodological perspective, because

operational risk was only intended to provide a cumulative add-on factor to the capital charge that may have fallen as a result of increased use of Internal Rating Based (IRB)-calculated market and credit risk charges.

Some scholars believed that operational risk might have acted as an anti-competitive tax on banks to the benefit of other non-regulated financial intermediaries. It was assumed that such a levy distorted the level playing field of banks versus other non-regulated financial institutions and created incentives for consolidation in banking sector as well as non – bank spin offs of many bank activities. Blundell, et.al (2010:4) were against the risk weighting formulas in Basel II capital regulations because they were based on a specific mathematical model which was subject to a constraint that it be portfolio invariant. This meant that the capital required to back loans was dependent only on the risk of that loan and not on the portfolio to which it was added.

However, a problem arose where the formula failed to capture the significance of diversification as on portfolio risk. The effect of the model was to raise linearly the minimum capital requirement related to the loan type as a result of credit risk with the holding of that asset type regardless of the magnitude of the exposure. Basel II risk weighting approach promoted portfolio concentrations in low weighted assets like government bonds, mortgages and lending between banks. This provided an opportunity to economize on capital and expand business into lower-weighted avenues.

This was more evident during the time for the credit default swaps (CDS) market. It was impossible to suffer from a credit deficit like in other markets before the CDS. This was because credit markets were not complete and the CDS contracts manipulated this weakness and created the potential for complete markets in credit. When banks swapped risk with derivatives the ideology of capital weights was affected because banks were able to economize on capital without having to trade as much on the underlying securities on primary markets (favouring assets with low risk weights).

Basel II promoted extensive use of Value-at-Risk (VaR) modelling in its advanced approaches to calculating capital charges for market, credit and operational risk under pillar I. VaR risk models had a serious weakness in that they assumed elliptically distributed returns. Current data reveal that the distribution of credit, market and operational risks are heavy-tailed, especially operational risk, so that estimates beyond VaR become significant.

Danielsson, (2000:9) was of the opinion that VaR models were important because they provided a point estimate of the loss distribution, a view not shared by other scholars who felt simple VaR estimates did not give any important information on the shape of the loss function in the tail when the risk distribution was characterized by non-normal tails. It was suggested that VaR regulation relied only on the estimate of a particular quintile opening a loop hole for legitimate actions by banks that were susceptible to the proposal. Now that the distribution of risk did not matter, a bank would not legitimately shift risk away from the quintile that mattered for the calculation of capital charges to the tail through the use of options to give an example.

Greenlaw, et.al (2008:72) in a US study, observed that approximately 49% of the subprime securitization exposures came from U.S's leveraged sector alone. If foreign investment banks and hedge funds were to be added, the extent of the potential subprime related losses concentrated in the leveraged sector will rise by two-thirds.

Furthermore, leverage ratios relying on current market values tended to be high in good times and low in bad times. As such, capital regulations were pro-cyclical because judgments tended to under estimate risks in both good and bad times. Therefore, where assets failed to capture future cash flows accurately pro-cyclicality would occur. This was because banks' risk measurements were done at a specific point in time and not over the entire cycle. It is clear that counter party credit policies were usually easy in good and tough in bad ones. Profit recognition and compensation schemes promoted short term risk taking but they were not adjusted for risk over the business cycle. There was a need to use measurement risks that were holistic for the entire business cycle.

Jablecki, (2008:6)was of the idea that the IRB approach of the Basel II framework actually institutionalized this pro-cyclicality by making banks responsible for estimating Probability of Default (PD), Loss Given Default (LGD) and Exposure at Default (EAD) which were a function of the cycle and were led by stock market, assets values and other financial variables. This made it difficult for commercial banks to forecast future asset prices and future volatility events. Therefore, the simplified system in Basel II did not change anything as was the case with Basel I. Of concern was that the external ratings based approach still used credit ratings which were famously pro-cyclical. The riskiness of assets varied over the business cycle. Risk assessments, whether based on credit rating agencies' assessments or internal ratings, revealed this pro-cyclicality, especially in the case of internal ratings which do not attempt to assess risk through the cycle.

This pro-cyclicality in ratings created an identical pro-cyclicality in capital charges causing banks to hold less capital, if not, excessively lending at the cusp of a cycle. Alternatively, they held capital in excess or under lent during a recession when microeconomic stabilization required an increase in lending. As a result, regulation did not only render bank crises more likely, but also destabilized the economy as a whole by inflating fluctuations.

Basel II requirements were not clear and had inconsistent definitions of capital. Regulatory adjustments for goodwill were not mandated to apply to common equity but were applied to Tier 1, or to a combination of Tier 1 and Tier 2. Additionally, these regulatory adjustments were not applied uniformly across jurisdictions clearing the way for regulatory arbitrage. Failure by the Basel accords to compel banks to provide clear and consistent data about their capital levels was another area where they have failed.

A consideration of Pillar II showed that the accord was not cautious about the high degree of inflexibility. In a different view, Danielsson, et.al (2001:14) believed that a high degree of flexibility risks counteracted the objectives of ensuring a level playing field. Their opinion was that flexibility brought the danger that a regulator used his own discretion to lower capital ratios for the bank under his control in order to give it a competitive edge. Alternatively, he opted for minimum ratios, prescribed under pillar I, when prudence suggested higher capital charges.

These possibilities were significant given the differentials in enforcement of the accord within Europe. Britain took a more flexible approach than some continental regulators while in the US relaxed capital adequacy ratios were ruled out by legislation. This justified the need for a mechanism that ensured that pillar II was implemented uniformly across countries and ensured that such quality assessments were done under the auspices were consistent across regulators. When such flexibility was absent as in the U.S, regulation created a knee-jerk reaction that may have aggravated any crisis.

A close scrutiny of Pillar III showed that the Basel accords failed the financial system by basing capital requirements on the mistaken risk assessments. It instructed national regulators to determine the amount of capital a bank would hold basing on the risk of its own business. Holding capital was costly and represented money that could not be lent at a profit. The capital requirement of pillar III inevitably encouraged banks to aggressively pursue activities for which little capital was required. For instance, regulators adhering to Basel II rules required banks to hold less capital against home mortgages than against loans to large companies. Lending to large companies was considered riskier. As such, when local housing prices collapsed in 2007 banks in many countries had too little capital to offset losses on mortgages causing bank runs by borrowers.

In addition, under Basel II loans by foreign banks to Icelandic banks required less capital than loans to highly rated multinational corporations because the Icelandic government had a strong credit rating. When the crises of 2007 gained momentum, all major banks in Iceland collapsed. Levison, (2010:4) believed Basel capital requirements destabilized the financial system by giving banks an incentive to remove loans from their books by securitizing them rather than setting aside more capital to back them.

Basel II rules allowed large banks to calculate their own capital requirements based on their own internal risk models. These proprietary mathematical models performed disastrously in 2007 and 2008. They failed to shield the banks from large losses due to the collapse of the housing market prices and the global economic down turn. One therefore questions the wisdom of letting banks model their own capital requirements. The creation of uniform international definition of 'capital' has made the banking system less safe. Well before Basel came into existence, some countries had stringent definitions that required

banks to hold large capital amounts of equity whilst others had definitions that were more lenient on capital requirements.

Another weakness on capital requirements was that Basel II rules required banks to meet part of their capital requirements with special bond like securities. The implication was that should a bank become distressed it would not stop paying interest on Tier 2 securities or convert them into equity even as the bank operated normally and serviced its other bonds. More often, bank regulators treated the owners of Tier 2 securities the same way they treated other creditors. They were protected against default. Tier 2 securities never performed their intended role as a cushion against the bank's capital losses.

2.2 Proposed Basel III Banking Standards

The subprime crises of 2008 exposed the flaws in Basel II and led to the introduction of a near final version of new bank capital and liquidity standards referred to as Basel III in December of 2010 by the Basel Committee on banking Supervision. Basel III was a series of corrections to the last Basel II framework. Its inception resulted in several changes coming into effect. Previous core solvency ratios have been retained at 8% of risk weighted assets ('RWAs'). Minimum common equity component would be 4.5% when fully phased in by 2015, increasing from the previous 2%. Overall tier 1 element of the capital base (in addition to common equity) will be 6% when fully phased in by 2019, rising from the previous 4% minimum (Blundell, et.al. 2010:11).

A capital conservation buffer made of an equity level of 2.5% of RWAs would be in place when fully phased in by 2019. It was suggested that where an institution has capital within the parameters of the buffer (with common equity of between 4.5% and 7%) dividend payouts, share buybacks and bonus will be subjected to control. An additional counter cyclical capital buffer would be imposed where necessary, especially during times of excessive credit growth to be released during times of credit contraction. It was agreed that the capital conservation buffer requirement will apply as of January 1, 2016 at 0.625%. From January 1, 2017 it will move to 1.25% and to 1.875% as of January 1, 2018 before rising to the full 2.5% level by January 1, 2019 (at which the total tier 1 common equity target would be 7%, that is, a 4.5% minimum and a 2.5% conservation buffer) (Blundell, et. al. 2010:12).

Under Basel III, banks that met minimum ratio requirements, but remained below the 7% tier common equity target, would be expected to maintain prudent earnings retention policies with the view to meet the conservation buffer as soon as reasonably possible. Basel Committee suggested that a quicker implementation would be appropriate in countries that were experiencing excessive credit growth. A second buffer, ranging from 0% to 2.5% of tier 1 common equity to RWAs, would be imposed by a national authority in times of excessive credit growth. The buffer was intended to lower its cost during a down turn. The countercyclical capital regime would be phased together with the capital conservation buffer requirement on January 1, 2016, becoming fully effective on January 1, 2019.

The national regulator would permit the release of the buffer of any size and at any time to the extent deemed necessary to achieve the buffer objective. Accenture (2011:6) believed individual countries were at liberty to consider other factors in making buffer decisions and may well exercise their discretion in very different ways. As a consequence, how, when and the magnitude to which the buffer would be used in practice would remain ambiguous for some time. It was however, the opinion of the Basel III Committee that the use of a buffer was particularly appropriate when the stock of national credit was excessive relative to the historical trends.

In cases where a banking group had operations in more than one country, it was required to calculate its own counter cyclical capital buffers in force in each Basel III country to which the group had any credit exposure. It was referred to as the 'jurisdictional reciprocity'. It aimed to create a level playing field for all institutions providing credit in a given jurisdiction. In practice, it would create an economic incentive for banks to increase their exposures to countries with no capital buffer requirement in place and to lower their exposures to countries that had imposed a relatively larger buffer and added to the complexity related to the calculation of the buffer.

Under Basel III, common equity of Tier 1 consisted of ordinary share capital and retained profits. Non-common equity Tier 1 would be made of perpetual non-cumulative preference shares and other qualifying instruments. Mandatory write-down or conversions into common equity would apply to all additional Tier 1 instruments in the event of the institution becoming non – viable without a bailout. Tier 2 capital would no longer be categorized into lower Tier 2 (principally, dated term preference shares and subordinated

debt) and upper Tier 2 (including certain perpetual preferred instruments and subordinated debt).

A single set of criteria would apply to Tier 1 instruments. All Tier 2 instruments would be required to be either convertible into common equity or write down should a bank become non-viable without a bail out. Tier 3 capital will be abolished. Tier 3 capital was unsecured debt that was fully paid up. This debt could only be repaid after regulatory approval. It had an original maturity of at least two years. Deductions from capital will be applied to the common equity Tier 1 component and not to the entire capital.

BlundeII, et.al (2010:12) showed that capital as defined by the risk weighting approach would lead to a capital level as in:

Min. CAP (RWA) =0.08*{12.5(OR+MR) +SUM [w (i) A (i)]}   (2.1)

Where: Min.CAP (RWA)   = minimum capital risk weighted assets

      MR   = market risk

      OR   = operation risk

But capital according to a leverage ratio was defined as:

 Min CAP (LR)   =βSUM [A (i)]   (2.2)

Where: Min. CAP (LR)   = minimum capital leverage ratio

    β   SUM   = summation of risk weighted assets

Whatever the level that was set for **β**, the binding constraint is the leverage ratio.

 Min. CAP (RWA) ≤Min. CAP (LP)   (2.3)

The authors demonstrated that the ability to arbitrage the capital weights to reduce capital and expand leverage was very broad for banks. Where leverage was set too high (capital required was too low), banks would have an incentive to arbitrage the weights to ensure they did not hold any more capital needed. This was a cost minimization exercise for banks that led regulators to effectively set maximum capital ratios in pillar I. This process was distortionary as had been the case in the past. It forced banks to lower weighted assets and shifted promises outside the banking system-and at times was associated with risks of creating new bubbles and or unintended shadow banking developments via the regulatory arbitrage process.

Such a move ensured that banks would have a minimum amount of capital sufficient to cover the needs of their customers. There would be more scope for bank management to do their job without heavy regulatory costs. Diaz, et.al (2011:8) believed that penalizing regulatory arbitrage would result in less onerous modelling requirements and would avoid concentration coming from the Basel model framework. The added advantage was that the incentives for regulatory and tax arbitrage would be avoided.

From 2015 financial institutions would be required to maintain a liquid asset buffer calibrated by reference to net cash outflow over a month. It was meant to measure a bank's ability to access funding for a month of acute market stress. Banks would be required to have a segregated stock of highly liquid and unencumbered assets that would at least equal to its estimated 'net cash flows' for a thirty day period during a time of acute liquidity stress. The thirty day stressed period assumed certain institution specific and system wide liquidity shocks including a credit rating downgrade of the bank three notches, partial loss of unsecured wholesale funding, withdrawal of some retail deposits, some committed but unfunded credit and liquidity lines provided by the bank being drawn down and general market volatility(Diaz, et.al 2011:6). The short term Liquidity Coverage Ratio (LCR) Basel has mooted was defined as:

LCR= (High Quality Assets)/ (30 Day Net Cash Outflows) ≥100 %   (2.4)

Where: LCR = Leverage Coverage Ratio

The value of assets and outflows referred to those that would arise with a major financial shock, a deposit run off and a three notch downgrade in the credit rating. High quality assets included central bank reserves, marketable claims on sovereigns, government debt issued in the currency of the country of operation. These had a low correlation to risky assets listed in active stable markets with market makers and low concentration of buyers and sellers; that is, easily convertible to cash in stressed markets. Corporate and covered bonds would be eligible – after a quantitative impact study. Cash outflows would be based on the modelling of funding run-offs: stable and less stable deposits, unsecured wholesale funding and secured (collaterised) funding run off.

Long term liquidity problems would be addressed by the Net Stable Fund Ratio (NSFR). Banks would be required to have stable funding in place to address funding needs over a one year stressed period. The implementation of this ratio would be scheduled for 2018.

$$\text{NSRF} = (\text{AvailableStableFunding}) / (\text{RequiredStableFunding}) \geq 100\ \% \tag{2.5}$$

Where**:** NSFR= net stable funding ratio

Available Stable Funding was defined as: Tier 1 and Tier 2 capital + preferred stock not in Tier 2 with maturity ≥ 1 year + liabilities ≥ 1 year + stable shorter term retail and small business funding (with ≤ € 1 m per customer) + less stable (e.g. unfinished non maturity) retail and small business funding + unsecured wholesale funding. Central bank discounting was excluded to avoid over reliance on central banks. The Required Stable Funding (RSF) was based on on-balance sheet and off-balance sheet exposure, and was defined as: Cash, securities ≤ 1 year, loans to financial firms ≤ 1 year + unencumbered marketable sovereign, central bank, BIS, MIS. Also included were AA-to-≥ 1 year loans to non financial corporate ≤ 1 year +loans to retail clients + all else.

Off-balance sheet exposures to be included, would be conditionally irrevocable, and irrevocable credit facilities to persons, firms, SPVs and public sector entities and a 10% RSF of the previously undrawn portion. All other obligations would have an RSF set by the national supervisor. The purpose of the NSFR was to constrain short term liquidity mismatches, encouraging the use of long term funding. A bank was required to have stable funding sources in excess of the amount of stable funding it would likely need over a one year period of extended market stress. Shearman and Sterling (2011:14) stated that this was a long term structural ratio that covered a bank's entire balance sheet as well as certain off-balance sheet commitments.

It was important that substantial amount of stable funding be available to finance those assets which were regarded as not being capable of being monetized through sale or use as collateral in secured borrowings during a liquidity event lasting one year. It should be noted that Basel Committee has already indicated that some refinements to the calculations of the LCR and NSFR would be necessary.

Shearman and Sterling (2011:11) argued that Basel Committee found that mark- to-market losses caused by the deterioration of credit worthiness short of default of counterparty was not accurately reflected. As such, Basel III now required the use of stressed inputs in assessing credit risk and more capital to be held to reflect mark- to-market losses (that is, the credit valuation adjustment risk) related to deterioration in counterparty's credit quality in relation to over the counter (OTC) derivatives.

Basel III called for strengthened standards for collateral management and managing of OTC derivatives and securities financing transactions. A multiplier of 1.25 was applied to the asset value correlation of exposures to regulated financial firms (with assets of at least $100bn) and to all exposures of unregulated financial firms regardless of size. A proposed risk weighting of 2% in which such exposures were previously treated as risk-free would be applied.

Though the proposals for capital reform in the latest Basel III did not address the important problems with the risk-weighting approach, they however, did make some improvements with respect to some aspects of the capital management process under Basel II era. For example, the introduction of a leverage ratio seemed to be the single most important reform. Dealing with pro-cyclicality, basing Probability of Default (PD) on longer –run data to determine inputs for minimum capital was better than the alternative. The forward looking provisioning based on expected losses seemed a useful method based on accounting principles and provide ample scope to business to manage their businesses in a sensible way (Blundell, et.al 2010:15).

As the case with its predecessors, the latest Basel III banking standards were not crafted after consulting widely with the entire global financial institutions when setting minimum capital levels. Under Basel III the weighting system continues to suffer from the assumption of portfolio invariance, or linear weighting that brings additives in the model. This weakness was apparent in both Basel I and Basel II. Consequently, very little was done in Pillar I to penalize concentration in portfolios, except insofar as model multipliers depended on exposure size in the treatment of counterparty risk.

A one size fits all approach still underpinned the modelling process yet there existed a variety of risks. Credit risk from the global business cycle risk factor was suitable for treatment in the Basel analytical approach. Market portfolio risk in global capital markets was addressed in a complex credit risk equivalent way and this was also a one size fits all approach. However, credit risk related to individual borrowers in a variety of business and regions was not well addressed in the analytical framework – leaving Basel III with the same problem as Basel II; that is, undue reliance on cumbersome supervisory override that has never worked well in the past.

It was charged that, there existed a problem of regulatory and tax arbitrage in 'complete' markets and the shifting of financial 'promises'. Markets in credit made it difficult to expect specified ex-ante risk buckets to remain stable as a basis for holding capital. Differential capital weights and tax status and tax rates faced by investors could not be arbitraged away by leveraged trading. There were policy parameters that gave incentives to lessen regulatory and tax costs. A huge incentive existed in the financial markets to utilize 'complete market' techniques to reconfigure credits as capital market instruments to avoid capital charges and reduced tax burdens for clients, thereby maximizing returns for themselves and their customers. However, this continued albeit the proposed reforms (Shearman and Sterling, 2011:4).

Basel III failed to deal with the required level of capital proposals. Improvements in the definition of capital were welcome but the Basel Committee was mum on the level at which the leverage ratio would be set and on how it would interact with capital weighting approach. This had to be deferred to be discussed with major banks in various diverse jurisdictions. EBA[4] (2012:19) was of the view that the leverage ratio would not succeed as a backstop because the main concern in the reform process was to set the leverage ratio at a level that ensured banks truly had adequate capital across all jurisdictions. Blundell, et. al. (2010:15) were of the view that the leverage ratio should not be thought as a backstop measure because of how ineffective the capital weighting approach had been. They believed that risk weighting and leverage ratio were not compatible to each other.

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[4] EBA, European Banking Authority

Methods of credit risk assessments, which were the standardized approach, internal ratings based approach and the advanced internal ratings based approach were maintained under Basel III as was the case in Basel II. The standardized approach was concerned with counterparty's credit rating to determine the credit risk of that counterparty. The foundation and the advanced approaches determined the mechanisms for calculating the three variables which were used in computing the credit risk component of capital requirement for institution, especially probability of default ('PD'), loss given default ('LGD') and exposure at default ('EAD').

Under the standardized approach, PD and LGD were incorporated into the weightings prescribed by Basel II and credit conversion factors were used to calculate PD. While LGD and EAD inputs would be provided by the regulator. The advanced internal ratings based approach allowed a bank to calculate all three variables using internal models, though the formula used in the model would be agreed with the regulator.

Furthermore, because of non consultancy in crafting of the Basel III banking standards Buckley (2011:298) is of the opinion that the risk weighting of assets remains a flawed concept unless securitized low grade debt is always required to be backed 100 % by liquid assets. Blinder (2010:1) argues that most of the changes in Basel III are based on the numerator that is, raising the amount of capital required and not adjusting the denominator which is crucial.

In addition, banks will need to raise at least €173billion in common equity in order to attain the core 4.5% common equity tier 1/Risk Weighted Asset ratio (RWA) applicable from 1 January 2015 and €602 billion in order to attain the 7% common equity Tier 1/RWA ratio applicable from 1 January 2019. These figures exclude capital surcharges that may be imposed on banks globally by national regulators. Shearman and Sterling (2011:9) state that the largest 35 US banks are short of meeting the common equity requirements by approximately $100billion, with 90% of the shortfall concentrated in the largest six banks, that is, Bank of America Corporation, J.P. Morgan Chase & Co, Citigroup Inc, Wells Fargo & Company, Goldman Sachs Group, Inc and Morgan Stanley.

The resurrection of the leverage ratio with no weighting is a welcome idea, but the chosen capital requirement is a mere 3%, what the Lehman Brothers had when it collapsed. Asset growth will be affected because equity exposures affect the capital leverage ratio. The NSFR aims to encourage more medium term funding. It highlights the level of long term funding compared with short term liabilities. However, no limit has been set for the NSFR and it is highly unlikely it will be (Moorad, 2011:273). The exact calculation of the metric has not been specified; hence it should be taken in conjunction with other metrics before reaching regulatory compliance. The Liquidity Coverage Ratio is biased towards government bonds; this will work against lending to the private sector (Blundell, et.al. 2010:19).

More so, liquidity proposals require more liquid assets to be held which, ceteris paribus, may lower returns. This may increase the incentive for excess risk taking in other areas. Some monetarists believe liquidity ratios only look at liquidity gaps in defined time horizons and not in other periods.

Basel III propose liquidity ratios to be calculated using predetermined standard aggregations and stress assumptions, yet the significance of these may differ substantially across banks with different sizes and business models in different countries. A counter cyclical buffer constituting of equity absorbing capital has been mooted. It can range from 0% to 2.5% of risk weighted assets depending on the changes in the credit-to-GDP ratio. South Africa believes the calibrations used in the calculations do not reflect its financial market structure (FSB, 2012:18). Shearman and Sterling (2011:10) believes the method may prove difficult for banks with operations internationally since the counter cyclical buffer required will have to be a weighted average of all the counter cyclical buffers in force in countries in which it has credit exposure.

CHAPTER 3: LITERATURE REVIEW

The Basel banking standards have received considerable research in the field of monetary economics since the financial crises that hit Europe and America in 1974. In providing a background view of the studies done for the Basel standards, this chapter will unpack the studies that were done in Europe, America, Africa and Asia on the leverage ratio, the anti-cyclical buffers, the level of capital adequacy, as well as how these were measured.

3.1 Review of previous studies conducted for the Basel Standards

Ever since the inception of the Basel banking standards numerous studies have been conducted to investigate the applicability, practicality and robustness of the requirements in stemming off business cycles emanating from the financial system. Recently, the OECD studies observed that at the time of the 2008 crisis, banks did not have enough capital. A regulatory and supervisory integration that allowed guarantees in the financial system to be transformed with derivatives, and passed out to the less-regulated and capitalized industries outside of banking, such as insurance and re-insurance was non-existent. Similar guarantees in the financial system were not given equal treatment (Blundell, et.al. 2010:20).

Furine (2000) in an econometric study (based on 362 American banks) revealed that though many factors might conceivably have accounted for changes in banks' portfolios, only changes in capital regulation simultaneously elucidated all of the observed alterations(Jablecki, 2009:12). Haubrich and Watchtel (1993:9) observed that American banks had substantially increased their holding of government securities from roughly 15% in 1989 to 22% of their total assets in 1993 because of the introduction of capital regulations. They believed the regulations constrained bank lending and contributed to a slowdown of the economy.

Cecchetti, Mohanty and Zampolli (2011:1) investigated the impact of debt on GDP. They used a data set that included the level of government, non-financial corporate and household debt in eighteen OECD[4] countries from 1980 to 2010. The study found that beyond a certain level debt is a drag on GDP. The study found that government debt had a threshold of around 85% of GDP. The immediate implication was that countries with high debt would act quickly and decisively to address their fiscal problems. The lesson was to build the fiscal buffer required to address extraordinary events, and governments would keep debt well below the estimated thresholds. The study also found that other type of debt yielded similar conclusions. When corporate debt was beyond 90% of GDP, it became a drag on growth. And as for household debt, the study reported a threshold around 85% of GDP, despite the impact being imprecisely estimated.

Debt and GDP had an association with Basel in that , Basel capital requirements proposed a variety of methods, such as the discretionary system , the formula driven approach or a mixture of both to counter cyclicality which was caused by debt and granting of credit . Griffiths, et. al. (2009:7) supposed that as banks created credit and entered into more debt they were exposed to risk of failure which caused gross domestic product to contract. The authors suggested that regulation of debt and credit is necessary to eliminate any downswings correlated to these variables.

Wasiuzzaman and Tarrmizi (2011:14), in a study of the impact of leveraging on bank profitability on Islamic banks in Malaysia, used Ordinary Least Squares (OLS) method to analyze the data collected from sixteen Islamic banks in order to understand the significance of leveraging and the determinants of Islamic banking profitability in Malaysia. Variables such as capitalization, asset quality, liquidity and operational efficiency were regressed against profitability. In addition macroeconomic variables such as gross domestic product and inflation were also considered in the analysis. The study found that capital and asset quality were inversely related with bank profitability while liquidity and operational efficiency had a positive influence.

Naidu (2011:86) studied the implications of capital structure and regulation on South Africa's four major banks, namely, Absa, Nedbank, Standard bank and First National Bank. It was found that an increase in leverage increased the volatility of a bank's earnings. The study used the trade-off theory of Ross, Westerfield, Jaffe and Jordan, 2008. The results showed that an increase in leverage ratio beyond a certain threshold increased the financial risk of the bank. The growth of the debt increased the costs of servicing that debt which was deleterious to the banks' cash flow. Overly the risk of bankruptcy was accelerated together with the related costs of financial distress. The demands on cash flow and earnings, along with the proportion of debt on the balance sheet, would negatively impact the bank's solvency and increased its probability of failure.

The general belief was that increased capital adequacy of a bank increased its ability to meet obligations and would lower the probability of financial distress. This was the primary objective of the Basel accord hence it propagated for minimum capital standards. Surprisingly, in statistical tests between capital adequacy and financial distress and probability of failure conducted for South Africa's major banks, it was only Nedbank's results that showed a positive correlation between capital adequacy and interest cover. Otherwise, the statistical test showed no significant correlation between capital adequacy and financial distress or capital structure and financial distress which was contrary to expectations (Naidu, 2011:88).

Rose and Gonzalez (2006:2) conducted a study on how bank capital buffers varied across countries using the Generalized-Method-of-Moments (GMM) estimator, developed for dynamic models of panel data by Arellano and Bond (1999). The method was designed to specifically address three econometric issues (i) the presence of unobserved bank-specific effects which were eliminated by taking first differences of all variables, (ii) the autoregressive process in the data regarding the behaviour of capital buffers and (iii) the likely endogeneity of the explanatory variables.

The panel estimator controlled this endogeneity by using instruments based on lagged values of explanatory variables. The study used 1337 banks across the globe from 70 countries. After controlling for adjustment cost and endogeneity of explanatory variables, it was observed that capital buffers generally were positively related to the cost of deposits and bank market power. However, these relations varied across countries depending on regulation and supervision and institutions.

Disyatat (2008:52) however, believed the problems of the level of capital ratios imposed by the regulators were a source of instability in the financial institutions. It was suggested that given the binding risk-based capital requirement, banks would not simply expand credit without obtaining additional capital.

The Conjectural Variation Model of Bresnahan (1989) was used by Mwega (2011:5) to investigate how financial reforms affected the degree of credit creation in the Kenyan Banking sector from 1998 to 2007. Based on macroeconomic foundations this method allowed for the derivation of an index of the bank's market power that was calculated as the deviation of the market price from the marginal cost.   Variables used included loans, the interest rate, exogenous factors affecting the demand for loans. Deposits were used as a proxy for factor inputs while loans were used as a proxy for outputs.

The Full Information Maximum Likelihood (FIML) results of the study showed that all the estimated coefficients had the right sign. The size of aggregate loans was the variable that mainly drove the aggregate costs faced by banks. The coefficient of loans $\beta_1 < 1$ suggested the presence of economies of scale in the banking industry. The results however, gave insignificant coefficients for administrative and other expenditures incurred by banks, with interest payments on deposits only significant at 20% level. Nonperforming loans ratio increased the aggregate costs faced by banks at the 20% significant level.

Basel Committee and Barclays Capital embarked on an impact studies of the Basel III prescriptions. According to the Basel Committee's Quantitative Impact Study(''QIS''), released December 16,2010, banks would have collectively required an additional €602 billion of Tier 1 common equity capital at the end of 2009 in order to have satisfied new common equity requirements. This study used variables such as capital ratios, assets, loans and other rules in the accord. The Barclays Capital study (released in November 2010), found that the largest 35 U.S banks were short of meeting the common equity requirements

of Basel III by between \$100 billion and \$150 billion, with 90% of the shortfall concentrated in the largest six banks(Shearman and Sterling, 2011 :17). The studies showed that the capital shortfalls were much more pronounced for larger internationally active banks than for smaller banks.

On the LCR, Blundell, et.al (2010:19) argue that it is biased towards government bonds whose effect is to crowd out the private sector. Mansson and Radstrom (2011:32) believe this distorts the market demand for government securities from banks and give governments a rare privileged position in financial markets to access cheap credit. This increases pressure on reserve banks to monetize governments' debt when they get into financial difficulty, than they would if banks were not compelled to hold government securities to meet liquid asset requirements.

Rizwan, Khan and Haffizullah (2012:7) observed that, under Islamic law, government bonds are considered to be liquid but debt is not, and cannot be included in liquidity calculations because in Islamic finance, trading in debt is not permissible. Kosseff (2010:18) states that; the calibrations used in the calculation of liquidity standards do not accurately reflect South Africa's financial market structure. Deposits by the public sector entities and wholesale funding are among the most stable funding sources in the domestic banking system, but both are considered less stable under Basel III. Onorato and Mendis (2010:5) advocate for the development of systems on common data inputs to drive market, credit and liquidity risk.

However, Blundell, et.al (2010:15) query that the level of capital is not dealt with in the proposals. Monetarists in China, Singapore and Hong Kong concur with this observation, but are of the opinion that, the broad concept of Basel III would enhance growth opportunities in Asia because Chinese banks are better placed than European and American ones in meeting capital requirements and are therefore less constrained to make new loans (Phua, 2011:5). In India, private banks would shift to the more stringent capital requirements easily compared to some of their international counterparts because the regulatory requirements on capital adequacy in that country are already more tight and most of the banks have historically kept their core and overall capital well in excess of the regulatory minimum (Bhatra, et.al.2010:1).

Kasekende, et.al (2013:10) referred to a study on bank regulatory capital to risk weighted assets in Swaziland, Botswana, Lesotho, Namibia and South Africa conducted by Global Financial Stability Report(October, 2010). Twelve banks were selected, with their levels of capital adequacy ratios were scrutinised and found to be higher than existing Basel prescriptions by between 2% and 7% points. Though this was welcome, of concern was the view that, if banks capital ratios were to rise by less than the percentage point increase in the statutory minimum, and the banks were to reduce lending to private sector, this would have deleterious effects on economic growth. This is because the private sector in SACU relies heavily on bank credit for its external finance.

However, the study found that Basel III's comprehensive and sophisticated requirement on banks to hold sufficient high quality liquid assets to cover all possible sources of liquidity pressures over a 30 day period, under stress conditions were in SACU banks' favour because they can usefully adopt LCR into their own banking legislation as a measure to safeguard liquidity (Kasekende, et.al, 2013:14).

Gottschalk (2014:14) cited a study done by McKinsey (2013) on Basel III and the banking system in Swaziland and Lesotho. In that study it was observed that the challenges with the new capital adequacy framework arose in the areas of design, data quality, reporting, operations and that many banks have vastly underestimated the required efforts as well as the financial costs for regulatory compliance.

Dipatane (2012:18) in a study on the progress of the implementation of the Basel standards concurs with the observations made by McKinsey in Swaziland and Lesotho. The researcher found that most banking regulators were not giving enough support to the Basel banking standards. In the study the researcher cited Mr Motsomi, (Director of Banking Supervision at the Central Bank of Botswana) who believed that his country was implementing the Basel prescriptions because it was a signatory to the Breton Woods's institutions, international consulting firms and rating agencies who pressurised it to comply with these best international regulatory standards.

CHAPTER 4: METHODOLOGY

In this study, loans will be regressed on assets of the bank to establish the nature of relationship between the two. The next step will involve the employment of the OLS technique. , which involves using a two-variable regression equation to estimate the strength of a bank's leverage ratio on bank assets as a formula that protects banks from any form of a financial leverage. This study will conclude its estimation by using Analysis of Variance (ANOVA) to inspect the correlations between changes in levels of debt and changes in Gross Domestic Product (GDP) and between changes in credit and changes in GDP including the interactions amongst these variables. The size of variation in debt and credit on GDP in SACU need to be attended to without delay in this study because they were marginally treated in the new Basel III banking standards.

4.1 Format of data analysis

In studying the practicality of Basel III banking standards to SACU banks, this study will use panel data analysis as a method for data analysis. The choice of this method is premised by the nature of this study, where on average three banks are selected from each of the member countries that make up SACU. In South Africa four banks will be studied as a panel, followed by the Namibian panel of three banks, the Botswana panel of three banks, the Lesotho panel of three banks and lastly the Swaziland panel of three banks. Data for all the members of the panel will form a sample from which estimations will be made. Panel data is preferred in this study due to its ability to present a hierarchical or grouping structure which is vital for this study and also plays an important role in modern econometric methodology because it is possible to take advantage of the grouping structure to address substantive econometric questions more completely than is possible with simpler forms of data.

Longitudinal data on variables such as assets, loans, leverage ratio, credit; debt and GDP are followed over a period of fourteen years from 2000 to 2013 and will be used in the estimations of this study. Longitudinal data analysis is plausible because it represents a marriage of regression and time series analysis that are composed of cross section variables and that can be observed over time hence allowing this study to investigate dynamic as well as cross-sectional aspects of the hypothesis.

Frees, (2004:16) believed that using longitudinal data than either purely cross sectional or time series data is advantageous in that it is feasible to study dynamic relationships and model the differences, or heterogeneity , among subjects. Panel data are more informative, have more degrees of freedom and estimates are more efficient. They give more information on time –ordering of events. Bruderl, (2005:2)believed that panel data allow for control for individual unobserved heterogeneity and since unobserved heterogeneity is the problem of non-experimental research, the latter benefit is especially useful. In using panel data this study will be cautious of the weakness of panel data analysis, that is, in panel data regular time intervals and a short panel is assumed and the fact that parameters may differ over individuals or time.

4.1.1 Ordinary Least Square estimation of the Leverage ratio on bank assets

Two variables will be used for this estimation, that is, the leverage ratio which will be the independent variable and assets the dependent variable. OLS technique will be used to estimate the significance of the leverage ratio on bank assets of SACU financial institutions from 2000 to 2013. This study finds this technique plausible because Wasiuzzaman and Tarrmizi (2011) employed it in a study on the impact of leveraging on bank profitability on Islamic banks in Malaysia. They used OLS method on data collected from sixteen banks to determine the significance of leveraging by regressing; assets, capitalisation and liquidity against profitability. It worked out well in their study because the researchers were able to use the OLS as estimators to provide a single value of the relevant population parameter in a regression of the leverage ratio on observable values of assets capitalisation and liquidity.

This study will espouse the Malaysian approach and employ the OLS technique in the estimation of the significance of the leverage ratio on bank assets. This is because by using the OLS technique estimators are expressed sorely in terms of the observable quantities, (assets and loans). This makes it easy to compute and become suitable for the purpose of this study. This study intends to observe the pattern followed by point estimates for the different panel samples in SACU on the impact of the leverage ratio on assets. Since the line of best fit obtained from using the OLS technique pass through sample means of the leverage ratio and assets and that the mean value of the estimated leverage ratio will be equal to the mean value of the actual leverage ratio, this study, therefore, find the technique

suitable. Finally, the results for this test will be presented in tables and the p-values will form the basis of interpretation.

4.1.2 Analysis of Variance on GDP using debt and credit as factors.

Table 1 below serves to illustrate the layout of data in the estimation of the effects of debt and credit on GDP. Data will be listed in tabular format with each cell identified as a combination of the *ith* level of factor debt with the *jth* level of factor credit. Each cell will contain r observations. For each level of each factor, a mean will be calculated. For instance: π_2 will be the mean for all observations that will receive the second level of factor debt (β_i). Similarly π_1 will be the mean for all observations that will receive the first level of factor credit (β_j). The grand ($\prod$) will represent the mean of all the observations that had been recorded.

The data to be analyzed can be listed in tabular form with each cell identified as a combination of the ith level of factor credit with the jth level of factor debt. Each cell contains r observations. For each level of each factor, a mean is calculated. The critical value of F will depend on the level of significance that has been selected and on the degrees of freedom associated with the numerator and denominator of the F statistic. If the calculations exceed [$\tilde{\alpha}$; β_0; β_1] the corresponding null hypothesis will be rejected.

Table 4.1 ANOVA on GDP using debt and credit as factors

FACTOR CREDIT(β), j=1 to c	Means for levels of factor DEBT

Factor DEBT,　　　　　　　　j=1　j=2　　j=c

i=1 to d　　　i=1

X_{111}	X_{121}	X_{1c1}
X_{112}	X_{122}	X_{1c2}
.	.	.
.	.	.
X_{11r}	X_{11r}	X_{1cr}

π_1

X_{211}	X_{221}	X_{2c1}
X_{212}	X_{222}	X_{2c2}
.	.	.
.	.	.
X_{21r}	X_{22r}	X_{2cr}

π_2

.

.

.

π_d

Table 4.1 ANOVA on GDP using debt and credit as factors

X_{d11}

X_{d21}

X_{dc1}

$Xd12$

$Xd22$

$Xdc2$

.

.

.

.

.

.

$Xd1r$

$Xd2r$

$Xdcr$

......

$\pi_{\cdot 1 \cdot}$

$\pi_{\cdot 2 \cdot}$

$\pi_{\cdot b \cdot}$
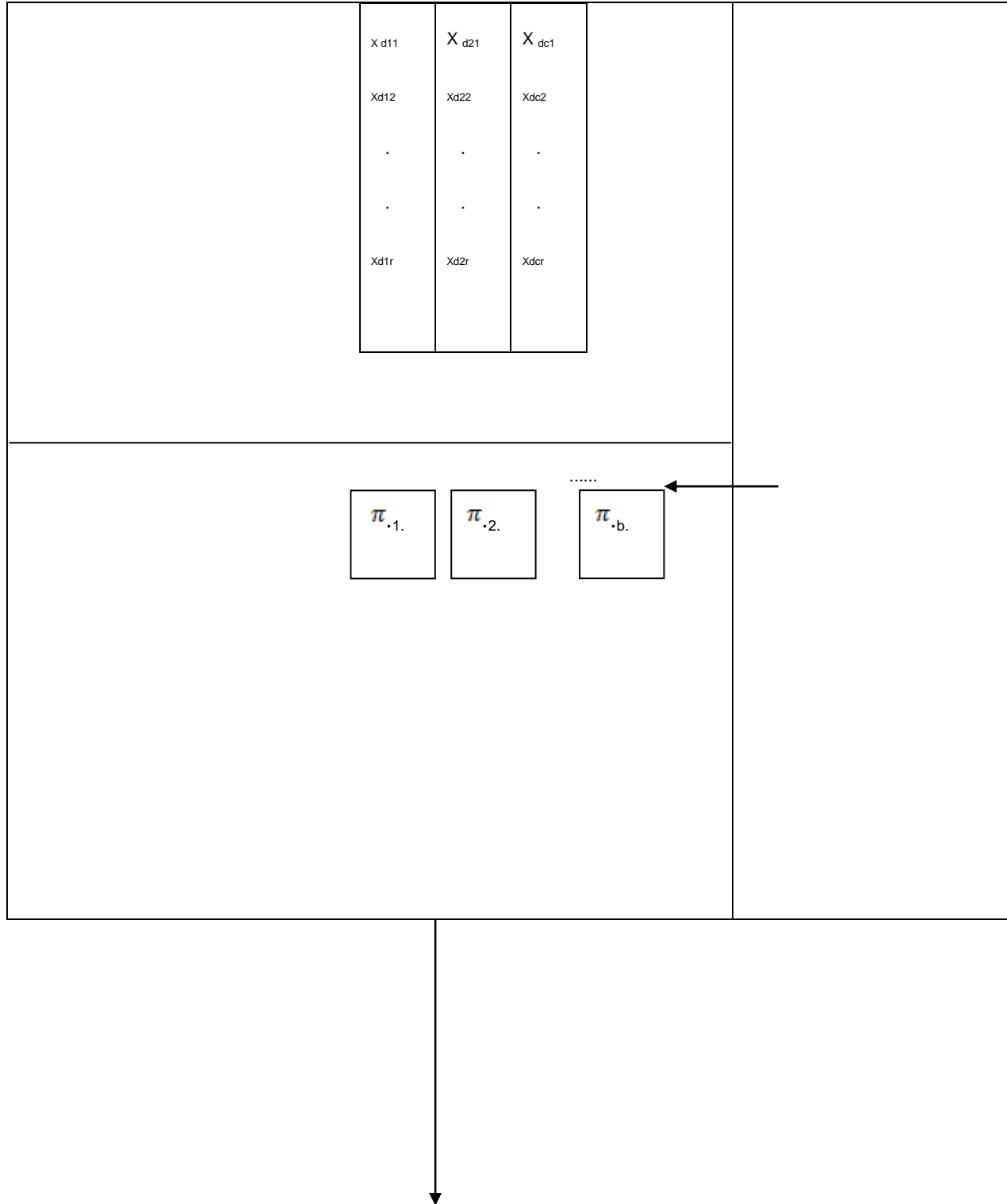
4.2 Calculations

Source of Variation	Sum of Squares	Degrees of freedom	Mean of Squares	F-Ratio
Factor Debt	$$SSD = rc + \sum_{j=1}^{d} (\pi i - \pi)$$	$(d-1)$	MSDEBT= $\dfrac{SSE(DEBT)}{d-1}$	F= $\dfrac{MSD}{MSE}$
Factor Credit	$$SSC = rd \sum_{j=1}^{c} (\pi i - \pi)$$	$(c-1)$	MSCREDIT= $\dfrac{SSE(DEBT)}{c-1}$	F= $\dfrac{MSC}{MSE}$
Interaction between Debt and Credit	SSDC=SST-SSD-SSC-SSE	$(d-1)(c-1)$	MSDC= $\dfrac{SSDC}{(d-1)(c-1)}$	F= $\dfrac{MSDC}{MSE}$
Sampling Error, E	SSE= $$\sum_{i=1}^{d} \sum_{j=1}^{c} \sum_{k=1}^{r} (Xijk - \pi ij)^2$$	$dc(r-1)$	MSE= $\dfrac{SSE}{dc(r-1)}$	
Total, T	SST= $$\sum_{i=1}^{d} \sum_{j=1}^{c} \sum_{k=1}^{r} (Xijk - \pi ij)^2$$	$dcr-1$		

In this estimation SSC will be the sum of squares reflecting variation caused by the levels of factor credit. SSD is the sum of squares reflecting variation caused by the levels of factor debt. SSDC will be the sum of squares reflecting variation caused by interactions between the levels of factors debt and credit. SSE is the sum of squares reflecting variation due to sampling error. In this calculation, each data value will be compared to the mean of its cell. SST is the sum of squares reflecting the overall variation in the data with each variation being compared to the grand mean and then the differences are squared and summed.

MSD, MSC, MSDC and MSE will form the mean squares for factors debt, credit, interactions between debt and credit and error, respectively. Each will be obtained by dividing the corresponding sum of squares by the number of degrees of freedom associated with this sum of squares. The results of each bank will be compared to other banks as per panel.

4.3 Critical values and decisions

1. Main effects , factor Debt:

   Reject H_0 : all $\beta_i = 0$, if F=$\frac{MSD}{MSE}$ is ›F[β_i,(d-1),dc(r-1)].

2. Main effects, factor Credit:

   Reject H_0 : all $\beta_j = 0$, if F =$\frac{MSC}{MSE}$ is ›F=[β_j(c-1), dc(r-1)].

3. Interaction effects:

   Reject H_0 : all $(\beta_i\beta_j)_{ij} = 0$, if F=$\frac{MSDC}{MSE}$ is ›F[β_i,(d-1)(c-1),dc(r-1)

Where the calculated *F* statistic appear to be large enough to suggest that sample means might not have been the same, this study will reject the null hypothesis at 0.025 level of significance. In the hypothesis testing the significance level, the significance level is the criterion used for rejecting the null hypothesis. The significance level will be used in this study using the following procedure: firstly, the difference between the results of the experiment and the null hypothesis will be determined, then assuming the null hypothesis is true: the probability of a difference that credit and debt's impact on GDP is large or larger will be computed. Finally, this probability will be compared to the significance level. Where the probability is less or equal to the significance level, then the null hypothesis will be rejected and the outcome will be said to be statistically significant.

Traditionally, researchers use either the 0.05 level or the 0.01 level. However, the choice is usually subjective. Usually, the lower the significance level, the more the data must diverge from the null hypothesis to be significant. Therefore, this study views a 0.025 level of significance to be more conservative than the 0.05 level. In selecting a the 0.025 level of significance, this study is allotting half of the alpha to testing the statistical significance in the one direction of credit to GDP and half of the alpha to testing the statistical significance in the other direction of debt to GDP. This means, when using a 0.025 level of significance, regardless of the direction of relationship between credit to GDP and debt to GDP this study hypothesizes, it will be testing for the possibility of relationship in both directions.

This study employed the ANOVA technique due to its ability to test joint hypothesis that the two partial slope coefficients of credit on GDP and of debt on GDP are equal to zero. This technique was employed in a study in Ghana by Perkins and Jonathan (2013), using panel and time series data analysis. Their research study was concerned about the factors that influence the adoption of online banking by bank customers. Data was analysed using multiple regression analysis in SPSS to generate ANOVA results. The researchers chose the ANOVA technique to estimate joint hypothesis on the factors determining online banking, such as Perceived Usefulness (PU), Perceived Ease of use (PEOU), as well as government support, trust and security. This study will also adopt ANOVA to inspect the joint effects of debt and credit on GDP.

4.2 Testing hypothesis

4.2.1 Hypothesis for this study

This study will hypothesize that there is no causality between assets and loan values for SACU banks and as such the leverage ratio is not significant in shaping bank assets. Having established the direction of causality between assets and loans and estimating on the efficacy of the leverage ratio in determining bank assets, this study will proceed to hypothesize that change in bank debt and changes in credit including the interaction effects of these two variables are insignificant on GDP.

Hypothesis: 1 there is no causation between assets and loan values for SACU banks and as such the leverage ratio is not significant in determining bank assets.

(a) There is no causation between assets and loans.

The starting point will be to regress advances offered by the bank to its customers on other assets of the bank to determine the direction of causality between these variables for each panel. Each panel results will be compared with those of other panels. The direction of causation will then be expected to provide clarity on the significance of the leverage ratio in determining bank assets. Simple ad hoc distributed lag models will be employed to verify the direction of causality between assets and loans. Ad hoc distributed lag model estimation is recommended when it is known that two variables are related but remain vague as to which variable leads the other to move. The primacy of this study will be to empirically verify the economic theory on how changes in the value of assets explain bank credit creation through estimating the value of loans on the basis of varying values of assets.

Panel data on assets and loans obtainable from sampled SACU banks' financial reports released annually from 2000 to 2013 will be used for this estimation. This study proposes to use the following ad hoc distributed models for this estimation and will specify them as: assets ''cause'' loans (AST→LNS) or loans ''cause'' assets (LNS→AST).

Causality between assets (AST) and loans (LNS)

The models for the causality are therefore specified as:

$$LNS_t = \sum_{t=1}^{n} \beta_{1i} assets_{t-i} + \sum_{J=1}^{n} \beta_{1j} LNS_{t-j} + \mu_{1t} \qquad (4.1)$$

$$AST_t = \sum_{t=1}^{m} \lambda_{1i} assets_{t-i} + \sum_{j=1}^{m} \lambda_{1j} LNS_{t-j} + \mu_{2t} \qquad (4.2)$$

Where: LNS = Loans

  AST = Assets

  $\lambda, \beta_{1j}, \beta_{1i}$ = Coefficients

  μ = error term

 Subscript **t** in the models above refers to time.

Model (4.1) postulates current value of loans as a function of past values of itself and that of assets, thus ''distributing'' the impact of assets over a number of time periods, ranging from 1 to n. Model (4.2) proposes current value of assets as a function of past values of itself and that of loans, accordingly ''distributing'' the impact of loans over a number of time periods, ranging from 1 to m. In model (4.1) loans are dependent on the explanatory variable, assets, whereas in model (4.2) assets are dependent on the independent variable loans. The rationale in the use of these models is to prove whether statistically this study can detect the direction of causality (cause and effect relationship) when there is temporarily a lead – lag relationship between assets and loans.

Using the difference in differences (DID) approach for panel data analysis; firstly, a mean will be computed for model (4.1) and for model (4.2) for each panel. These averages will then be compared with the results from other panels. Usually the difference of the expected mean for assets and that for loans will be the causal effect. Growth in assets is believed to have led to the rise in bank securitization during the subprime crisis. Generally, since the future cannot predict the past, if assets ''Granger causes'' loans, then changes in assets should precede changes in loans. Therefore, in a regression of loans on assets (including its own past values) if we include past or lagged values of assets and it significantly improves the prediction of loans, then we can say that assets ''Granger causes'' loans.

This study is sensitive that causality of assets on loans is difficult to test and will, therefore, test for ''Granger causality''. Granger causality is an incident in which one time series variable consistently and predictably changes before another variable (Gujarati, 1988:620). Testing for 'Granger causality' will shed light as to which variable caused the other to change between assets and loans.   This technique is extremely useful for forecasting purposes and this study believes the technique will allow banks to predict the direction of a cycle, and be able to put control measures in place.

 Cognizant of the significance of 'Granger causality', Studenmund (2006:431) cautioned that in spite of the value of the 'Granger causality', researchers should not let themselves be drawn into believing that it allows them to prove economic causality in any rigorous way. He believed that if one variable 'Granger caused' another, a researcher cannot be sure that the first variable 'caused' the other to change. Bos and Newbold (1984:27) substantiated further, when he observed that a statistical relationship, however strong and however suggestive, can never establish causal connections.

 The panel data in use in this study will be stationary. Stationary data has a mean or variance which does not change overtime whereas non-stationary data has one or more basic properties that change over time. The significance for this study is that the auto-correlation function depends on lag alone and does not change with the time at which the function will be calculated. This study postulates a flat looking series, without trend.

 In this estimation, the t-statistic for the assets and loans and the coefficient of determination (r^2) will be used to measure the direction of causality between assets and loans. The measure r^2 is a summary measure which tells how well the sample regression line fits the data for a two variable regression equation. It measures the proportion of the total variation in loans as explained by the regression model. An r^2 measure that is close to 1 represent an excellent overall fit, whilst an r^2 close to zero shows overall weakness (Weiers, 2008:32). This study will adopt Ordinary Least Squares in its analysis because of its attractive statistical properties that have made it one of the most powerful and popular methods of regression analysis. The method is relatively easy to use and the goal of minimizing Σe^2 is quite appropriate from a theoretical point of view. The estimated regression line goes through the means of loans and assets and the sum of the residuals is exactly zero.

(b) The Leverage Ratio is not significant in determining bank assets.

In this part of the chapter this study will estimate the strength of the leverage ratio in determining the level of bank assets, consequently insulating them against financial crisis from financial markets as they go about allocating financial securities towards meeting the needs of their customers. This study defines a sound leverage ratio as that which will enable a bank to finance its financial obligations as they fall due at any given time. Assets will be the dependent variable while the leverage ratio (debt/equity) will be the independent variable in this estimation. OLS will be the estimation technique.

Valvi, Fragkos and Frangos, (2012: 16) observed that bank assets were used as variables that can reflect on the continued significance of bank based financial intermediation in the euro area. Given that bank assets are a complex indicator and are a measure of financial stability this study will investigate whether the leverage ratio can have an influence on asset values. Where a strong influence exists the implication is that it will be possible to use the leverage ratio to influence the level of assets banks should maintain, so as to eliminate the appetite for securitization by banks. The variables that this study has selected are those commonly used in calculating the leverage ratio (INVESTOPEDIA, 2013:12). The model to be used for this estimation will be specified as follows.

$$ASSETS = \beta_0 + \beta_1 LR + \mu_t \tag{4.3}$$

Where: LR   =   Leverage ratio (debt/equity)

            β_0, β_1 =   coefficients

            μ_t =   residual error term

So by using this model, this study will consider how assets respond to changes in the leverage ratio. Since panel data analysis is preferred in this study, the estimations will be done for each bank and compared with those of other banks that form the panel. The response will serve to indicate the extent to which the leverage ratio for banks will be able to capture the effects of changes of debt and equity on assets over a defined period so that asset levels can be easily aligned to debt and asset obligations of the bank.

The study's foundation of thinking is that banks built their asset levels from debt acquisition. These financial sources reveal risk return profiles whose costs differ per bank. Since debt has a negative impact on the bank's financial position, this study will adjudge the cost of debt to equal the weighted average values of the leverage ratio. The leverage ratio of this test will be obtained by dividing total bank debt with equity.

This study contemplates a leverage ratio that will enable SACU banks to measure a mix of operating costs, giving an idea of how changes in assets will affect operating income. This study envisages a leverage ratio which can model all market risks associated with bank assets and loans. Basel III banking standards want the implementation of the leverage ratio to lend a hand in modelling risk. Therefore, in this study assets, debt and equity are viewed as variables that represent major sources of bank risk and hence the reason why they are used in the estimation of the strength of the leverage ratio in providing bank stability.

The coefficient of correlation (r) and the t-distribution will form the metrics for the measurement of the strength and structural compatibility of the leverage ratio in this estimation. Correlation is a technique that will be used to measure and describe the strength and direction of the relationship between the leverage ratio and bank assets. Where r is positive, assets and the leverage ratio will be directly related and where r is negative, the variables are inversely related.

Furthermore, the larger the absolute values of r, the stronger will the linear relationship between assets and the leverage ratio. If r =-1 or r=+1, the best fit linear will actually include all of the data points. Where there are absolute values of r that are less than 1, the weaker the linear relationship will be between assets and the leverage ratio. Where r is equal to zero, there will be no linear relationship whatsoever between assets and the leverage ratio and this study will interpret the value for assets as not being influenced by the leverage ratio.

The t-distribution is a probability density function. The higher the absolute values of the t-statistic for the leverage ratio the lower will be the probability that the difference is random. In other words, where the t-statistic for the leverage ratio is too far off the original hypothesis, the leverage ratio will be rejected as structurally significant. Conversely, where it is found to be close to the original hypothesis, it will likely be accepted as being structurally significant. The actual distribution for this test will be based on fourteen observations (from 2000 to 2014).

Testing the hypothesis at 5 percent level of significance

H_0 : $\beta_0 = 0$

(i.e. the slope coefficient for the leverage ratio is equal to zero)

H_1 : $\beta_1 \neq 0$

The slope coefficient for the leverage ratio is not equal to zero.

Hypothesis 2: Changes in bank debt, changes in credit including the interaction effects of these two variables are insignificant on GDP.

Having examined the significance of the leverage ratio this study will proceed to manipulate the technique of the Analysis of Variance to test for the significance of debt and credit on GDP. This technique is potent in that it allows comparison to be made between two or more sample means simultaneously. With ANOVA the effects of debt on GDP and of credit on GDP including the interaction effects between the different levels of these two factors on GDP can be clearly observed by this study. The outcome of this estimation will prove the extent to which debt and credit impact on GDP. The findings will help indicate the optional method that can be proposed to address cyclicality amongst the formulas based; the subjective or an integrated approach which blends the formulas based and the subjective based approaches. Various countries in the world are still not agreed on an acceptable and effective method to address cyclicality.

Weiers (2011:442) advocated for the use of ANOVA because it allows two or more factors and the treatments to be represented in all possible combinations of their levels. In a two factor experiment (credit and debt), interaction exists when the effect of a level for one factor is dependent on effect of the other factor which is present.

GDP is the dependent variable while debt and credit are the explanatory variables. Debt and credit will be the different factor levels and each factor level (or, in multiple –factor experiments, the intersection of a level of debt with a level of credit) will be referred to as a treatment. Random assignments will be made to allow other units to be subjected to each possible combination of the factor levels. The test units within each of these combinations shall be referred to as r=the number of replications with r≥2. This study will, however, confine itself only to the balanced design, where there will be equal numbers of replications(r) within each combination of factor levels.

For the purpose of this test, this study will implement model (4.4) below. This model is preferred because it is intendant to capture the effects of the factor debt and those of the factor credit and their interaction effects on GDP through using these variables as regressors. This study specifies the model as follows:

$$GDP = \beta_0 + \beta_1 D_i + \beta_2 C_j + \beta_3 DC_{ij} + \varepsilon_{ijk} \tag{4.4}$$

Where: GDP = Gross Domestic Product

D_i = Debt

C_j = Credit

DC_{ij} = Debt * Credit (the interaction effect between debt and credit)

β = Coefficients

The *kth* observation for level *i* of factor debt and level *j* of factor credit will be x_{ijk}. It will comprise of the total population mean μ, the effect of the *ith* level of factor debt β_i, the effect of *jth* level of factor credit β_j, the interaction effect between level *i* of factor debt and level *j* of factor credit βDC_{ij} including a random error due to sampling ϵ_{ijk}.

The following sets of null and alternative hypotheses will be tested and will be expressed in terms of the main effects, (factors Debt and Credit) and interaction effects (combinations of levels of these factors).

Assumptions:

    i)   There are $d \times c$ factor – level combinations, or cells for debt and credit respectively.

    ii) The **r** observations in each cell will be drawn from normally distributed populations with equal variances.

    iii) There is bound to be some interaction between the factors

    1) Testing the main effects , factor debt:

       H_0: $\beta_i = 0$ for each level of debt, with i= 1 through **d**.

       (No level of factor debt has an effect on GDP.)

       H_1: $\beta_i \neq 0$ for at least one value of i, with i=1 through **d.**

       (At least one level of factor debt has an effect on GDP)

    2) Testing the main effects, factor credit:

       H_0: $\beta_j = 0$ for each level of credit, with j=1 through **c**

       (No level of credit has an effect on GDP.)

       H_1: $\beta_j \neq 0$ for at least one value of j, with j = 1 through **c**

       (At least one level of factor credit has an effect on GDP.)

    3) Testing for interaction effects between levels of Debt and Credit:

       H_0: $\beta\, DC_{ij} = 0$ for each combination of i and j.

       (There are no interaction effects on GDP)

       H_1: $\beta\, DC_{ij} \neq 0$ for at least one combination of i and j has an effect on GDP).

There were **d * c** factor level combinations, or cells. It was assumed that **r** observations in each cell had been drawn from normally distributed populations with equal variances. The assumption of no interactions was no longer applicable.

For each null hypothesis to be tested, a separate test statistic will be calculated. The numerator and denominator will be separate estimates of the variance that the cell populations will assume to share. For each null hypothesis, the critical value of F dependent on a 0.025 level of significance and on the number of degrees of freedom associated with the numerator and denominator of the F statistic will be compared. Where if a calculated F statistic exceeds $F[\beta_i, \beta_j, \beta DC_{ij}]$, the corresponding null hypothesis will be rejected.

In this chapter an outline on the methodology this study will use in testing the two hypotheses have been suggested. The discussion elucidates what the models selected for the estimations of the hypotheses will achieve and how this will be done. In the following chapter findings of this study will be presented.

CHAPTER 5 – ANALYSIS OF RESULTS

In this chapter results for estimations of the hypotheses are analyzed in line with how the hypotheses are laid out in the previous chapter. Results on causality between assets and loans will be analyzed first, followed by findings on the efficacy of the leverage ratio in influencing growth of assets for banks, using Ordinary Least Square technique. Findings on the scope of power of debt and credit on GDP will be analyzed last.

5.1 Presentation by hypothesis

5.1.1 Hypothesis 1: There is no causality from assets to loans and vice versa.

In this section, tables displaying findings of the estimation for the direction of causality between assets and loans are presented as a group for the whole of SACU. First are results for panel South Africa, followed by the outcome from panel Namibia, panel Botswana, panel Lesotho and Swaziland respectively. The table is divided into five columns; the first column shows the country where the test was carried out, followed by the null hypothesis, the column for number of observations. Column four shows the F-statistic and lastly the probability of happening is in column five.

The sample observations covered period 2000 to 2013, which constitute 52 observations for panel South Africa and 39 for other panels. Panel South Africa has more observations than others because of the number of banks that make up the sample.

After the table presentations, the analysis of the outcomes as displayed in the table will follow, including possible explanations to the variations in the findings for the different panels.

5.1 Result of the causality between assets and loans for SACU banks

Country	Null Hypothesis	Observation	F-Statistic	Probability
South African banks	Loans does not ''Granger Cause'' Assets	52	0.72695	0.3980
	Assets does not ''Granger Cause'' Loans		0.47249	0.4951
Namibian banks	Loans does not ''Granger Cause'' Assets	39	7.42289	0.0099
	Assets does not ''Granger Cause'' Loans		14.3696	0.0006
Botswana banks	Loans does not ''Granger Cause'' Assets	39	1.46033	0.2348
	Assets does not ''Granger Cause'' Loans		0.92914	0.3415
Lesotho banks	Loans does not ''Granger Cause'' Assets	39	0.12084	0.7302
	Assets does not ''Granger Cause'' Loans		1.03979	0.3147
Swaziland banks	Loans does not ''Granger Cause'' Assets	39	0.73658	0.3964
	Assets does not ''Granger Cause'' Loans		0.45608	0.5038

ANALYSIS: By Author

Table 5.1 above shows the estimation results for the direction of causality from loans to assets and from assets to loans for all panels of SACU. The F- statistics of 0.47249 is for the model loans do not ''Granger cause'' assets and 0.72695 for the model assets do not ''Granger cause'' loans. The p-values for the model loans do not ''Granger cause'' assets is 0.3980 and 0.47249 for model assets do not ''Granger cause' loans. Both models' p-values are more than the 0.05 level of significance.

Likewise, Botswana's results confirm that the probability of occurrence for the model assets ''Granger cause'' loans is 0.2348 and 0.3415 for the model loans do not ''Granger cause'' assets. This probability of occurrence is way beyond the 0.05 level of significance. The F-statistics for the model assets do not ''Granger cause'' loans is at 1.46 and 0.93 for the model loans do not Granger cause assets. Based on a 0.05 level of significance the results of the two panels fail to reject the null hypothesis that assets do not ''Granger cause'' loans and that loans do not ''Granger cause assets''.

Correspondingly results for Lesotho and for Swaziland prove non-existence of causality between loans and assets. The F- statistics of 0.12 is identified for the model assets do not ''Granger cause'' loans and 1.039 for model loans do not ''Granger cause'' assets for panel Lesotho. The probability value of 0.7302 for model assets do not ''Granger cause loans and 0.3147 for model loans do not ''Granger cause'' loans are more than the 0.05 level of significance. In Swaziland, the model assets do not ''Granger cause'' loans specifies an F- statistics of 0.73658 and 0.456 for model loans do not ''Granger cause'' assets. Once again the significant levels of 0.3964 for model assets do not ''Granger cause'' loans and 0. 503 for model loans do not ''Granger cause'' assets are more than the 0.05 level of significance. Premised on the results above, this study cannot reject the null hypothesis that assets do not ''Granger cause'' loans or that loans do not ''Granger cause'' assets in South Africa, Swaziland, Lesotho and in Botswana.

Divergent results are those from panel Namibia, where causality is detected. Results for Namibia shows an F- statistics of 7.42289 for model assets do not ''Granger cause'' loans with a chance of occurrence of 0.0099 and 14.3696 for model loans do not ''Granger cause'' loans with a corresponding prospect value of 0.0006. These probability values are both less than the 0.05 level of significance for the panel. Grounded on these findings, this study can reject the null hypothesis that loans do not ''Granger Cause'' assets or that assets do not ''Granger Cause'' loans in Namibia given a 0.05 level of significance. The conclusion is that there is a bi-directional causality from loans to assets and from assets to loans at a 0.05 level of significance for the Namibian panel.

It is projected that assets are ''Granger causal'' for loans if assets help precede loans at some stage in the future or loans is ''Granger causal'' for assets if loans help precede assets at some stage in the future. Absence of direction of causality in the South African panel is stuck in the monetary policy of South Africa. The South African Reserve bank uses a classical cash reserve system as a framework for its monetary policy implementation. In this framework an appropriate liquidity requirement or structural money market shortage is created by levying a cash reserve requirement on banks. This strategy removes any unwanted excess liquidity in the economy, and assists in explaining why it is unlikely to tell the direction of causation between assets and loans in panel South Africa.

The main refinancing operation is the weekly seven-day repurchase auction, conducted with the commercial banks at the repo rate determined by the monetary policy committee. The reserve bank lends funds to the banks against eligible collateral comprising of assets that also qualify as liquid assets in terms of the prudential liquid asset requirement. Under such a regulation any excess liquidity is eliminated making it intricate to contrast the direction of causality from assets to loans and from loans to assets.

This study would like to advance that the sampling period could have had a bearing on the outcome of results in this investigation. A long sampling period can hide the direction of causality in variables under study. In this estimation 13 years is quite a momentous period to hide the direction of causality from assets to loans and from loans to assets. Another view this study would put forward, is that of the preferred lag. The chosen lag could have impacted on the direction of causality. Where different lags are used the result can be different. In this study lag1 is preferred because it is conjectured that the current values of loans are based on both the current values of assets and the one past period values of assets. However, had any other lag been used a different result would have been obtained. These are some of the limitations of using ''Granger causality'' as an estimating tool.

The result for Botswana is plausible because of the operational implementation of monetary policy of Botswana which is undertaken through trading a variety of money market instruments with domestic banks. By using weekly Open Market Operations (OMOs) auctions of the Bank of Botswana Certificates (BoBCs) the bank has succeeded in influencing liquidity conditions in the domestic money market.

OMOs are centered weekly sales by auction of fourteen- day BoBCs and in support of these short term operations there are also monthly auctions for 90-day BoBCs. Given that the rationale to using these instruments is to manage liquidity in the banking system and not envisioned for general investment purposes, few banks are allowed to hold them. As in South Africa this monetary policy measure is meant to wipe out excess liquidity that may lead to an increase in bank assets. Under such circumstances causality between the two variables is unlikely to be substantiated.

The size of Lesotho's economy is reason why it is difficult to quantify the direction of causation between assets and loans. Geographically, Lesotho is a small kingdom within the boundaries of the South African economy and is economically integrated with it as well. The economy of Lesotho is based on agriculture, livestock and depends heavily on inflows of workers' remittances and receipts from SACU. The majority of households subsist on farming. The formal sector employment consists mainly of female workers in the apparel sector and the male migrant labour primarily as miners in South Africa. Besides, a fall in money supply by 0.9 percent in June 2013 due to a decline in net foreign assets of the banking sector and a further decline of 1.0 percent in May, 2013 are factors that might have impacted on causality between assets and loans in this economy as growth is generally subdued.

Causality could not be ascertained in Swaziland because of the deceleration in credit extension to the private sector from double digit growth of 18.2 percent to 1.4 percent up to February 2013(Kosseff, 2010:7). The decline in credit extension was due to loan repayments since 2010. The curtailment of credit meant that banks could not generate loans. This Namibian result is potent because Namibian banks are primary mobilizes of funds from the public and the main sources of financing for the economy. As such banks generate more assets which influence the volume of loans in the economy.

A case in point is that following contractions and low growth rate levels in the first half of 2012, the bank of Namibia lowered interest rates and this led to growth in credit creation asset holdings by banks. Furthermore, overdraft lending increased by 12.1 percent on year on year in August of 2012. Mortgage loans continued to make up the largest category of private sector credit. They grew by 13. 5 percent on year on year because of properties in the upper price segment (Bank of Namibia, 2012:1). Private sector credit growth increased to 14.2 percent in August, from 13.2 percent in the previous month. This growth was driven by loans to both households and business, which experienced growth of 14.2 and 14.3 percent, respectively.

5.1.2 Hypothesis 2: The Leverage Ratio is not significant in determining bank assets.

The approach below is to firstly present the tables in a single group as was the case in hypothesis 1 above. In the tables below the explanatory variable is Leverage ratio (L/R) and the dependent variable is assets. In this estimation observations of asset values and leverage ratios from 2000 to 2013 are used. There will be a total of 52 observations for the panel of South Africa due to the number of banks it contributes to this study. The rest of SACU members will be made up of 39 observations. Thereafter, analysis of the outcome is provided for all panels as a group. This approach is preferred because it allows comparison to be done for the whole of SACU.

It should be noted that, the regression output for the tests in the table below violates one of the OLS assumptions. The classical view is that autocorrelation does not exist in the disturbances. In this instance the classical model would assume that the disturbance term relating to assets in one period would not have a bearing on the level of assets for the following period. In this study there is dependence in the data. The disruption caused by assets level in one period affect the value of assets in the next period; this is serial correlation. Tintner, cited by Gujarati (1988:401) defined serial correlation as ''lag correlation between two different series''. Therefore to solve this problem an alternative method would be to lag the leverage ratio.

Results in tables A1; A3; A4 and A5 in Appendix A express the leverage ratio to be significant in determining bank assets in the panels of South Africa, Botswana, Swaziland and Lesotho. The r measure for the South African panel is $\sqrt{0.327309} = 0.57$ with an analogous t-statistic for the L/R of 5.1. This measure is positive and indicates a strong linear relationship between assets and the L/R. Results for Botswana indicates that the r size is $\sqrt{0.126676} = 0.36$. This result, though it points to a weak linear relationship between assets and the L/R, the t-statistic for L/R of 2.4 is significant. Besides, the p-value of 0.0207 is below the level of significance of 0.05.

The r measure for the Swaziland panel is $\sqrt{0.66700} = 0.81$ and depicts a strong linear relationship between assets and the L/R. This result is validated by the p- value of 0.0000 for L/R which is below the critical level of significance of 0.05. In Lesotho the r statistic is $\sqrt{0.624397} = 0.79$, this is an indication of a strong linear relationship between assets and L/R in this economy. This result is confirmed by the value of the calculated t-statistic for L/R of 8.15 which is significant. Similarly, the probability value of 0.0000 is below the critical level of significance of 0.05. The insinuation from these results is that the L/R influenced bank assets in South Africa, Botswana, Swaziland and Lesotho for the period under investigation. Based on these findings this study is able to reject the null hypothesis that the L/R is not significant in controlling bank assets in South Africa, Botswana, Swaziland and Lesotho.

The result for the South African panel is concrete because of its large and sound economy in Africa. The economy attracts huge levels of assets across SACU and the rest of the world. The monetary authorities always monitor banks on how they use the L/R in influencing their bank assets. Notice that the r-statistic for the L/R of South African panel is not as large as that of Lesotho and Swaziland, rather resembles that of Botswana because of the refinancing policies used by the two countries. Banks are precluded from amassing excess assets; hence this might have depressed the impact of L/R on assets in these countries to magnitudes of Swaziland and Lesotho.

The result for Botswana is credible given the small size of the economy and the operational implementation of monetary policy of Botswana which is undertaken through trading (BoBCs) with domestic banks. Its motive is to eliminate any accumulation of excess liquidity that might find it increasing the growth of assets by banks. What is evident is that the L/R is being complimented by other policy measures to influence bank assets, hence these other measures emboldens the prowess of the L/R.

Swaziland thrives on the Risk Based Supervision (RBS) approach to banking inspection. This approach envisages the monitoring of banks by allocating supervisory resources and concentrating supervisory attention according to the risk profile of the bank. The process involves a persistent monitoring and evaluation of the appropriateness of the risk management systems and control environment of the supervised institution in line with its business strategy and exposures, with ultimate goal to quantify its riskiness.

To show that it was concerned; in 2011, in which the central bank took a proactive supervisory approach to ameliorate liquidity risk by assessing the minimum liquidity requirement of the banking sector. This policy was premised in view of the banking sector's role in intermediation which makes them inherently susceptible to the risk, especially in cases where creditors' demands for repayment may exceed their potential to liquidate their assets. This statutory minimum requirement serves to augment the L/R and maintain a balance in the trade off in liquid assets and the utilization of deposits by Swaziland banks.

The geographical location of Lesotho is reason why the leverage ratio is significant in determining the level of assets because it benefits from the size of economy of South Africa. An additional explanation could be that the method of accounting that is being used across the jurisdiction of SACU is not uniform. It could be possible some banks are ignorant on which assets to record, say, under cash reserve requirements.

On the contrary, results from panel Namibia in table A2 in Appendix A are at variance with those of other panels of SACU on this hypothesis. The r measure for the Namibian panel is $\sqrt{0.010057} = 0.10$. This measure though positive, point to a weak linear relationship between assets and the L/R. The corollary is that the L/R had a fragile influence on Namibian banks' assets during the period under investigation. This result is confirmed by the value of the calculated t-statistic for L/R of -0.63, which is not significant. This result ascends at a p-value of 0.5275 which falls beyond the significance level of 0.05.

In Namibia, the potency of the leverage ratio is insignificant due to the different trends in financial innovation. Significant leverage is assumed through economic and embedded leverage, which is not recorded on the balance sheet in most of its banking institutions. Furthermore, a leverage ratio cannot be expected to do the job alone, as is the case in this economy. It needs to be complemented by other prudential tools to ensure a comprehensive picture of the built up of leverage in individual banks as well as the entire financial system. Additional measures to provide a complete picture of leverage, including embedded leverage, and to trigger enhanced surveillance by supervisors, need to be improved. This is the approach being used by the South African and Botswana monetary authorities to supplement the leverage ratio in the refinancing policy.

5.1.3 Hypothesis 3: Changes in bank debt, changes in credit including the interaction effects of these two variables are insignificant on GDP.

In this section, the technique of ANOVA is being used to analyze the effects of the explanatory variables of debt and credit on GDP. For each panel there are three sub- tables, as shown in Appendix B. The first one shows the method, followed by the table of analysis of variance and lastly the category statistics for variables debt, credit and debit and credit in that order. Like the approach used for the hypotheses above, 52 observations for variables GDP, debt and credit from 2000 to 2013 are employed for panel South Africa and 39 for the rest of the panels. Tables are grouped and presented in Appendix A, as A6, A7, A8, A9 and A10.

This test is being carried out at α=0.05 level. The critical value of F is F (0.05, 2, 55) =2.39. In South Africa the calculated *F-value* of 7.66 exceeds the critical value of 2.39. Besides, a p-value of 0.0001 is far below the 0.05 level of significance. In Namibia, Swaziland, Botswana and Lesotho the critical value of F is (F 0.05, 2, 41) =3.23. In contrast the calculated *F-value* for Namibia is 134.77, while that of Swaziland is identified as F = 38.13. Botswana and Lesotho also displays a calculated *F-value* of 169.86 and 19.79 respectively. It is perceptible that in all panels under investigation the calculated F-statistic exceeds the critical values at a probability level of 0.0000 which is below the 0.05 level of significance. Premised on these findings, this study cannot accept the null hypothesis that the population means equal zero. At this level of significance the conclusion for this study is that debt and credit and the interaction thereof had a significant effect on GDP in SACU.

CHAPTER 6: CONCLUSION

This section summarises, concludes, suggests policy recommendations and highlights some limitations encountered. The policy recommendations will give guidance as to what banks within the SACU bloc will need to do in order to maintain enough capital requirements. Limitations are also presented under this section.

6.1 Summary of findings

Results on the direction of causality on estimations conducted on all SACU panels, except for Namibia, showed that assets did not 'Granger cause' loans and that loans did not 'Granger cause' assets. Results for Namibia point to a bi-directional causality from assets to loans, and from loans to assets. Estimation on the supremacy of the L/R in South Africa, Botswana, Swaziland and Lesotho on bank assets was significant; nonetheless, this was not the case in Namibia. The existence of different accounting methods used in SACU made it difficult for this study to draw valid conclusions on the significant of the L/R and on the direction of causality of assets and loans. Moreover, asset treatment differed across most of SACU countries.

Monetary economists should also be cognisant that the leverage ratio uses short term liabilities in the numerator, yet investors rely on long term debt. This will lead to failure by the ratio to prove the correct financial position for banks. This is the reason why other banks are substituting total liabilities with long term debt when crunching numbers.

However, it was observed within SACU that the leverage ratio, if well used, can help indicate the degree of vulnerability when banks make large debts during a down turn. It is evident that, in some countries the central bank supplements the leverage ratio to influence the level of assets in the economy. Where such supplementary measures have been used it has worked positively to eliminate excess liquidity, thereby creating stability in the economy.

ANOVA showed that bank debt and credit had a momentous impact on GDP for the period under review in all panels under investigation. It is evident that the problem for banks does not lie in borrowing per se. Rather, the problem lies in the use of debt, especially once it becomes excessive, with interest taking a huge chunk out of banking income, the bank will have less income to fund other important customer obligations.

The outcome on the significance of the leverage ratio in this study is synonymous with the results of Wasiuzzaman and Tarrmizi (2011:14) in a study on the impact of the leverage ratio on Islamic banks in Malaysia. Using OLS technique they were able to conclude that the leverage ratio was significant on bank profitability, capital and asset quality. In SACU the leverage ratio was found to be significant on determining bank assets.

Naidu (2011:86)'s findings on the impact of debt and credit on GDP, were also similar to the findings of this study. In that study it was concluded that the growth in debt increased the cost of servicing that debt which was detrimental to the economic growth of a country and the banks. The same conclusion was reached by Cecchetti, et.al, (2011:1). They found out that beyond a certain level debt is a drag on GDP. This study using the technique of ANOVA also came to the conclusion that debt and credit, including their interaction effects, have a negative impact on GDP.

6.2 Implications of the findings

The findings on causality between assets and loans acquaint monetary economists with knowledge that, not all relationships are causal in this sector of the economy. Any results from investigations directed towards causality between financial variables cannot be completely the result of one or two variables directly impacting on each other's, rather other unidentified factors in the banking industry could be responsible. Therefore, a multifaceted approach is required when pondering on the causality between variables in the banking industry.

The choice of the sampling period had a bearing on the direction of causality between loans and assets. A long sampling period could have contributed to hiding the direction of causality in some panels and the lag value used by this study could also have influenced the direction of causality.

The repurchase and refinance framework as applied by South Africa and Botswana have helped in curtailing banks from generating unwarranted assets or loans. The refinancing frame work has been used as a supplementary tool to the leverage ratio. This has worked positively as the South Africa and Botswana economies have managed to weather much of the crisis that is associated with financial markets. The implication here is that the leverage ratio should be used with other banking measures, for it to be effective.

The variation in results for different panels in the leverage ratio might have been because of the problem of data quality checks undertaken by some banks within SACU. Some banks such as African Development bank and Capitec bank are unsure about the application of the cash reserve requirement treatment, for instance the manner in which derivative exposure, cash collateral and Securities Financing Transactions are reported is not in tandem with current Basel III prescriptions.

This study will further claim that in some instances regulation has a bearing on the way the leverage ratio is being applied by banks. A case in point is the South African Regulation 38 (17). It stipulates that a bank shall manage its business at a leverage ratio that is less than 4 percent. This ratio will be determined by the Registrar in consultation with the Governor of the Reserve Bank and it shall in no case be less than 3 percent. The Financial Mail, July 2013 deems that such a regulation led Nedbank to have the highest leverage ratio of 8.5 percent followed by ABSA at 8 percent with Standard bank at 7, 1 percent and FirstRand at 7 percent. Such ambiguity in the right level of calibration of the leverage ratio is likely to leave banks in a situation of uncertainty and panic on the levels of asset holdings and the leverage ratio to use rendering its use irrelevant.

What is also clear in the case above is that the relaxation by the Basel Committee on Banking Supervision of some of its controversial leverage rules in Basel III has begun to encourage banks to increase lending. There is no transparency on how banks in SACU are coming up with their risk inputs. A case in point is that of African Development Bank and Capitec bank of South Africa. Unsecured lending was extended to Capitec Bank by African Development Bank and this later caused operational and systemic risk on the balance sheet of the African Development Bank. This variability or data manipulation, implies banks in SACU are ending up with very different levels of capital which are not ample to help them sustain unexpected loses.

This study is of the opinion that the placement of the African Development Bank under curatorship by the South African Reserve Bank on August 10, 2014 and the subsequent downgrading of Standard bank; FNB, Nedbank, ABSA and Capitec bank by Moody's Rating Agency is evidence enough to manifest the weaknesses in the understanding of the implementation of the leverage ratio and other capital based rules in SACU. The implication is that there is need to come up with a common benchmark for application of the leverage ratio if it is to be helpful globally. This study, will therefore, maintain that as long as there is no harmonization on accounting methods on the implementation of the current prescriptions of the Basel regime it will remain impossible to evaluate the efficacy of these rules across the globe.

The ratio of a country's debt to its Gross Domestic Product (GDP) indicates a country's ability to pay back its debt. The higher the debt to GDP ratio, the less likely the country will pay its debt back and the higher its risk of default. Findings from ANOVA show rising debt accumulation by SACU members, such as Swaziland, South Africa and Lesotho. This is the reason why there is a downward trend in the economic growth of these SACU member countries. The implication drawn from this study is that the formula driven approach could be the panacea to cyclicality because a formula can be worked out on the acceptable levels of debt and credit for a country so as to avoid business cycles that are currently experienced in SACU due to ignorance on the right method to use on issues of debt management.

6.3 Limitations encountered in this study

This study was constrained in that banks in SACU used different leverage ratios, as such this compromised comparison of results. Most SACU countries also use different monetary policy approaches to the treatment of assets levels in their economies in an attempt to eliminate excess liquidity. That variation in policy approach had a bearing on arriving at the correct conclusion on the direction of causation between loans and assets.

6.4 (a) Recommendations on how to maintain Capital Adequacy for SACU Banks

SACU banking authorities need to maintain the correct match between assets and liabilities of the bank because any source of mismatch between these two variables will lead to insolvency by a bank leading to a ban run.

Central banks of SACU should tighten bank regulation and supervision to avoid banks from undertaking excessive risk transactions which is a major cause of capital inadequacy in most SACU banks. All financial operations entail risks. Managing them well is critical for banking authorities. The basis of efficient risk management and a good risk adjusted return is pivotal to generate enough cash that will sustain the bank into the future.

SACU banks need to be well capitalised. Cost benefit analysis should be used as a formula to determine capital adequacy levels. However, regulators should select a capital level that is flexible enough to allow the mean or modal behaviour of regulated banks, and only outliers at the low end. This approach will impose zero costs on most banks and require a change of behaviour only in the weakest banks, which must either raise capital or liquidate.

It should however be noted that maintaining Capital Adequacy has its limitations. One of this is the loss of profit potential that a bank institution suffers by complying with capital regulations. This probably explains why most SACU banking executives are reluctant to implement some of these requirements.

Tier 2 Capital-which is mainly debt can be costly to banks because, authorities cannot cut interest rate obligations, compared to tier 1 Capital- which is mainly equity. Under tier 1 Capital banks can cut dividends when cash is needed. Trading in derivatives will be done in organised exchanges or will require a full financial back-up of transactions. The introduction of the leverage ratio implies a corresponding capital ratio. Without the leverage ratio it is feasible for banks to hold a small amount of capital versus the unweighted balance sheet.

(b) Recommendations for further research

Having assessed the above findings and their possible explanations this study will conclude that the current Basel III banking standards have loopholes and if not rectified, the current problems will perpetuate into the future, like her predecessors. Based on the above conclusion, this study would like to make the following recommendations to be included in the following Basel IV banking standards, now that the current Basel III standards are flawed:

- Basel authorities need to consult widely from all banking jurisdictions of the globe, so that the standards will adequately capture different characteristics and regulations of an average bank in the world. Currently the standards are perceived as skewed in favour of the West and not in favour of the world.

- There is need to identify the type of assets to be considered when dealing with bank risks. It has been apparent throughout this investigation that categorization on asset quality has been a major problem in capturing quality data for banks in SACU. The impact of asset quality and value need to be studied because changes in asset quality and value can wipe out bank capital. For example, if short term liabilities are used to fund longer term assets, and should there be a failure to roll over short term financial paper or a deposit run occurs, banks will de-leverage and asset sales will result as the bank desperately source for funding to meet long term liabilities. This will negatively impact on bank capital within SACU.

- The capital levels for an average bank need to be investigated because right now different capital levels are being used across SACU. If Basel III standards are to be effective, it should be possible to come up with common capital levels that will allow smooth trading and comparison to occur around the world.

- Unsecured lending has recently been practiced within SACU and led to downgrading of South Africa's four major banks by Moody's Ratings Agency. There is need to re-look into the laws of the role of the central bank, especially what and how to supervise on lending by banks.

The corollary is for researchers' in monetary economics to be wary of the structure of the leverage ratio when interpreting financial results of banking institutions. In other words, can short term numerator values used to make long term investment decisions? This study concurs with previous researchers that the leverage ratio is improperly calibrated and there is need to come up with a correct calibration of it.

High debt to GDP ratio makes it difficult for a country to pay its debt and causes it to default, causing a panic in the domestic and international markets. Monetary economists should help their governments strive to have low debt to GDP ratios. It is debt to GDP that measures the financial leverage of an economy. A low debt to GDP ratio indicates an economy that produces and sells goods and services sufficient to pay back debts without incurring further debt.

A country can achieve external debt sustainability if it can meet its present and future external debt service obligations in full, without resorting to debt rescheduling or the accumulation of arrears and without compromising growth. This is achievable if net present value of external debt is brought down below values of exports. Given the volatility of GDP during business cycles, this study would recommend for the adoption of the formula based method for addressing cyclicality, rather than the discretionary based method. This is because debt and credit levels need to be ascertained and quantified and matched with GDP.

This study is significant in that it is based on SACU. It attempts to test the authenticity of the assertion that the new Basel III banking standards are not relevant to other parts of the world, including SACU. In SACU, the leverage ratio was significant, especially when supplemented by other monetary measures. Economies of SACU have managed to weather effects of the business cycles through use of supplementary monetary measures to the leverage ratio. It has also been found that some banks are sceptical on the use of the liquidity requirements, because they do not know the right formula and the variables to use when compiling data for assessment of the leverage ratio and minimum capital adequacy requirements; hence this is rendering the credibility of the latest Basel III standards negatively. What is needed now and going forward is to come up with the right method for calibrating the leverage ratio and minimum capital levels.

This study concludes that the latest banking standards can be improved for the banking industry of SACU and other parts of the globe, to reflect on the realities of their economies. What is necessary for the future is for the monetary authorities of any given country to tailor make their own local settings to be in line with the current banking standards, and to enable comparisons to be made internationally. Other areas for further research include: category of assets that banks need to consider in order to have a globally acceptable leverage ratio. The numerator of the leverage ratio should not constitute short term liabilities; rather it should be in line with investor's interest. Furthermore, the current level of 3 per cent for the leverage ratio needs review, since it is viewed as too low.

APPENDIX

Table A1 Results of the OLS estimates for South African banks assets.

Dependent Variable: Assets

Variable	Coefficient	Standard Error	t-statistic	Probability
**L/R	49132.43	9585.172	5.125878	0.0000
C	-2184.889	108679.5	-0.020104	0.9840
R-squared	0.327309			
Adjusted R-squared	0.314852			
Prob(F-stat)	0.00004			
S.E. of regression	187175.0			
DW	0.241995			

ANALYSIS: By author

* Where L / R and assets are statistically independent, the correlation coefficient between them will be zero; however,

 Zero correlation does not imply independence.

*α=righttailarea0.05,df=55,thet-valueis2.0.

** L / R = Leverage ratio

Table A2 Results of the OLS estimates for Namibian bank assets

Dependent Variable: Assets

Variable	Coefficient	Standard Error	t-statistic	Probability
**L/R	-264690.7	9585.172	5.125878	0.5275
C	105388389	108679.5	-0.020104	0.0085
R-squared	0.010057			
Adjusted R-squared	-0.014692			
Prob(F-stat)	0.527458			
S.E. of regression	6102970			
DW	0.230991			

ANALYSIS: By author

* Where L / R and assets are statistically independent, the correlation coefficient between them will be zero; however,

 Zero correlation does not imply independence.

*α=righttailarea0.05,df=55,thet-valueis2.0.

** L / R = Leverage ratio

Table A3 Results of the OLS estimates for Botswana banks assets

Dependent Variable: Assets

Variable	Coefficient	Standard Error	t-statistic	Probability
**L/R	802161.0	333020.8	2.408741	0.0207
C	-511095.0	3404666	-0.150116	0.8814
R-squared	0.126676			
Adjusted R-squared	0.104843			
Prob(F-stat)	0.020705			
S.E of regression	4603763			
DW	0.197085			

ANALYSIS: By author

* Where L / R and assets are statistically independent, the correlation coefficient between them will be zero; however,

Zero correlation does not imply independence.

*α=righttailarea0.05,df=55,thet-valueis2.0.

** L / R = Leverage ratio

Table A4 Results of the OLS estimates for Swaziland banks assets

Dependent Variable: Assets

Variable	Coefficient	Standard Error	t-statistic	Probability
**L/R	826884.71	333020.8	2.408741	0.0000
C	-238869.0	3404666	-0.150116	0.0146
R-squared	0.667000			
Adjusted R-squared	0.658675			
Prob(F-stat)	0.000000			
S.E of regression	6.17E+11			
DW	0.248902			

ANALYSIS: By author

* Where L / R and assets are statistically independent, the correlation coefficient between them will be zero; however,

Zero correlation does not imply independence.

*α=righttailarea0.05,df=55,thet-valueis2.0.

** L / R = Leverage ratio

Table A5 Results of the OLS estimates for Lesotho banks assets

Dependent Variable: Assets

Variable	Coefficient	Standard Error	t-statistic	Probability
**L/R	137158.5	16820.03	8.154472	0.0000
C	-578602.2	155268.6	-3.726461	0.0006
R-squared	0.624397			
Adjusted R-squared	0.615007			
Prob(F-stat)	0.000000			
S.E of regression	238090.9			
DW	0.497759			

ANALYSIS: By author

* Where L / R and assets are statistically independent, the correlation coefficient between them will be zero; however,

 Zero correlation does not imply independence.

*α=righttailarea0.05,df=55,thet-valueis2.0.

** L / R = Leverage ratio

Table A6 ANOVA results of the debt and credit for South Africa (2000-2013).

Dependent Variable GDP

Method	Df	value	Probability
Anova F-test	(3.220)	7.656725	0.0001
Welsh F-test*	(3.106.536)	113.6599	0.0000

*Test allows for unequal cell variances

e.g. ''Analysis of variance''

Source of variation	Df	Sum of Sq.	Mean Sq.
Between	3	1.84E+19	6.12E+18
Within	220	1.76E+20	8.00E+17
Total	223	1.94E+20	8.71E+17

''Category Statistics''

Variable	Count	Mean	Std.Dev.	Std Err of Mean
GDP	56	1357008	360574.5	48183.79
DEBT-INSRUMENT	56	211837.7	618339.1	82629.03
CREDIT DEBT-	56	388700.7	1881104.4	25137.31
CREDIT	56	6.62E+08	1.79E+09	2.39E+08
ALL	224	1.66E+08	9.33E+08	62367092

ANALYSIS: By author

*Data and example calculations for a two- way ANOVA design to examine main and interactive effects of debt and credit .*Each cell
is a combination of factor levels i and j , and contains r=2 observations or replications.

GDP= Gross Domestic Product; DEBT-INSTR=Debt Instrument

BANKS: (FNB; STANDARD BANK ABSA AND NEDBANK)

Table A7 ANOVA results of the debt and credit for Namibia (2000-2013).

 Dependent variable GDP

Method	Df	value	Probability
Anova F-test	(3.164)	134.7793	0.0000
Welsh F-test[*]	(3.68.3333)	114.6714	0.0000

*Test allows for unequal cell variances **e.g. ''Analysis of variance''**			

Source of variation	Df	Sum of Sq.	Mean Sq.
Between	3	1.32E+15	4.40E+14
Within	164	5.36E+14	3.27E+12
Total	167	1.86E+15	

''Category Statistics''				
Variable	Count	Mean	Std.Dev.	Std Err of Mean
GDP	42	39726.36	18174.27	2804.350
DEBT-INSRUMENT	42	135591.8	251107.3	38746.70
CREDIT DEBT-	42	6532371	3605721	556374.8
CREDIT	42	4.291029	2.501668	0.386016
ALL	168	1676923	3333982	257222.3

ANALYSIS: By author

 *Data and example calculations for a two- way ANOVA design to examine main and interactive effects of debt and credit .*Each cell

is a combination of factor levels i and j , and contains r=2 observations or replications.

GDP= Gross Domestic Product; DEBT-INSTR=Debt Instrument

BANKS: (FNB; STANDARD BANK ABSA AND NEDBANK)

Table A8 ANOVA results of the debt and credit for Botswana (2000-2013).

Dependent Variable GDP

Method	Df	value	Probability
Anova F-test	(3.164)	169.8674	0.0000
Welsh F-test[*]	(3.68.3333)	90.44979	0.0000

*Test allows for unequal cell variances
e.g. ''Analysis of variance''

Source of variation	Df	Sum of Sq.	Mean Sq.
Between	3	4.46E+21	1.49E+21
Within	164	1.43E+21	8.75E+18
Total	167	5.89E+21	3.53E+19

''Category Statistics''

Variable	Count	Mean	Std.Dev.	Std Err of Mean
GDP	42	1.19E+10	5.92E+09	9.13E+08
DEBT-INSRUMENT	42	266846.3	228768.3	35299.72
CREDIT DEBT-	42	2472655	2275184	351068.5
CREDIT	42	3.798908	2.598374	0.400938
ALL	168	2.97E+09	5.94E+09	4.58E+08

ANALYSIS: By author

*Data and example calculations for a two- way ANOVA design to examine main and interactive effects of debt and credit .*Each cell

is a combination of factor levels i and j , and contains r=2 observations or replications.

GDP= Gross Domestic Product; DEBT-INSTR=Debt Instrument

BANKS: (FNB; STANBIC BANK AND BARCLAYS).

Table A9 ANOVA results of the debt and credit for Lesotho (2000-2013).

Dependent Variable GDP

Method	Df	value	Probability
Anova F-test	(3.164)	19.78853	0.0000
Welsh F-test[*]	(3,68.3333)	98.57270	0.0000

*Test allows for unequal cell variances
e.g. ''Analysis of variance''

Source of variation	Df	Sum of Sq.	Mean Sq.
Between	3	5.01E+22	1.67E+22
Within	164	1.38E+23	8.43E+20
Total	167	1.88E+23	1.13E+21

''Category Statistics''

Variable	Count	Mean	Std.Dev.	Std Err of Mean
GDP	42	7841.998	2606.372	402.1720
DEBT-INSRUMENT	42	68613.52	76557.72	11813.11
DEBT-INSRUMENT	42	68613.52	76557.72	11813.11
CREDIT DEBT-	42	515875.6	206030.2	31791.14
CREDIT	42	3.99E+10	5.81E+10	8.96E+09
ALL	168	9.97E+09	9.97E+09	2.59E+09

ANALYSIS: By author

*Data and example calculations for a two- way ANOVA design to examine main and interactive effects of debt and credit .*Each cell is a combination of factor levels i and j , and contains r=2 observations or replications.

GDP= Gross Domestic Product; DEBT-INSTR=Debt Instrument;

BANKS: (FNB; STANDARD BANK AND ABSA)

Table A10 ANOVA results of the debt and credit for Swaziland (2000-2013).

Dependent Variable GDP

Method	Df	value	Probability
Anova F-test	(3.164)	38.13599	0.0000
Welsh F-test*	(3,77.1034)	2811.223	0.0000

*Test allows for unequal cell variances
e.g. ''Analysis of variance''

Source of variation	Df	Sum of Sq.	Mean Sq.
Between	3	2.26E+20	
Within	164	3.24E+20	
Total	167	5.49E+20	3.29E+18

''Category Statistics''

Variable	Count	Mean	Std.Dev.	Std Err of Mean
GDP	42	12167006	848537.1	130932.1
DEBT-INSRUMENT	42	39895.31	60319.20	9307.454
CREDIT DEBT-	42	148822.8	115722.2	17856.33
CREDIT	42	2.68E+09	2.81E+09	4.33E+08
ALL	168	6.73E+08	1.81E+09	1.40E+08

ANALYSIS: By author

*Data and example calculations for a two- way ANOVA designed to examine the main and interactive effects of debt and credit.*Each cell is a combination of factor levels i and j , and contains r=2 observations or replications.

GDP= Gross Domestic Product; DEBT-INSTR=Debt Instrument

BANKS: (FNB; STANDARD BANK AND ABSA)

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